

ter to put your bucket in the well than to turn on the Croton, if you wish to know what spring-water really is. If pedestrian travel could only be made fashionable, as it is in Europe, what a deal of prejudice and holiday-clothes parade might be spared us. Here in New England the mind of the masses is at the mercy of the artful demagogue, in spite of various ingenious ventilators made and provided, because in so many ways the masses are first persuaded what they ought to say and then taught to say it. I do not suppose that pedestrianism is a patent medicine for all local or district disorders ; but I do say that if you want to

know what a people is, you must travel among them, not be whisked through them. And if a young man wishes to lay in a good stock of health, a knowledge of his countrymen, and a fairer experience of men and things than he can get either in college or the counting-house, he had better take up knapsack and staff, and explore either those valleys just named, the recesses of the White Hills, the little-known and glorious nooks of the Ramapo, the Berkshire glens, or the backwoods of Maine, instead of trusting himself merely to impressions picked up in hotel bar-rooms at Saratoga, Niagara, Newport, or Sharon Springs.

THE BRICK MOON.

[From the Papers of Captain Frederic Ingham.]

I.

PREPARATION.

I HAVE no sort of objection now to telling the whole story. The subscribers, of course, have a right to know what became of their money. The astronomers may as well know all about it, before they announce any more asteroids with an enormous movement in declination. And experimenters on the longitude may as well know, so that they may act advisedly in attempting another brick moon or in refusing to do so.

It all began more than thirty years ago, when we were in college ; as most good things begin. We were studying in the book which has gray sides and a green back, and is called " Cambridge Astronomy " because it is translated from the French. We came across this business of the longitude, and, as we talked, in the gloom and glamour of the old south middle dining-hall, we had going the usual number of students' stories about rewards offered by the Board of Longitude for discoveries in that matter, — stories, all

of which, so far as I know, are lies. Like all boys, we had tried our hands at perpetual motion. For me, I was sure I could square the circle, if they would give me chalk enough. But as to this business of the longitude, it was reserved for Q. to make the happy hit and to explain it to the rest of us.

I wonder if I can explain it to an unlearned world, which has not studied the book with gray sides and a green cambric back. Let us try.

You know then, dear world, that when you look at the North Star, it always appears to you at just the same height above the horizon or what is between you and the horizon : say the Dwight School-house, or the houses in Concord Street ; or to me, just now, North College. You know also that, if you were to travel to the North Pole, the North Star would be just over your head. And, if you were to travel to the equator, it would be just on your horizon, if you could see it at all through the red, dusty, hazy mist in the north, — as you could not. If you were just half-way between pole and equator, on the line

between us and Canada, the North Star would be half-way up, or 45° from the horizon. So you would know there that you were 45° from the equator. Here in Boston, you would find it was $42^\circ 20'$ from the horizon. So you know here that you are $42^\circ 20'$ from the equator. At Seattle again you would find it was $47^\circ 40'$ high, so our friends at Seattle know that they are $47^\circ 40'$ from the equator. The latitude of a place, in other words, is found very easily by any observation which shows how high the North Star is; if you do not want to measure the North Star, you may take any star when it is just to north of you, and measure its height; wait twelve hours, and if you can find it, measure its height again. Split the difference, and that is the altitude of the pole, or the latitude of you, the observer.

"Of course, we know this," says the graduating world. "Do you suppose that is what we take the Atlantic for, to have you spell out your miserable elementary astronomy?" At which rebuff I should shrink distressed, but that a chorus of voices an octave higher comes up with, "Dear Mr. Ingham, we are ever so much obliged to you; we did not know it at all before, and you make it perfectly clear."

Thank you, my dear, and you, and you. We will not care what the others say. If you do understand it, or do know it, it is more than Mr. Charles Reade knew, or he would not have made his two lovers on the island guess at their latitude, as they did. If they had either of them been educated at a respectable academy for the Middle Classes, they would have fared better.

Now about the longitude.

The latitude, which you have found, measures your distance north or south from the equator or the pole. To find your longitude, you want to find your distance east or west from the meridian of Greenwich. Now if any one would build a good tall tower at Greenwich, straight into the sky, — say a hundred miles into the sky, — of course if you and I were east or west of it, and

could see it, we could tell how far east or west we were by measuring the apparent height of the tower above our horizon. If we could see so far, when the lantern with a Drummond's light, "ever so bright," on the very top of the tower, appeared to be on our horizon, we should know we were eight hundred and seventy-three miles away from it. The top of the tower would answer for us as the North Star does when we are measuring the latitude. If we were nearer, our horizon would make a longer angle with the line from the top to our place of vision. If we were farther away, we should need a higher tower.

But nobody will build any such tower at Greenwich, or elsewhere on that meridian, or on any meridian. You see that to be of use to the half the world nearest to it, it would have to be so high that the diameter of the world would seem nothing in proportion. And then, for the other half of the world you would have to erect another tower as high on the other side. It was this difficulty that made Q. suggest the expedient of the Brick Moon.

For you see that if, by good luck, there were a ring like Saturn's which stretched round the world, above Greenwich and the meridian of Greenwich, and if it would stay above Greenwich, turning with the world, any one who wanted to measure his longitude or distance from Greenwich would look out of window and see how high this ring was above his horizon. At Greenwich it would be over his head exactly. At New Orleans, which is quarter round the world from Greenwich, it would be just in his horizon. A little west of New Orleans you would begin to look for the other half of the ring on the west instead of the east; and if you went a little west of the Feejee Islands the ring would be over your head again. So if we only had a ring like that, not round the equator of the world, — as Saturn's ring is around Saturn, — but vertical to the plane of the equator, as the brass ring of an artificial globe goes, only far higher in proportion, —

“from that ring,” said Q., pensively, “we could calculate the longitude.”

Failing that, after various propositions, he suggested the Brick Moon. The plan was this : If from the surface of the earth, by a gigantic pea-shooter, you could shoot a pea upward from Greenwich, aimed northward as well as upward ; if you drove it so fast and far that when its power of ascent was exhausted, and it began to fall, it should clear the earth, and pass outside the North Pole ; if you had given it sufficient power to get it half round the earth without touching, that pea would clear the earth forever. It would continue to rotate above the North Pole, above the Feejee Island place, above the South Pole and Greenwich, forever, with the impulse with which it had first cleared our atmosphere and attraction. If only we could see that pea as it revolved in that convenient orbit, then we could measure the longitude from that, as soon as we knew how high the orbit was, as well as if it were the ring of Saturn.

“But a pea is so small !”

“Yes,” said Q., “but we must make a large pea.” Then we fell to work on plans for making the pea very large and very light. Large, — that it might be seen far away by storm-tossed navigators : light, — that it might be the easier blown four thousand and odd miles into the air ; lest it should fall on the heads of the Greenlanders or the Patagonians ; lest they should be injured and the world lose its new moon. But, of course, all this lath-and-plaster had to be given up. For the motion through the air would set fire to this moon just as it does to other aerolites, and all your lath-and-plaster would gather into a few white drops, which no Rosse telescope even could discern. “No !” said Q. bravely, “at the least it must be very substantial. It must stand fire well, very well. Iron will not answer. It must be brick ; we must have a Brick Moon !”

Then we had to calculate its size. You can see, on the old moon, an edifice two hundred feet long with any of the fine refractors of our day. But no

such refractors as those can be carried by the poor little fishermen whom we wanted to befriend, the bones of whose ships lie white on so many cliffs, their names unreported at any Lloyd’s or by any Ross, — themselves the owners, and their sons the crew. On the other hand, we did not want our moon two hundred and fifty thousand miles away, as the old moon is, which I will call the Thornbush moon, for distinction. We did not care how near it was, indeed, if it were only far enough away to be seen, in practice, from almost the whole world. There must be a little strip where they could not see it from the surface, unless we threw it infinitely high. “But they need not look from the surface,” said Q. ; “they might climb to the mast-head. And if they did not see it at all, they would know that they were ninety degrees from the meridian.”

This difficulty about what we call “the strip,” however, led to an improvement in the plan, which made it better in every way. It was clear that even if “the strip” were quite wide, the moon would have to be a good way off, and, in proportion, hard to see. If, however, we would satisfy ourselves with a moon four thousand miles away, *that* could be seen on the earth’s surface for three or four thousand miles on each side ; and twice three thousand, or six thousand, is one fourth of the largest circumference of the earth. We did not dare have it nearer than four thousand miles, since even at that distance it would be eclipsed three hours out of every night ; and we wanted it bright and distinct, and not of that lurid, copper, eclipse color. But at four thousand miles’ distance the moon could be seen by a belt of observers six or eight thousand miles in diameter. “Start, then, two moons,” — this was my contribution to the plan. “Suppose one over the meridian of Greenwich, and the other over that of New Orleans. Take care that there is a little difference in the radii of their orbits, lest they ‘collide’ some foul day. Then, in most places, one or other, perhaps

two, will come in sight. So much the less risk of clouds: and everywhere there may be one, except when it is cloudy. Neither need be more than four thousand miles off; so much the larger and more beautiful will they be. If on the old Thornbush moon old Herschel with his reflector could see a town-house two hundred feet long, on the Brick Moon young Herschel will be able to see a dab of mortar a foot and a half long, if he wants to. And people without the reflector, with their opera-glasses, will be able to see sufficiently well." And to this they agreed: that eventually there must be two Brick Moons. Indeed it were better that there should be four, as each must be below the horizon half the time. That is only as many as Jupiter has. But it was also agreed that we might begin with one.

Why we settled on two hundred feet of diameter I hardly know. I think it was from the statement of dear John Farrar's about the impossibility of there being a state house two hundred feet long not yet discovered, on the sunny side of old Thornbush. That, somehow, made two hundred our fixed point. Besides, a moon of two hundred feet diameter did not seem quite unmanageable. Yet it was evident that a smaller moon would be of no use, unless we meant to have them near the world, when there would be so many that they would be confusing, and eclipsed most of the time. And four thousand miles is a good way off to see a moon even two hundred feet in diameter.

Small though we made them on paper, these two-hundred-foot moons were still too much for us. Of course we meant to build them hollow. But even hollow there must be some thickness, and the quantity of brick would at best be enormous. Then, to get them up! The pea-shooter, of course, was only an illustration. It was long after that time, that Rodman and other guns sent iron balls five or six miles in distance, — say two miles, more or less, in height.

Iron is much heavier than hollow

brick, but you can build no gun with a bore of two hundred feet now, — far less could you then. No. Q. again suggested the method of shooting off the moon. It was not to be by any of your sudden explosions. It was to be done as all great things are done, — by the gradual and silent accumulation of power. You all know that a fly-wheel — heavy, very heavy on the circumference, light, very light within it — was made to save up power, from the time when it was produced to the time when it was wanted. Yes? Then, before we began even to build the moon, before we even began to make the brick, we would build two gigantic fly-wheels, the diameter of each should be "ever so great," the circumference heavy beyond all precedent, and thundering strong, so that no temptation might burst it. They should revolve, their edges nearly touching, in opposite directions, for years, if it were necessary, to accumulate power, driven by some waterfall now wasted to the world. One should be a little heavier than the other. When the Brick Moon was finished, and all was ready, it should be gently rolled down a gigantic groove provided for it, till it lighted on the edge of both wheels at the same instant. Of course it would not rest there, not the ten-thousandth part of a second. It would be snapped upwards, as a drop of water from a grindstone. Upward and upward; but the heavier wheel would have deflected it a little from the vertical. Upward and northward it would rise, therefore, till it had passed the axis of the world. It would, of course, feel the world's attraction all the time, which would bend its flight gently, but still it would leave the world more and more behind. Upward still, but now southward, till it had traversed more than one hundred and eighty degrees of a circle. Little resistance, indeed, after it had cleared the forty or fifty miles of visible atmosphere. "Now let it fall," said Q., inspired with the vision. "Let it fall, and the sooner the better! The curve it is now on will forever clear the world;

and over the meridian of that lonely waterfall,—if only we have rightly adjusted the gigantic flies,—will forever revolve, in its obedient orbit, the Brick Moon, the blessing of all seamen,—as constant in all change as its older sister has been fickle, and the second cynosure of all lovers upon the waves, and of all girls left behind them.” “Amen,” we cried, and then we sat in silence till the clock struck ten; then shook each other gravely by the hand, and left the hall.

Of waterfalls there were plenty that we knew.

Fly-wheels could be built of oak and pine, and hooped with iron. Fly-wheels did not discourage us.

But brick? One brick is, say, sixty-four cubic inches only. This moon,—though we made it hollow,—see,—it must take twelve million brick.

The brick alone will cost sixty thousand dollars!

II.

The brick alone would cost sixty thousand dollars. There the scheme of the Brick Moon hung, an airy vision, for seventeen years,—the years that changed us from young men into men. The brick alone, sixty thousand dollars! For, to boys who have still left a few of their college bills unpaid, who cannot think of buying that lovely little Elzevir which Smith has for sale at auction, of which Smith does not dream of the value, sixty thousand dollars seems as intangible as sixty million sestertia. Clarke, second, how much are sixty million sestertia stated in cowries? How much in currency, gold being at $1.37\frac{1}{4}$? Right; go up. Stop, I forget myself!

So, to resume, the project of the Brick Moon hung in the ideal, an airy vision, a vision as lovely and as distant as the Brick Moon itself, at this calm moment of midnight when I write, as it poises itself over the shoulder of Orion, in my southern horizon. Stop! I anticipate. Let me keep—as we say in Beadle's Dime Series—to the even current of my story.

Seventeen years passed by. We were no longer boys, though we felt so. For myself, to this hour, I never enter board meeting, committee meeting, or synod, without the queer question, What would happen should any one discover that this bearded man was only a big boy disguised? that the frock-coat and the round hat are none of mine, and that, if I should be spurned from the assembly as an interloper, a judicious public, learning all the facts, would give a verdict, “Served him right.” This consideration helps me through many bored meetings which would be else so dismal. What did my old copy say? “Boards are made of wood, they are long and narrow.” But we do not get on!

Seventeen years after, I say, or should have said, dear Orcutt entered my room at Naguadavick again. I had not seen him since the Commencement day when we parted at Cambridge. He looked the same, and yet not the same. His smile was the same, his voice, his tender look of sympathy when I spoke to him of a great sorrow, his childlike love of fun. His waistband was different, his pantaloons were different, his smooth chin was buried in a full beard, and he weighed two hundred pounds if he weighed a gramme. O, the good time we had, so like the times of old! Those were happy days for me in Naguadavick. At that moment my double was at work for me at a meeting of the publishing committee of the Sandemanian Review, so I called Orcutt up to my own snugery, and we talked over old times; talked till tea was ready. Polly came up through the orchard and made tea for us herself there. We talked on and on, till nine, ten at night, and then it was that dear Orcutt asked me if I remembered the Brick Moon. Remember it? of course I did. And without leaving my chair, I opened the drawer of my writing-desk, and handed him a portfolio full of working-drawings on which I had engaged myself for my “third” * all that winter.

* “Every man,” says Dr. Peabody, “should have a vocation and an avocation.” To which I add, “A third.”

Orcutt was delighted. He turned them over hastily but intelligently, and said: "I am so glad. I could not think you had forgotten. And I have seen Brannan, and Brannan has not forgotten." "Now do you know," said he, "in all this railroading of mine, I have not forgotten. I have learned many things that will help. When I built the great tunnel for the Cattawissa and Opelousas, by which we got rid of the old inclined planes, there was never a stone bigger than a peach-stone within two hundred miles of us. I baked the brick of that tunnel on the line with my own kilns. Ingham, I have made more brick, I believe, than any man living in the world!"

"You are the providential man," said I.

"Am I not, Fred? More than that," said he; "I have succeeded in things the world counts worth more than brick. I have made brick, and I have made money!"

"One of us make money?" asked I, amazed.

"Even so," said dear Orcutt; "one of us has made money." And he proceeded to tell me how. It was not in building tunnels, nor in making brick. No! It was by buying up the original stock of the Cattawissa and Opelousas, at a moment when that stock had hardly a nominal price in the market. There were the first mortgage bonds, and the second mortgage bonds, and the third, and I know not how much floating debt; and, worse than all, the reputation of the road lost, and deservedly lost. Every locomotive it had was asthmatic. Every car it had bore the marks of unprecedented accidents, for which no one was to blame. Rival lines, I know not how many, were cutting each other's throats for its legitimate business. At this juncture, dear George invested all his earnings as a contractor, in the despised original stock, — he actually bought it for $3\frac{1}{4}$ per cent, — good shares that had cost a round hundred to every wretch who had subscribed. Six thousand eight hundred dollars — every cent he had — did

George thus invest. Then he went himself to the trustees of the first mortgage, to the trustees of the second, and to the trustees of the third, and told them what he had done.

Now it is personal presence that moves the world. Dear Orcutt has found that out since, if he did not know it before. The trustees who would have sniffed had George written to them, turned round from their desks, and begged him to take a chair, when he came to talk with them. Had he put every penny he was worth into that stock? Then it was worth something which they did not know of, for George Orcutt was no fool about railroads. The man who bridged the Lower Rapidan when a freshet was running was no fool.

"What were his plans?"

George did not tell, — no, not to lordly trustees, — what his plans were. He had plans, but he kept them to himself. All he told them was that he had plans. On those plans he had staked his all. Now would they or would they not agree to put him in charge of the running of that road, for twelve months, on a nominal salary. The superintendent they had had was a rascal. He had proved that by running away. They knew George was not a rascal. He knew that he could make this road pay expenses, pay bondholders, and pay a dividend, — a thing no one else had dreamed of for twenty years. Could they do better than try him?

Of course they could not, and they knew they could not. Of course, they sniffed and talked, and waited, and pretended they did not know, and that they must consult, and so forth and so on. But of course they all did try him, on his own terms. He was put in charge of the running of that road.

In one week he showed he should redeem it. In three months he did redeem it!

He advertised boldly the first day: "*Infant children at treble price.*"

The novelty attracted instant remark. And it showed many things. First, it showed he was a humane man, who wished to save human life. He would

leave these innocents in their cradles, where they belonged.

Second, and chiefly, the world of travellers saw that the Crichton, the Amadis, the perfect chevalier of the future, had arisen, — a railroad manager caring for the comfort of his passengers!

The first week the number of the C. and O.'s passengers was doubled: in a week or two more, freight began to come in, in driblets, on the line which its owners had gone over. As soon as the shops could turn them out, some cars were put on, with arms on which travellers could rest their elbows, with head-rests where they could take naps if they were weary. These excited so much curiosity that one was exhibited in the museum at Cattawissa and another at Opelousas. It may not be generally known that the received car of the American roads was devised to secure a premium offered by the Pawtucket and Podunk Company. Their receipts were growing so large that they feared they should forfeit their charter. They advertised therefore for a car in which no man could sleep at night or rest by day, — in which the backs should be straight, the heads of passengers unsupported, the feet entangled in a vice, the elbows always knocked by the passing conductor. The pattern was produced which immediately came into use on all the American roads. But on the Cattawissa and Opelousas this time-honored pattern was set aside.

Of course you see the result. Men went hundreds of miles out of their way to ride on the C. and O. The third mortgage was paid off; a reserve fund was piled up for the second; the trustees of the first lived in dread of being paid; and George's stock, which he bought at $3\frac{1}{4}$, rose to 147 before two years had gone by! So was it that, as we sat together in the snugger, George was worth wellnigh three hundred thousand dollars. Some of his eggs were in the basket where they were laid; some he had taken out and placed in other baskets; some in nests where various hens were brooding over them. Sound eggs they were, wherever

placed; and such was the victory of which George had come to tell.

One of us had made money!

On his way he had seen Brannan. Brannan, the pure-minded, right-minded, shifty man of tact, man of brain, man of heart, and man of word, who held New Altona in the hollow of his hand. Brannan had made no money. Not he, nor ever will. But Brannan could do much what he pleased in this world, without money. For whenever Brannan studied the rights and the wrongs of any enterprise, all men knew that what Brannan decided about it was wellnigh the eternal truth; and therefore all men of sense were accustomed to place great confidence in his prophecies. But, more than this, and better, Brannan was an unconscious dog, who believed in the people. So, when he knew what was the right and what was the wrong, he could stand up before two or three thousand people and tell them what was right and what was wrong, and tell them with the same simplicity and freshness with which he would talk to little Horace on his knee. Of the thousands who heard him there would not be one in a hundred who knew that this was eloquence. They were fain to say, as they sat in their shops, talking, that Brannan was not eloquent. Nay, they went so far as to regret that Brannan was not eloquent! If he were only as eloquent as Carker was or as Barker was, how excellent he would be! But when, a month after, it was necessary for them to do anything about the thing he had been speaking of, they did what Brannan had told them to do; forgetting, most likely, that he had ever told them, and fancying that these were their own ideas, which, in fact, had, from his liquid, ponderous, transparent, and invisible common sense, distilled unconsciously into their being. I wonder whether Brannan ever knew that he was eloquent. What I knew, and what dear George knew, was, that he was one of the leaders of men!

Courage, my friends, we are steadily advancing to the Brick Moon!

For George had stopped, and seen Brannan; and Brannan had not forgotten. Seventeen years Brannan had remembered, and not a ship had been lost on a lee-shore because her longitude was wrong, — not a baby had wailed its last as it was ground between wrecked spar and cruel rock, — not a swollen corpse unknown had been flung up upon the sand, and been buried with a nameless epitaph, — but Brannan had recollected the Brick Moon, and had, in the memory-chamber which rejected nothing, stored away the story of the horror. And now, George was ready to consecrate a round hundred thousand to the building of the Moon; and Brannan was ready in the thousand ways in which wise men move the people to and fro, to persuade them to give to us a hundred thousand more; and George had come to ask me if I were not ready to undertake with them the final great effort, of which our old calculations were the embryo. For this I was now to contribute the mathematical certainty and the lore borrowed from naval science, which should blossom and bear fruit, when the Brick Moon was snapped like a cherry from the ways on which it was built, was launched into the air by power gathered from a thousand freshets, and, poised at last in its own pre-calculated region of the ether, should begin its course of eternal blessings in one unchanging meridian!

Vision of Beneficence and Wonder!
Of course I consented.

O, that you were not so eager for the end! O, that I might tell you, what now you will never know, — of the great campaign which we then and there inaugurated! How the horrible loss of the Royal Martyr, whose longitude was three degrees awry, startled the whole world, and gave us a point to start from. How I explained to George that he must not subscribe the one hundred thousand dollars in a moment. It must come in bits, when "the cause" needed a stimulus, or the public needed encouragement. How we caught neophyte editors, and explained to them

enough to make them think the Moon was wellnigh their own invention and their own thunder. How, beginning in Boston, we sent round to all the men of science, all those of philanthropy, and all those of commerce, three thousand circulars, inviting them to a private meeting at George's parlors at the Revere. How, besides ourselves, and some nice, respectable-looking old gentlemen Brannan had brought over from Podunk with him, paying their fares both ways, there were present only three men, — all adventurers whose projects had failed, — besides the representatives of the press. How, of these representatives, some understood the whole, and some understood nothing. How, the next day, all gave us "first-rate notices." How, a few days after, in the lower Horticultural Hall, we had our first public meeting. How Haliburton brought us fifty people who loved him, — his Bible class, most of them, — to help fill up; how, besides these, there were not three persons whom we had not asked personally, or one who could invent an excuse to stay away. How we had hung the walls with intelligible and unintelligible diagrams. How I opened the meeting. Of that meeting, indeed, I must tell something.

First, I spoke. I did not pretend to unfold the scheme. I did not attempt any rhetoric. But I did not make any apologies. I told them simply of the dangers of lee-shores. I told them when they were most dangerous, — when seamen came upon them unawares. I explained to them that, though the costly chronometer, frequently adjusted, made a delusive guide to the voyager who often made a harbor, still the adjustment was treacherous, the instrument beyond the use of the poor, and that, once astray, its error increased forever. I said that we believed we had a method which, if the means were supplied for the experiment, would give the humblest fisherman the very certainty of sunrise and of sunset in his calculations of his place upon the world. And I said that whenever a man knew his place in this world, it

was always likely all would go well. Then I sat down.

Then dear George spoke, — simply, but very briefly. He said he was a stranger to the Boston people, and that those who knew him at all knew he was not a talking man. He was a civil engineer, and his business was to calculate and to build, and not to talk. But he had come here to say that he had studied this new plan for the longitude from the Top to the Bottom, and that he believed in it through and through. There was his opinion, if that was worth anything to anybody. If that meeting resolved to go forward with the enterprise, or if anybody proposed to, he should offer his services in any capacity, and without any pay, for its success. If he might only work as a bricklayer, he would work as a bricklayer. For he believed, on his soul, that the success of this enterprise promised more for mankind than any enterprise which was ever likely to call for the devotion of his life. “And to the good of mankind,” he said, very simply, “my life is devoted.” Then he sat down.

Then Brannan got up. Up to this time, excepting that George had dropped this hint about bricklaying, nobody had said a word about the Moon, far less hinted what it was to be made of. So Ben had the whole to open. He did it as if he had been talking to a bright boy of ten years old. He made those people think that he respected them as his equals. But in fact, he chose every word, as if not one of them knew anything. He explained, as if it were rather more simple to explain than to take for granted. But he explained as if, were they talking, they might be explaining to him. He led them from point to point, — oh! so much more clearly than I have been leading you, — till, as their mouths dropped a little open in their eager interest, and their lids forgot to wink in their gaze upon his face, and so their eyebrows seemed a little lifted in curiosity, — till, I say, each man felt as if he were himself the inventor, who had bridged difficulty

after difficulty; as if, indeed, the whole were too simple to be called difficult or complicated. The only wonder was that the Board of Longitude, or the Emperor Napoleon, or the Smithsonian, or somebody, had not sent this little planet on its voyage of blessing long before. Not a syllable that you would have called rhetoric, not a word that you would have thought prepared; and then Brannan sat down.

That was Ben Brannan's way. For my part, I like it better than eloquence.

Then I got up again. We would answer any questions, I said. We represented people who were eager to go forward with this work. (Alas! except Q., all of those represented were on the stage.) We could not go forward without the general assistance of the community. It was not an enterprise which the government could be asked to favor. It was not an enterprise which would yield one penny of profit to any human being. We had therefore, purely on the ground of its benefit to mankind, brought it before an assembly of Boston men and women.

Then there was a pause, and we could hear our watches tick, and our hearts beat. Dear George asked me in a whisper if he should say anything more, but I thought not. The pause became painful, and then Tom Coram, prince of merchants, rose. Had any calculation been made of the probable cost of the experiment of one moon?

I said the calculations were on the table. The brick alone would cost \$60,000. Mr. Orcutt had computed that \$214,729 would complete two fly-wheels and one moon. This made no allowance for whitewashing the moon, which was not strictly necessary. The fly-wheels and water-power would be equally valuable for the succeeding moons, if any were attempted, and therefore the second moon could be turned off, it was hoped, for \$159,732.

Thomas Coram had been standing all the time I spoke, and in an instant he said: “I am no mathematician. But I have had a ship ground to pieces under me on the Laccadives because our

chronometer was wrong. You need \$250,000 to build your first moon. I will be one of twenty men to furnish the money; or I will pay \$10,000 tomorrow for this purpose, to any person who may be named as treasurer, to be repaid to me if the moon is not finished this day twenty years."

That was as long a speech as Tom Coram ever made. But it was pointed. The small audience tapped applause.

Orcutt looked at me, and I nodded. "I will be another of the twenty men," cried he. "And I another," said an old bluff Englishman, whom nobody had invited; who proved to be a Mr. Robert Boll, a Sheffield man, who came in from curiosity. He stopped after the meeting; said he should leave the country the next week, and I have never seen him since. But his bill of exchange came all the same.

That was all the public subscribing. Enough more than we had hoped for. We tried to make Coram treasurer, but he refused. We had to make Haliburton treasurer, though we should have liked a man better known than he then was. Then we adjourned. Some nice ladies then came up, and gave, one a dollar, and one five dollars, and one fifty, and so on,—and some men who have stuck by ever since. I always, in my own mind, call each of those women Damaris, and each of those men Dionysius. But those are not their real names.

How I am wasting time on an old story! Then some of these ladies came the next day and proposed a fair; and out of that, six months after, grew the great Longitude Fair, that you will all

remember, if you went to it, I am sure. And the papers the next day gave us first-rate reports; and then, two by two, with our subscription-books, we went at it. But I must not tell the details of that subscription. There were two or three men who subscribed \$5,000 each, because they were perfectly certain the amount would never be raised. They wanted, for once, to get the credit of liberality for nothing. There were many men and many women who subscribed from one dollar up to one thousand, not because they cared a straw for the longitude, nor because they believed in the least in the project; but because they believed in Brannan, in Orcutt, in Q., or in me. Love goes far in this world of ours. Some few men subscribed because others had done it: it was the thing to do, and they must not be out of fashion. And three or four, at least, subscribed because each hour of their lives there came up the memory of the day when the news came that the — was lost, George, or Harry, or John, in the —, and they knew that George, or Harry, or John, might have been at home, had it been easier than it is, to read the courses of the stars!

Fair, subscriptions, and Orcutt's reserve,—we counted up \$162,000, or nearly so. There would be a little more when all was paid in.

But we could not use a cent, except Orcutt's and our own little subscriptions, till we had got the whole. And at this point it seemed as if the whole world was sick of us, and that we had gathered every penny that was in store for us. The orange was squeezed dry!

in the suburbs it is a miracle that it is ever lived through. The night-winds have not risen yet to stir the languid foliage of the sidewalk maples; the lamps are not yet lighted to take away the gloom from the blank, staring windows of the houses near; it is too late

for letters, too early for a book. In town your fancy would turn to the theatres; in the country you would occupy yourself with cares of poultry or of stock: in the suburbs you can but sit upon your threshold, and fight the predatory mosquito.

THE BRICK MOON.

[From the Papers of Colonel Frederic Ingham.]

II.

HOW WE BUILT IT.

THE orange was squeezed dry! And how little any of us knew, — skilful George Orcutt, thoughtful Ben Brannan, loyal Haliburton, ingenious Q., or poor painstaking I, — how little we knew, or any of us, where was another orange, or how we could mix malic acid and tartaric acid, and citric acid and auric acid and sugar and water so as to imitate orange-juice, and fill up the bank-account enough to draw in the conditioned subscriptions, and so begin to build the MOON. How often, as I lay awake at night, have I added up the different subscriptions in some new order, as if that would help the matter: and how steadily they have come out one hundred and sixty-two thousand dollars, or even less, when I must needs, in my sleepiness, forget somebody's name! So Haliburton put into railroad stocks all the money he collected, and the rest of us ground on at our mills, or flew up on our own wings towards Heaven. Thus Orcutt built more tunnels, Q. prepared for more commencements, Haliburton calculated more policies, Ben Brannan created more civilization, and I, as I could, healed the hurt of my people of Naguadavick for the months there were left to me of my stay in that thriving town.

None of us had the wit to see how the problem was to be wrought out further. No. The best things come

to us when we have faithfully and well made all the preparation and done our best; but they come in some way that is none of ours. So was it now, that to build the BRICK MOON it was necessary that I should be turned out of Naguadavick ignominiously, and that Jeff. Davis and some seven or eight other bad men should create the Great Rebellion. Hear how it happened.

Dennis Shea, my Double, — otherwise, indeed, called by my name and legally so, — undid me, as my friends supposed, one evening at a public meeting called by poor Isaacs in Naguadavick. Of that transaction I have no occasion here to tell the story. But of that transaction one consequence is that the BRICK MOON now moves in ether. I stop writing, to rest my eye upon it, through a little telescope of Alvan Clark's here, which is always trained near it. It is moving on as placidly as ever.

It came about thus. The morning after poor Dennis, whom I have long since forgiven, made his extraordinary speeches, without any authority from me, in the Town Hall at Naguadavick, I thought, and my wife agreed with me, that we had better both leave town with the children. Auchmuty, our dear friend, thought so too. We left in the ten-thirty Accommodation for Skowhegan, and so came to Township No. 9 in the 3rd Range, and there for years we resided. That whole range of town-

ships was set off under a provision admirable in its character, that the first settled minister in each town should receive one hundred acres of land as the "minister's grant," and the first settled schoolmaster eighty. To No. 9 therefore I came. I constituted a little Sandemanian church. Auchmuty and Delafield came up and installed me, and with these hands I built the cabin in which, with Polly and the little ones, I have since spent many happy nights and days. This is not the place for me to publish a map, which I have by me, of No. 9, nor an account of its many advantages for settlers. Should I ever print my papers called "Stay-at-Home Robinsons," it will be easy with them to explain its topography and geography. Suffice it now to say, that, with Alice and Bertha and Polly, I took tramps up and down through the lumbermen's roads, and soon knew the general features of the lay of the land. Nor was it long, of course, before we came out one day upon the curious landslides, which have more than once averted the flow of the little Carrotook River, where it has washed the rocks away so far as to let down one section more of the overlying yielding yellow clay.

Think how my eyes flashed, and my wife's, as, struggling through a wilderness of moosewood, we came out one afternoon on this front of yellow clay! Yellow clay, of course, when properly treated by fire, is brick! Here we were surrounded by forests, only waiting to be burned; yonder was clay, only waiting to be baked. Polly looked at me, and I looked at her, and with one voice, we cried out, "The MOON."

For here was this shouting river at our feet, whose power had been running to waste since the day when the Laurentian hills first heaved themselves above the hot Atlantic; and that day, I am informed by Mr. Agassiz, was the first day in the history of this solid world. Here was water-power enough for forty fly-wheels, were it necessary to send heavenward twenty moons. Here was solid timber enough for a

hundred dams, yet only one was necessary to give motion to the fly-wheels. Here was retirement, — freedom from criticism, an escape from the journalists, who would not embarrass us by telling of every cracked brick which had to be rejected from the structure. We had lived in No. 9 now for six weeks, and not an "own correspondent" of them all had yet told what Rev. Mr. Ingham had for dinner.

Of course I wrote to George Orcutt at once of our great discovery, and he came up at once to examine the situation. On the whole, it pleased him. He could not take the site I proposed for the dam, because this very clay there made the channel treacherous, and there was danger that the stream would work out a new career. But lower down we found a stony gorge with which George was satisfied; he traced out a line for a railway by which, of their own weight, the brick-cars could run to the centrings; he showed us where, with some excavations, the fly-wheels could be placed exactly above the great mill-wheels, that no power might be wasted, and explained to us how, when the gigantic structure was finished, the BRICK MOON would gently roll down its ways upon the rapid wheels, to be launched instant into the sky!

Shall I ever forget that happy October day of anticipation?

We spent many of those October days in tentative surveys. Alice and Bertha were our chain-men, intelligent and obedient. I drove for George his stakes, or I cut away his brush, or I raised and lowered the shield at which he sighted; and at noon Polly appeared with her baskets, and we would dine *al fresco*, on a pretty point which, not many months after, was wholly covered by the eastern end of the dam. When the field-work was finished we retired to the cabin for days, and calculated and drew, and drew and calculated. Estimates for feeding Irishmen, estimates of hay for mules, — George was sure he could work mules better than oxen, — estimates for cement, estimates

for the preliminary saw-mills, estimates for rail for the little brick-road, for wheels, for spikes, and for cutting ties; what did we not estimate for — on a basis almost wholly new, you will observe. For here the brick would cost us less than our old conceptions, — our water-power cost us almost nothing, — but our stores and our wages would cost us much more.

These estimates are now to me very curious, — a monument, indeed, to dear George's memory, that in the result they proved so accurate. I would gladly print them here at length, with some illustrative cuts, but that I know the impatience of the public, and its indifference to detail. If we are ever able to print a proper memorial of George, that, perhaps, will be the fitter place for them. Suffice it to say that with the subtractions thus made from the original estimates — even with the additions forced upon us by working in a wilderness — George was satisfied that a money charge of \$ 197,327 would build and start THE MOON. As soon as we had determined the site, we marked off eighty acres, which contained all the essential localities, up and down the little Carrotook River, — I engaged George for the first schoolmaster in No. 9, and he took these eighty acres for the schoolmaster's reservation. Alice and Bertha went to school to him the next day, taking lessons in civil engineering; and I wrote to the Bingham trustees to notify them that I had engaged a teacher, and that he had selected his land.

Of course we remembered, still, that we were near forty thousand dollars short of the new estimates, and also that much of our money would not be paid us but on condition that two hundred and fifty thousand were raised. But George said that his own subscription was wholly unhampered: with that we would go to work on the preliminary work of the dam, and on the flies. Then, if the flies would hold together, — and they should hold if mortise and iron could hold them, — they might be at work summers and winters, days

and nights, storing up Power for us. This would encourage the subscribers, nay, would encourage us; and all this preliminary work would be out of the way when we were really ready to begin upon the MOON.

Brannan, Haliburton, and Q. readily agreed to this when they were consulted. They were the other trustees under an instrument which we had got St. Leger to draw up. George gave up, as soon as he might, his other appointments; and taught me, meanwhile, where and how I was to rig a little saw-mill, to cut some necessary lumber. I engaged a gang of men to cut the timber for the dam, and to have it ready; and, with the next spring, we were well at work on the dam and on the flies! These needed, of course, the most solid foundation. The least irregularity of their movement might send the MOON awry.

Ah me! would I not gladly tell the history of every bar of iron which was bent into the tires of those flies, and of every log which was mortised into its place in the dam, nay, of every curling mass of foam which played in the eddies beneath, when the dam was finished, and the waste water ran so smoothly over? Alas! that one drop should be wasted of water that might move a world, although a small one! I almost dare say that I remember each and all these, — with such hope and happiness did I lend myself, as I could, each day to the great enterprise; lending to dear George, who was here and there and everywhere, and was this and that and everybody, — lending to him, I say, such poor help as I could lend, in whatever way. We waked, in the two cabins, in those happy days, just before the sun came up, when the birds were in their loudest clamor of morning joy. Wrapped each in a blanket, George and I stepped out from our doors, each trying to call the other, and often meeting on the grass between. We ran to the river and plunged in, — O, how cold it was! — laughed and screamed like boys, rubbed ourselves aglow, and ran home to build

Polly's fire beneath the open chimney which stood beside my cabin. The bread had risen in the night. The water soon boiled above the logs. The children came, laughing, out upon the grass, barefoot, and fearless of the dew. Then Polly appeared with her gridiron and bear-steak, or with her griddle and eggs, and, in fewer minutes than this page has cost me, the breakfast was ready for Alice to carry, dish by dish, to the white-clad table on the piazza. Not Raphael and Adam more enjoyed their watermelons, fox-grapes, and late blueberries! And, in the long croon of the breakfast, lingering at the board, we revenged ourselves for the haste with which it had been prepared.

When we were well at table, a horn from the cabins below sounded the reveille for the drowsier workmen. Soon above the larches rose the blue of their smokes; and when we were at last nodding to the children, to say that they might leave the table, and Polly was folding her napkin as to say she wished we were gone, we would see tall Asaph Langdon, then foreman of the carpenters, sauntering up the valley with a roll of paper, or an adze, or a shingle with some calculations on it,—with something on which he wanted Mr. Orcutt's directions for the day.

An hour of nothings set the carnal machinery of the day agoing. We fed the horses, the cows, the pigs, and the hens. We collected the eggs and cleaned the hen-houses and the barns. We brought in wood enough for the day's fire, and water enough for the day's cooking and cleanliness. These heads describe what I and the children did. Polly's life during that hour was more mysterious. That great first hour of the day is devoted with women to the deepest arcana of the Eleusinian mysteries of the divine science of house-keeping. She who can meet the requisitions of that hour wisely and bravely conquers in the Day's Battle. But what she does in it, let no man try to say! It can be named, but not de-

scribed, in the comprehensive formula, "Just stepping round."

That hour well given to chores and to digestion, the children went to Mr. Orcutt's open-air school, and I to my rustic study,—a separate cabin, with a rough square table in it, and some book-boxes equally rude. No man entered it, excepting George and me. Here for two hours I worked undisturbed,—how happy the world, had it neither postman nor door-bell!—worked upon my *Traces of Sandemanianism in the Sixth and Seventh Centuries*, and then was ready to render such service to the cause and to George as the day might demand. Thus I rode to Lincoln or to Foxcroft to order supplies; I took my gun and lay in wait on Chairback for a bear; I transferred to the hewn lumber the angles or bevels from the careful drawings: as best I could, I filled an apostle's part, and became all things to all these men around me. Happy those days!—and thus the dam was built; in such Arcadian simplicity was reared the mighty wheel; thus grew on each side the towers which were to support the flies; and thus, to our delight not unmixed with wonder, at last we saw those mighty flies begin to turn. Not in one day, nor in ten; but in a year or two of happy life,—full of the joy of joys,—the "joy of eventful living!"

Yet, for all this, \$152,000 was not \$197,000, far less was it \$250,000; and but for Jeff. Davis and his crew the BRICK MOON would not have been born.

But at last Jeff. Davis was ready. "My preparations being completed," wrote General Beauregard, "I opened fire on Fort Sumter." Little did he know it,—but in that explosion the BRICK MOON also was lifted into the sky!

Little did we know it, when, four weeks after, George came up from the settlements, all excited with the news! The wheels had been turning now for four days, faster of course and faster. George had gone down for money to pay

off the men, and he brought us up the news that the Rebellion had begun.

"The last of this happy life," he said; "the last, alas, of our dear MOON." How little he knew and we!

But he paid off the men, and they packed their traps and disappeared, and, before two months were over, were in the lines before the enemy. George packed up, bade us sadly good-by, and before a week had offered his service to Governor Fenton in Albany. For us, it took rather longer; but we were soon packed; Polly took the children to her sister's, and I went on to the Department to offer my service there. No sign of life left in No. 9, but the two gigantic Fly-Wheels, moving faster and faster by day and by night, and accumulating Power till it was needed. If only they would hold together till the moment came!

So we all ground through the first slow year of the war. George in his place, I in mine, Brannan in his,—we lifted as we could. But how heavy the weight seemed! It was in the second year, when the second large loan was placed, that Haliburton wrote to me,—I got the letter, I think, at Hilton Head,—that he had sold out every penny of our railroad stocks, at the high prices which railroad stocks then bore, and had invested the whole fifty-nine thousand in the new Governments. "I could not call a board meeting," said Haliburton, "for I am here only on leave of absence, and the rest are all away. But the case is clear enough. If the government goes up, the MOON will never go up; and, for one, I do not look beyond the veil." So he wrote to us all, and of course we all approved.

So it was that Jeff. Davis also served. Deep must that man go into the Pit who does not serve, though unconscious. For thus it was that, in the fourth year of the war, when gold was at 290, Haliburton was receiving on his fifty-nine thousand dollars seventeen per cent interest in currency; thus was it that, before the war was over, he had piled up, compounding his interest,

more than fifty per cent addition to his capital; thus was it that, as soon as peace came, all his stocks were at a handsome percentage; thus was it that, before I returned from South America, he reported to all the subscribers that the full quarter-million was secured; thus was it that, when I returned after that long cruise of mine in the Florida, I found Polly and the children again at No. 9, George there also, directing a working party of nearly eighty bricklayers and hodmen, the lower centrings wellnigh filled to their horizons, and the BRICK MOON, to the eye, seeming almost half completed.

Here it is that I regret most of all that I cannot print the working-drawings with this paper. If you will cut open the seed-vessel of *Spergularia Rubra*, or any other carpel that has a free central placenta, and observe how the circular seeds cling around the circular centre, you will have some idea of the arrangement of a transverse horizontal section of the completed MOON. Lay three croquet-balls on the piazza, and call one or two of the children to help you poise seven in one plane above the three; then let another child place three more above the seven, and you have the *core* of the MOON completely. If you want a more poetical illustration, it was what Mr. Wordsworth calls a mass

"Of conglobated bubbles undissolved."

Any section through any diameter looked like an immense rose-window, of six circles grouped round a seventh. In truth, each of these sections would reveal the existence of seven chambers in the moon,—each a sphere itself,—whose arches gave solidity to the whole; while yet, of the whole moon, the greater part was air. In all there were thirteen of these moonlets, if I am so to call them; though no one section, of course, would reveal so many. Sustained on each side by their groined arches, the surface of the whole moon was built over them and under them,—simply two domes connected at the bases. The chambers themselves were

made lighter by leaving large, round windows or open circles in the parts of their vaults farthest from their points of contact, so that each of them looked not unlike the outer sphere of a Japanese ivory nest of concentric balls. You see the object was to make a moon, which, when left to its own gravity, should be fitly supported or braced within. Dear George was sure that, by this constant repetition of arches, we should with the least weight unite the greatest strength. I believe it still, and experience has proved that there is strength enough.

When I went up to No. 9, on my return from South America, I found the lower centring up, and half full of the working-bees, — who were really Keltic laborers, — all busy in bringing up the lower half-dome of the shell. This lower centring was of wood, in form exactly like a Roman amphitheatre if the seats of it be circular; on this the lower or inverted brick dome was laid. The whole fabric was on one of the terraces which were heaved up in some old geological cataclysm, when some lake gave way, and the Carrotook River was born. The level was higher than that of the top of the fly-wheels, which, with an awful velocity now, were circling in their wild career in the ravine below. Three of the lowest moonlets, as I have called them, — separate croquet-balls, if you take my other illustration, — had been completed; their centrings had been taken to pieces and drawn out through the holes, and were now set up again with other new centrings for the second story of cells.

I was received with wonder and delight. I had telegraphed my arrival, but the despatches had never been forwarded from Skowhegan. Of course, we all had a deal to tell; and, for me, there was no end to inquiries which I had to make in turn. I was never tired of exploring the various spheres, and the nameless spaces between them. I was never tired of talking with the laborers. All of us, indeed, became skilful bricklayers; and on a pleasant afternoon you might see Alice and Bertha, and George and me, all laying

brick together, — Polly sitting in the shade of some wall which had been built high enough, and reading to us from Jean Ingelow or Monte-Christo or Jane Austen, while little Clara brought to us our mortar. Happily and lightly went by that summer. Haliburton and his wife made us a visit; Ben Brannan brought up his wife and children; Mrs. Haliburton herself put in the keystone to the central chamber, which had always been named G. on the plans; and at her suggestion, it was named Grace now, because her mother's name was Hannah. Before winter we had passed the diameter of I, J, and K, the three uppermost cells of all; and the surrounding shell was closing in upon them. On the whole, the funds had held out amazingly well. The wages had been rather higher than we meant; but the men had no chances at liquor or dissipation and had worked faster than we expected; and, with our new brick-machines, we made brick inconceivably fast, while their quality was so good that dear George said there was never so little waste. We celebrated Thanksgiving of that year together, — my family and his family. We had paid off all the laborers; and there were left, of that busy village, only Asaph Langdon and his family, Levi Jordan and Levi Ross, Horace Leonard and Seth Whitman with theirs. "Theirs," I say, but Ross had no family. He was a nice young fellow who was there as Haliburton's representative, to take care of the accounts and the pay-roll; Jordan was the head of the brick-kilns; Leonard, of the carpenters; and Whitman, of the commissariat, — and a good commissary Whitman was.

We celebrated Thanksgiving together! Ah me! what a cheerful, pleasant time we had; how happy the children were together! Polly and I and our bairns were to go to Boston the next day. I was to spend the winter in one final effort to get twenty-five thousand dollars more if I could, with which we might paint the MOON, or put on some ground felspathic granite dust, in a sort of paste, which in its hot flight

through the air might fuse into a white enamel. All of us who saw the MOON were so delighted with its success that we felt sure "the friends" would not pause about this trifle. The rest of them were to stay there to watch the winter, and to be ready to begin work the moment the snow had gone. Thanksgiving afternoon, — how well I remember it, — that good fellow, Whitman, came and asked Polly and me to visit his family in their new quarters. They had moved for the winter into cells B and E, so lofty, spacious, and warm, and so much drier than their log-cabins. Mrs. Whitman, I remember, was very cheerful and jolly; made my children eat another piece of pie, and stuffed their pockets with raisins; and then with great ceremony and fun we christened room B by the name of Bertha, and E, Ellen, which was Mrs. Whitman's name. And the next day we bade them all good by, little thinking what we said, and with endless promises of what we would send and bring them in the spring.

Here are the scraps of letters from Orcutt, dear fellow, which tell what more there is left to tell: —

"December 10th.

". . . . After you left we were a little blue, and hung round loose for a day or two. Sunday we missed you especially, but Asaph made a good substitute, and Mrs. Leonard led the singing. The next day we moved the Leonards into L and M, which we christened Leonard and Mary (Mary is for your wife). They are pretty dark, but very dry. Leonard has swung hammocks, as Whitman did.

Asaph came to me Tuesday and said he thought they had better turn to and put a shed over the unfinished circle, and so take occasion of warm days for dry work there. This we have done, and the occupation is good for us. . . ."

"December 25th.

"I have had no chance to write for a fortnight. The truth is, that the weather has been so open that I let Asaph go down to No. 7 and to Wilder's, and

engage five-and-twenty of the best of the men, who, we knew, were hanging round there. We have all been at work most of the time since, with very good success. H is now wholly covered in, and the centring is out. The men have named it Haliburton. I is well advanced. J is as you left it. The work has been good for us all, morally."

"February 11th.

". . . . We got your mail unexpectedly by some lumbermen on their way to the 9th Range. One of them has cut himself, and takes this down.

"You will be amazed to hear that I and K are both done. We have had splendid weather, and have worked half the time. We had a great jollification when K was closed in, — called it Kilpatrick, for Seth's old general. I wish you could just run up and see us. You must be quick, if you want to put in any of the last licks. . . ."

"March 12th.

"DEAR FRED, — I have but an instant. By all means make your preparations to be here by the end of the month or early in next month. The weather has been faultless, you know. Asaph got in a dozen more men, and we have brought up the surface farther than you could dream. The ways are well forward, and I cannot see why, if the freshet hold off a little, we should not launch her by the 10th or 12th. I do not think it worth while to wait for paint or enamel. Telegraph Brannan that he must be here. You will be amused by our quarters. We, who were the last outsiders, move into A and D to-morrow, for a few weeks. It is much warmer there.

"Ever yours,

"G. O."

I telegraphed Brannan, and in reply he came with his wife and his children to Boston. I told him that he could not possibly get up there, as the roads then were; but Ben said he would go to Skowhegan, and take his chance there. He would, of course, communicate with me as soon he got there. Accordingly I got a note from him at

Skowhegan, saying he had hired a sleigh to go over to No. 9; and in four days more I got this letter:—

“March 27th.

“DEAR FRED,—I am most glad I came, and I beg you to bring your wife as soon as possible. The river is very full, the wheels, to which Leonard has added two auxiliaries, are moving as if they could not hold out long, the ways are all but ready, and we think we must not wait. Start with all hands as soon as you can. I had no difficulty in coming over from Skowhegan. We did it in two days.”

This note I sent at once to Haliburton; and we got all the children ready for a winter journey, as the spectacle of the launch of the MOON was one to be remembered their life long. But it was clearly impossible to attempt, at that season, to get the subscribers together. Just as we started, this despatch from Skowhegan was brought me,—the last word I got from them:—

“Stop for nothing. There is a jam below us in the stream, and we fear back-water.

“ORCUTT.”

Of course we could not go faster than we could. We missed no connection. At Skowhegan, Haliburton and I took a cutter, leaving the ladies and children to follow at once in larger sleighs. We drove all night, changed horses at Prospect, and kept on all the next day. At No. 7 we had to wait over night. We started early in the morning, and came down the Spoonwood Hill at four in the afternoon, in full sight of our little village.

It was quiet as the grave! Not a smoke, not a man, not an adze-blow, nor the tick of a trowel. Only the gigantic fly-wheels were whirling as I saw them last.

There was the lower Coliseum-like centring, somewhat as I first saw it.

But where was the Brick Dome of the MOON?

“Good Heavens! has it fallen on them all?” cried I.

Haliburton lashed the beast till he fairly ran down that steep hill. We turned a little point, and came out in front of the centring. There was no MOON there! An empty amphitheatre, with not a brick nor a splinter within!

We were speechless. We left the cutter. We ran up the stairways to the terrace. We ran by the familiar paths into the centring. We came out upon the ways, which we had never seen before. These told the story too well! The ground and crushed surface of the timbers, scorched by the rapidity with which THE MOON had slid down, told that they had done the duty for which they were built.

It was too clear that in some wild rush of the waters the ground had yielded a trifle. We could not find that the foundations had sunk more than six inches, but that was enough. In that fatal six inches' decline of the centring, the MOON had been launched upon the ways just as George had intended that it should be when he was ready. But it had slid, not rolled, down upon these angry fly-wheels, and in an instant, with all our friends, it had been hurled into the sky!

“They have gone up!” said Haliburton; “She has gone up!” said I;—both in one breath. And with a common instinct, we looked up into the blue.

But of course she was not there.

Not a shred of letter or any other tidings could we find in any of the shanties. It was indeed six weeks since George and Fanny and their children had moved into Annie and Diamond,—two unoccupied cells of the MOON,—so much more comfortable had the cells proved than the cabins, for winter life. Returning to No. 7, we found there many of the laborers, who were astonished at what we told them. They had been paid off on the 30th, and told to come up again on the 15th of April, to see the launch. One of them, a man named Rob Shea, told me that George kept his cousin Peter to help

him move back into his house the beginning of the next week.

And that was the last I knew of any of them for more than a year. At first I expected, each hour, to hear that they had fallen somewhere. But time passed by, and of such a fall, where man knows the world's surface, there was no tale. I answered, as best I could, the letters of their friends, by saying I did not know where they were, and had not heard from them. My real thought was, that if this fatal MOON did indeed pass our atmosphere, all in it must have

been burned to death in the transit. But this I whispered to no one save to Polly and Annie and Haliburton. In this terrible doubt I remained, till I noticed one day in the *Astronomical Record* the memorandum, which you perhaps remember, of the observation, by Dr. Zitta, of a new asteroid, with an enormous movement in declination.

[Mr. Ingham's observations on this asteroid will be published in our next number.]

MOHAMMED, AND HIS PLACE IN UNIVERSAL HISTORY.

DR. SAMUEL JOHNSON once declared: "There are two objects of curiosity, the Christian world and the Mohammedan world; all the rest may be considered as barbarous." Since Dr. Johnson's time we have learned to be curious about other forms of human thought, and regard the famous line of Terence as expressing more accurately the proper frame of mind for a Christian philosopher. Nevertheless, Mohammedanism still claims a special interest and excites a peculiar curiosity. It is the only religion which has threatened Christianity with a dangerous rivalry. It is the only other religion whose origin is in the broad daylight of history. Its author is the only one among the great men of the world who has at the same time founded a religion, formed a people, and established an empire. The marvellous spread of this religion is a mystery which never ceases to stimulate the mind to new inquiry. How was it that in the short space of a century the Arab tribes, before always at war among themselves, should have been united into an irresistible power, and have conquered Syria, Persia, the whole of Northern Africa, and Spain? And with this religious outbreak, this great

revival of Monotheism in Asia, there came also as remarkable a renaissance of learning, which made the Arabs the teachers of philosophy and art to Europe during a long period. Arab Spain was a focus of light while Christian Europe lay in mediæval darkness. And still more interesting and perplexing is the character of Mohammed himself. What was he,—an impostor, or a prophet? Did his work advance or retard human progress? What is his position in history? Such are some of the questions on which we shall endeavor to throw light in the present article.

Within a few years new materials for this study have been made accessible by the labors of Weil, Caussin de Perceval, Muir, Sprenger, Döllinger, and Arnold. Dr. Gustav Weil published his work * in 1843. It was drawn from Arabic manuscripts and the Koran. When Weil began his studies on Mohammed, in 1837, he found no book except that of Gagnier, published in 1732, from which he could derive substantial aid. But Gagnier had only collected, without any attempt at criticism, the traditions and statements concerning Mohammed believed by or-

* *Mohammed der Prophet, sein Leben und seine Lehre.* Stuttgart, 1843.

THE BRICK MOON.

[From the Papers of Colonel Frederic Ingham.]

III. FULFILMENT.

LOOKING back upon it now, it seems inconceivable that we said as little to each other as we did, of this horrible catastrophe. That night we did not pretend to sleep. We sat in one of the deserted cabins, now talking fast, now sitting and brooding, without speaking, perhaps, for hours. Riding back the next day to meet the women and children, we still brooded, or we discussed this "if," that "if," and yet others. But after we had once opened it all to them, — and when we had once answered the children's horribly naïve questions as best we could, — we very seldom spoke to each other of it again. It was too hateful, all of it, to talk about. I went round to Tom Coram's office one day, and told him all I knew. He saw it was dreadful to me, and, with his eyes full, just squeezed my hand, and never said one word more. We lay awake nights, pondering and wondering, but hardly ever did I to Haliburton or he to me explain our respective notions as they came and went. I believe my general impression was that of which I have spoken, that they were all burned to death on the instant, as the little aerolite fused in its passage through our atmosphere. I believe Haliburton's thought more often was that they were conscious of what had happened, and gasped out their lives in one or two breathless minutes, — so horribly long! — as they shot outside of our atmosphere. But it was all too terrible for words. And that which we could not but think upon, in those dreadful waking nights, we scarcely whispered even to our wives.

Of course I looked and he looked for the miserable thing. But we looked in vain. I returned to the few subscribers the money which I had scraped together towards whitewashing the moon, — "shrouding its guilty face

with innocent white" indeed! But we agreed to spend the wretched trifle of the other money, left in the treasury after paying the last bills, for the largest Alvan Clark telescope that we could buy; and we were fortunate in obtaining cheap a second-hand one which came to the hammer when the property of the Shubael Academy was sold by the mortgagees. But we had, of course, scarce a hint whatever as to where the miserable object was to be found. All we could do was to carry the glass to No. 9, to train it there on the meridian of No. 9, and take turns every night in watching the field, in the hope that this child of sorrow might drift across it in its path of ruin. But, though everything else seemed to drift by, from east to west, nothing came from south to north, as we expected. For a whole month of spring, another of autumn, another of summer, and another of winter, did Haliburton and his wife and Polly and I glue our eyes to that eyeglass, from the twilight of evening to the twilight of morning, and the dead hulk never hove in sight. Wherever else it was, it seemed not to be on that meridian, which was where it ought to be and was made to be! Had ever any dead mass of matter wrought such ruin to its makers, and, of its own stupid inertia, so falsified all the prophecies of its birth! O, the total depravity of things!

It was more than a year after the fatal night, — if it all happened in the night, as I suppose, — that, as I dreamily read through the "Astronomical Record" in the new reading-room of the College Library at Cambridge, I lighted on this scrap: —

"Professor Karl Zitta of Breslau writes to the *Astronomische Nachrichten* to claim the discovery of a new asteroid observed by him on the night of March 31st.

(92)

Bresl. M. T.	h. m. s.			App. A. R.			App. Decl.			Size.
				h.	m.	s.	°	'	"	
March 31	12	53	51.9	15	39	52.32	—23	50	26.1	12.9
April 1	1	3	2.1	15	39	52.32	—23	9	1.9	12.9

He proposes for the asteroid the name of Phœbe. Dr. Zitta states that in the short period which he had for observing Phœbe, for an hour after midnight, her motion in R. A. seemed slight and her motion in declination very rapid."

After this, however, for months, nay even to this moment, nothing more was heard of Dr. Zitta of Breslau.

But, one morning, before I was up, Haliburton came banging at my door on D Street. The mood had taken him, as he returned from some private theatricals at Cambridge, to take the comfort of the new reading-room at night, and thus express in practice his gratitude to the overseers of the college for keeping it open through all the twenty-four hours. Poor Haliburton, he did not sleep well in those times! Well, as he read away on the *Astronomische Nachrichten* itself, what should he find but this in German, which he copied for me, and then, all on foot in the rain and darkness, tramped over with, to South Boston:—

"The most enlightened head professor Dr. Gmelin writes to the director of the Porpol Astronomik at St. Petersburg, to claim the discovery of an asteroid in a very high southern latitude, of a wider inclination of the orbit, as will be noticed, than any asteroid yet observed.

"Planet's apparent α $21^{\text{h}} 20^{\text{m}} 51^{\text{s}}.40$.
Planet's apparent δ $-39^{\circ} 31' 11''.9$.
Comparison star α .

"Dr. Gmelin publishes no separate second observation, but is confident that the declination is diminishing. Dr. Gmelin suggests for the name of this extra-zodiacal planet "Io," as appropriate to its wanderings from the accustomed ways of planetary life, and trusts that the very distinguished Herr Peters, the godfather of so many planets, will relinquish this name, already claimed for

the asteroid (85) observed by him, September 15, 1865.

I had run down stairs almost as I was, slippers and dressing-gown being the only claims I had on society. But to me, as to Haliburton, this stuff about "extra-zodiacal wandering" blazed out upon the page, and though there was no evidence that the "most enlightened" Gmelin found anything the next night, yet, if his "diminishing" meant anything, there was, with Zitta's observation— whoever Zitta might be— something to start upon. We rushed upon some old bound volumes of the Record and spotted the "enlightened Gmelin." He was chief of a college at Taganrog, where perhaps they had a spyglass. This gave us the parallax of his observation. Breslau, of course, we knew, and so we could place Zitta's, and with these poor data I went to work to construct, if I could, an orbit for this Io-Phœbe mass of brick and mortar. Haliburton, not strong in spherical trigonometry, looked out logarithms for me till breakfast, and, as soon as it would do, went over to Mrs. Bowdoin, to borrow her telescope, ours being left at No. 9.

Mrs. Bowdoin was kind, as she always was, and at noon Haliburton appeared in triumph with the boxes on P. Nolan's job-wagon. We always employ P., in memory of dear old Phil. We got the telescope rigged, and waited for night, only, alas! to be disappointed again. Io had wandered somewhere else, and, with all our sweeping back and forth on the tentative curve I had laid out, Io would not appear. We spent that night in vain.

But we were not going to give it up so. Phœbe might have gone round the world twice before she became Io; might have gone three times, four, five, six,— nay, six hundred,— who knew? Nay, who knew how far off Phœb-Io

was, or Io-Phœbe? We sent over for Annie, and she and Polly and George and I went to work again. We calculated in the next week sixty-seven orbits on the supposition of so many different distances from our surface. I laid out on a paper, which we stuck up on the wall opposite, the formula, and then one woman and one man attacked each set of elements, each having the Logarithmic Tables, and, so in a week's working-time, the sixty-seven orbits were completed. Sixty-seven possible places for Io-Phœbe to be in on the forthcoming Friday evening. Of these sixty-seven, forty-one were observable above our horizon that night.

She was not in one of the forty-one, nor near it.

But Despair, if Giotto be correct, is the chief of sins. So has he depicted her in the fresco of the Arena in Padua. No sin, that, of ours! After searching all that Friday night, we slept all Saturday (sleeping after sweeping). We all came to the Chapel, Sunday, kept awake there, and taught our Sunday classes special lessons on Perseverance. On Monday we began again, and that week we calculated sixty-seven more orbits. I am sure I do not know why we stopped at sixty-seven. All of these were on the supposition that the revolution of the Brick Moon, or Io-Phœbe, was so fast that it would require either fifteen days to complete its orbit, or sixteen days, or seventeen days, and so on up to eighty-one days. And, with these orbits, on the next Friday we waited for the darkness. As we sat at tea, I asked if I should begin observing at the smallest or at the largest orbit. And there was a great clamor of diverse opinions. But little Bertha said, "Begin in the middle."

"And what is the middle?" said George, chaffing the little girl.

But she was not to be dismayed. She had been in and out all the week, and knew that the first orbit was of fifteen days and the last of eighty-one; and, with true Lincoln School precision, she said: "The mean of the smallest orbit and the largest orbit is forty-eight days."

"Amen!" said I, as we all laughed. "On forty-eight days we will begin."

Alice ran to the sheets, turned up that number and read: "R. A. $27^{\circ} 11'$. South declination $34^{\circ} 49'$."

"Convenient place," said George; "good omen, Bertha, my darling! If we find her there, Alice and Bertha and Clara shall all have new dolls."

It was the first word of pleasantry that had been spoken about the horrid thing since Spoonwood Hill!

Night came at last. We trained the glass on the fated spot. I bade Polly take the eye-glass. She did so, shook her head uneasily, screwed the tube northward herself a moment, and then screamed, "It is there! it is there, — a clear disk, — gibbous shape, — and very sharp on the upper edge. Look! look! as big again as Jupiter!"

Polly was right! The Brick Moon was found!

Now we had found it, we never lost it. Zitta and Gmelin, I suppose, had had foggy nights and stormy weather often. But we had some one at the eye-glass all that night, and before morning had very respectable elements, good measurements of angular distance when we got one, and another star in the field of our lowest power. For we could see her even with a good French opera-glass I had, and with a night-glass which I used to carry on the South Atlantic Station. It certainly was an extraordinary illustration of Orcutt's engineering ability, that, flying off as she did, without leave or license, she should have gained so nearly the orbit of our original plan, — nine thousand miles from the earth's centre, five thousand from the surface. He had always stuck to the hope of this, and on his very last tests of the Flies he had said they were almost up to it. But for this accuracy of his, I can hardly suppose we should have found her to this hour, since she had failed, by what cause I then did not know, to take her intended place on the meridian of No. 9. At five thousand miles the Moon appeared as large as the largest satellite of Jupiter

appears. And Polly was right in that first observation, when she said she got a good disk with that admirable glass of Mrs. Bowdoin.

The orbit was not on the meridian of No. 9, nor did it remain on any meridian. But it was very nearly South and North, — an enormous motion in declination with a very slight *retrograde* motion in Right Ascension. At five thousand miles the Moon showed as large as a circle two miles and a third in diameter would have shown on old Thornbush, as we always called her older sister. We longed for an eclipse of Thornbush by B. M., but no such lucky chance is on the cards in any place accessible to us for many years. Of course, with a Moon so near us the terrestrial parallax is enormous.

Now, you know, dear reader, that the gigantic reflector of Lord Rosse, and the exquisite fifteen-inch refractors of the modern observatories, eliminate from the chaotic rubbish-heap of the surface of old Thornbush much smaller objects than such a circle as I have named. If you have read Mr. Locke's amusing Moon Hoax as often as I have, you have those details fresh in your memory. As John Farrar taught us when all this began, — and as I have said already, — if there were a State-House in Thornbush two hundred feet long, the first Herschel would have seen it. His magnifying power was 6450; that would have brought this deaf-and-dumb State House within some forty miles. Go up on Mt. Washington and see white sails eighty miles away, beyond Portland, with your naked eye, and you will find how well he would have seen that State-House with his reflector. Lord Rosse's statement is, that with his reflector he can see objects on old Thornbush two hundred and fifty-two feet long. If he can do that, he can see on our B. M. objects which are five feet long; and, of course, we were beside ourselves to get control of some instrument which had some approach to such power. Haliburton was for at once building a reflector at No. 9; and perhaps he will do it yet, for Haliburton

has been successful in his paper-making and lumbering. But I went to work more promptly.

I remembered, not an apothecary, but an observatory, which had been dormant, as we say of volcanoes, now for ten or a dozen years, — no matter why! The trustees had quarrelled with the director, or the funds had given out, or the director had been shot at the head of his division, — one of those accidents had happened which will happen even in observatories which have fifteen-inch equatorials; and so the equatorial here had been left as useless as a cannon whose metal has been strained or its reputation stained in an experiment. The observatory at Tamworth, dedicated with such enthusiasm, — “another light-house in the skies,” — had been, so long as I have said, worthless to the world. To Tamworth therefore I travelled. In the neighborhood of the observatory I took lodgings. To the church where worshipped the family which lived in the observatory buildings I repaired; after two Sundays I established acquaintance with John Donald, the head of this family. On the evening of the third, I made acquaintance with his wife in a visit to them. Before three Sundays more, he had recommended me to the surviving trustees as his successor as janitor to the buildings. He himself had accepted promotion, and gone, with his household, to keep a store for Haliburton in North Ovid. I sent for Polly and the children, to establish them in the janitor's rooms; and, after writing to her, with trembling eye I waited for the Brick Moon to pass over the field of the fifteen-inch equatorial.

Night came. I was “sole alone!” B. M. came, more than filled the field of vision, of course; but for that I was ready. Heavens! how changed. Red no longer, but green as a meadow in the spring. Still I could see — black on the green — the large twenty-foot circles which I remembered so well, which broke the concave of the dome; and, on the upper edge — were these palm-trees? They were. No, they

were hemlocks by their shape, and among them were moving to and fro — — — — flies? Of course, I cannot see flies! But something is moving, — coming, going. One, two, three, ten; there are more than thirty in all! They are men and women and their children!

Could it be possible? It was possible! Orcutt and Brannan and the rest of them had survived that giddy flight through the ether, and were going and coming on the surface of their own little world, bound to it by its own attraction and living by its own laws!

As I watched, I saw one of them leap from that surface. He passed wholly out of my field of vision, but in a minute, more or less, returned. Why not! Of course, the attraction of his world must be very small, while he retained the same power of muscle he had when he was here. They must be horribly crowded, I thought. No. They had three acres of surface, and there were but thirty-seven of them. Not so much crowded as people are in Roxbury, not nearly so much as in Boston; and besides, these people are living underground, and have the whole of their surface for their exercise.

I watched their every movement as they approached the edge and as they left it. Often they passed beyond it, so that I could see them no more. Often they sheltered themselves from that tropical sun beneath the trees. Think of living on a world where from the vertical heat of the hottest noon of the equator to the twilight of the poles is a walk of only fifty paces! What atmosphere they had, to temper and diffuse those rays, I could not then conjecture.

I knew that at half past ten they would pass into the inevitable eclipse which struck them every night at this period of their orbit, and must, I thought, be a luxury to them, as recalling old memories of night when they were on this world. As they approached the line of shadow, some fifteen minutes before it was due, I counted on

the edge thirty-seven specks arranged evidently in order; and, at one moment, as by one signal, all thirty-seven jumped into the air, — high jumps. Again they did it, and again. Then a low jump; then a high one. I caught the idea in a moment. They were telegraphing to our world, in the hope of an observer. Long leaps and short leaps, — the long and short of Morse's Telegraph Alphabet, — were communicating ideas. My paper and pencil had been of course before me. I jotted down the despatch, whose language I knew perfectly: —

“Show ‘I understand’ on the Saw-Mill Flat.”

“Show ‘I understand’ on the Saw-Mill Flat.”

“Show ‘I understand’ on the Saw-Mill Flat.”

By “I understand” they meant the responsive signal given, in all telegraphy, by an operator who has received and understood a message.

As soon as this exercise had been three times repeated, they proceeded in a solid body — much the most apparent object I had had until now — to Circle No. 3, and then evidently descended into the Moon.

The eclipse soon began, but I knew the Moon's path now, and followed the dusky, coppery spot without difficulty. At 1.33 it emerged, and in a very few moments I saw the solid column pass from Circle No. 3, again, deploy on the edge again, and repeat three times the signal: —

“Show ‘I understand’ on the Saw-Mill Flat.”

“Show ‘I understand’ on the Saw-Mill Flat.”

“Show ‘I understand’ on the Saw-Mill Flat.”

It was clear that Orcutt had known that the edge of his little world would be most easy of observation, and that he had guessed that the moments of obscuration and of emersion were the moments when observers would be most careful. After this signal they broke up again, and I could not follow them. With daylight I sent off a despatch to

Haliburton, and, grateful and happy in comparison, sank into the first sleep, not haunted by horrid dreams, which I had known for years.

Haliburton knew that George Orcutt had taken with him a good Dolland's refractor, which he had bought in London, of a two-inch glass. He knew that this would give Orcutt a very considerable power, if he could only adjust it accurately enough to find No. 9 in the 3d Range. Orcutt had chosen well in selecting the "Saw-Mill Flat," a large meadow, easily distinguished by the peculiar shape of the mill-pond which we had made. Eager though Haliburton was, to join me, he loyally took moneys, caught the first train to Skowhegan, and, travelling thence, in thirty-six hours more was again descending Spoonwood Hill, for the first time since our futile observations. The snow lay white upon the Flat. With Rob. Shea's help, he rapidly unrolled a piece of black cambric twenty yards long, and pinned it to the crust upon the snow; another by its side, and another. Much cambric had he left. They had carried down with them enough for the funerals of two Presidents. Haliburton showed the symbols for "I understand," but he could not resist also displaying . . . — . —, which are the dots and lines to represent O. K., which, he says, is the shortest message of comfort. And, not having exhausted the space on the Flat, he and Robert, before night closed in, made a gigantic **O. K.**, fifteen yards from top to bottom, and in marks that were fifteen feet through.

I had telegraphed my great news to Haliburton on Monday night. Tuesday night he was at Skowhegan. Thursday night he was at No 9. Friday he and Rob. stretched their cambric. Meanwhile, every day I slept. Every night I was glued to the eye-piece. Fifteen minutes before the eclipse every night this weird dance of leaps two hundred feet high, followed by hops of twenty feet high, mingled always in the steady order I have described, spelt out the ghastly message: —

"Show 'I understand' on the Saw-Mill Flat."

And every morning, as the eclipse ended, I saw the column creep along to the horizon, and again, as the duty of opening day, spell out the same: —

"Show 'I understand' on the Saw-Mill Flat."

They had done this twice in every twenty-four hours for nearly two years. For three nights steadily, I read these signals twice each night; only these, and nothing more.

But Friday night all was changed. After "Attention," that dreadful "Show" did not come, but this cheerful signal: —

"Hurrah. All well. Air, food, and friends! what more can man require? Hurrah."

How like George! How like Ben Brannan! How like George's wife! How like them all! And they were all well! Yet poor *I* could not answer. Nay, I could only guess what Haliburton had done. But I have never, I believe, been so grateful since I was born!

After a pause, the united line of leapers resumed their jumps and hops. Long and short spelled out: —

"Your O. K. is twice as large as it need be."

Of the meaning of this, lonely *I* had, of course, no idea.

"I have a power of seven hundred," continued George. How did he get that? He has never told us. But this I can see, that all our analogies deceive us, — of views of the sea from Mt. Washington, or of the Boston State-House from Wachusett. For in these views we look through forty or eighty miles of dense terrestrial atmosphere. But Orcutt was looking nearly vertically through an atmosphere which was, most of it, rare indeed, and pure indeed, compared with its lowest stratum.

In the record-book of my observations these despatches are entered as 12 and 13. Of course it was impossible for me to reply. All I could do was to telegraph these in the morning to Skowhegan, sending them to the

care of the Moores, that they might forward them. But the next night showed that this had not been necessary.

Friday night George and the others went on for a quarter of an hour. Then they would rest, saying, "two," "three," or whatever their next signal time would be. Before morning I had these despatches:—

14. "Write to all hands that we are doing well. Langdon's baby is named Io, and Leonard's is named Phebe."

How queer that was! What a coincidence! And they had some humor there.

15 was: "Our atmosphere stuck to us. It weighs three tenths of an inch—our weight."

16. "Our rain-fall is regular as the clock. We have made a cistern of Kilpatrick."

This meant the spherical chamber of that name.

17. "Write to Darwin that he is all right. We began with lichens and have come as far as palms and hemlocks."

These were the first night's messages. I had scarcely covered the eyeglasses, and adjusted the equatorial for the day, when the bell announced the carriage in which Polly and the children came from the station to relieve me in my solitary service as janitor. I had the joy of showing her the good news. This night's work seemed to fill our cup. For all the day before, when I was awake, I had been haunted by the fear of famine for them. True, I knew that they had stored away in chambers H, I, and J the pork and flour which we had sent up for the workmen through the summer, and the corn and oats for the horses. But this could not last forever.

Now, however, that it proved that in a tropical climate they were forming their own soil, developing their own palms, and eventually even their bread-fruit and bananas, planting their own oats and maize, and developing rice, wheat, and all other cereals, harvesting these six, eight, or ten times—for aught I could see—in one of our years,—why then, there was no danger

of famine for them. If, as I thought, they carried up with them heavy drifts of ice and snow in the two chambers which were not covered in when they started, why, they had waters in their firmament quite sufficient for all purposes of thirst and of ablution. And what I had seen of their exercise showed that they were in strength sufficient for the proper development of their little world.

Polly had the messages by heart before an hour was over, and the little girls, of course, knew them sooner than she.

Haliburton, meanwhile, had brought out the Shubael refractor (Alvan Clark), and by night of Friday was in readiness to see what he could see. Shubael of course gave him no such luxury of detail as did my fifteen-inch equatorial. But still he had no difficulty in making out groves of hemlock, and the circular openings. And although he could not make out my thirty-seven flies, still when 10.15 came, he saw distinctly the black square crossing from hole Mary to the edge, and begin its Dervish dances. They were on his edge more precisely than on mine. For Orcutt knew nothing of Tamworth, and had thought his best chance was to display for No. 9. So was it that, at the same moment with me, Haliburton also was spelling out Orcutt & Co.'s joyous "Hurrah."

"Ththeppen," lisps Celia, "promith that you will look at yon moon [old Thornbush] at the inthtant I do." So was it with me and Haliburton.

He was of course informed long before the Moores' messenger came, that, in Orcutt's judgment, twenty feet of length were sufficient for his signals. Orcutt's atmosphere, of course, must be exquisitely clear.

So, on Saturday, Rob. and Haliburton pulled up all their cambric and arranged it on the Flat again, in letters of twenty feet, in this legend:—

RAH. AL WEL.

Haliburton said he could not waste flat or cambric on spelling.

He had had all night since half past ten to consider what next was most important for them to know; and a very difficult question it was, you will observe. They had been gone nearly two years, and much had happened. Which thing was, on the whole, the most interesting and important? He had said we were all well. What then?

Did you never find yourself in the same difficulty? When your husband had come home from sea, and kissed you and the children, and wondered at their size, did you never sit silent, and have to think what you should say? Were you never fairly relieved when little Phil said, blustering, "I got three eggs to-day." The truth is, that silence is very satisfactory intercourse if we only know all is well. When De Sauty got his original cable going, he had not much to tell after all; only that consols were a quarter per cent higher than they were the day before. "Send me news," lisped he—poor lonely myth!—from Bull's Bay to Valentia,— "send me news; they are mad for news." But how if there be no news worth sending? What do I read in my cable despatch to-day? Only that the Harvard crew pulled at Putney yesterday, which I knew before I opened the paper, and that there had been a riot in Spain, which I also knew. Here is a letter just brought me by the mail from Moreau, Tazewell County, Iowa. It is written by Follansbee, in a good cheerful hand. How glad I am to hear from Follansbee! Yes; but do I care one straw whether Follansbee planted spring wheat or winter wheat? Not I. All I care for is Follansbee's way of telling it. All these are the remarks by which Haliburton explains the character of the messages he sent in reply to George Orcutt's autographs, which were so thoroughly satisfactory.

Should he say Mr. Borie had left the Navy Department, and Mr. Robeson come in? Should he say the Lords had backed down on the Disendowment Bill? Should he say the telegraph had been landed at Duxbury? Should he say Ingham had removed to

Tamworth? What did they care for this? What does anybody ever care for facts? Should he say that the State Constable was enforcing the liquor law on whiskey, but was winking at lager? All this would take him a week, in the most severe condensation,—and for what good? as Haliburton asked. Yet these were the things that the newspapers told, and they told nothing else. There was a nice little poem of Jean Ingelow's in a Transcript Haliburton had with him. He said he was really tempted to spell that out. It was better worth it than all the rest of the newspaper stuff, and would be remembered a thousand years after that was forgotten. "What they wanted," says Haliburton, "was sentiment. That is all that survives and is eternal." So he and Rob. laid out their cambric thus:—

RAH. AL WEL. SO GLAD.

Haliburton hesitated whether he would not add, "Power 5000," to indicate the full power I was using at Tamworth. But he determined not to, and, I think, wisely. The convenience was so great, of receiving the signal at the spot where it could be answered, that for the present he thought it best that they should go on as they did. That night, however, to his dismay, clouds gathered and a grim snow-storm began. He got no observations; and the next day it stormed so heavily that he could not lay his signals out. For me at Tamworth, I had a heavy storm all day, but at midnight it was clear; and as soon as the regular eclipse was past George began with what we saw was an account of the great anaclysm which sent them there. You observe that Orcutt had far greater power of communicating with us than we had with him. He knew this. And it was fortunate he had. For he had, on his little world, much more of interest to tell than we had, on our large one.

18. "It stormed hard. We were all asleep, and knew nothing till morning; the hammocks turned so slowly."

Here was another revelation and relief. I had always supposed that, if

they knew anything before they were roasted to death, they had had one wild moment of horror. Instead of this, the gentle slide of the Moon had not wakened them, the flight upward had been as easy as it was rapid, the change from one centre of gravity to another had of course been slow,—and they had actually slept through the whole. After the dancers had rested once, Orcutt continued:—

19. “We cleared E. A. in two seconds, I think. Our outer surface fused and cracked somewhat. So much the better for us.”

They moved so fast that the heat of their friction through the air could not propagate itself through the whole brick surface. Indeed there could have been but little friction after the first five or ten miles. By E. A. he means earth’s atmosphere.

His 20th despatch is: “I have no observations of ascent. But by theory our positive ascent ceased in two minutes five seconds, when we fell into our proper orbit, which, as I calculate, is 5,109 miles from your mean surface.”

In all this, observe, George dropped no word of regret through these five thousand miles.

His 21st despatch is: “Our rotation on our axis is made once in seven hours, our axis being exactly vertical to the plane of our own orbit. But in each of your daily rotations we get sunned all round.”

Of course, they never had lost their identity with us, so far as our rotation and revolution went: our inertia was theirs; all the fatal Fly-Wheels had given them was an additional motion in space of their own.

This was the last despatch before daylight of Sunday morning; and the terrible snow-storm of March, sweeping our hemisphere, cut off our communication with them, both at Tamworth and No. 9, for several days.

But here was ample food for reflection. Our friends were in a world of their own, all thirty-seven of them well, and it seemed they had two more little girls added to their number since

they started. They had plenty of vegetables to eat, with prospect of new tropical varieties according to Dr. Darwin. Rob. Shea was sure that they carried up hens; he said he knew Mrs. Whitman had several Middlesexes and Mrs. Leonard two or three Black Spanish fowls, which had been given her by some friends in Foxcroft. Even if they had not yet had time enough for these to develop into Alderneys and venison, they would not be without animal food.

When at last it cleared off, Haliburton had to telegraph: “Repeat from 20”; and this took all his cambric, though he had doubled his stock. Orcutt replied the next night:—

21. “I can see your storms. We have none. When we want to change climate we can walk in less than a minute from midsummer to the depth of winter. But in the inside we have eleven different temperatures, which do not change.”

On the whole there is a certain convenience in such an arrangement. With No. 22 he went back to his story:

“It took us many days, one or two of our months, to adjust ourselves to our new condition. Our greatest grief is that we are not on the meridian. Do you know why?”

Loyal George! He was willing to exile himself and his race from the most of mankind, if only the great purpose of his life could be fulfilled. But his great regret was that it was not fulfilled. He was not on the meridian. I did not know why. But Haliburton, with infinite labor, spelt out on the Flat,

CYC. PROJECT. AD FIN.,

by which he meant, “See article Projectiles in the Cyclopædia at the end”; and there indeed is the only explanation to be given. When you fire a shot, why does it ever go to the right or left of the plane in which it is projected? Dr. Hutton ascribes it to a whirling motion acquired by the bullet by friction with the gun. Euler thinks it due chiefly to the irregularity of the shape of the ball. In our case the B. M. was regular enough. But on one side, being wholly unprepared for flight, she

was heavily stored with pork and corn, while her other chambers had in some of them heavy drifts of snow, and some only a few men and women and hens.

Before Orcutt saw Haliburton's advice, he had sent us 23 and 24.

23. "We have established a Sandemanian church, and ordained Brannan. My son Edward and Alice Whitman are to be married this evening."

This despatch unfortunately did not reach Haliburton, though I got it. So, all the happy pair received for our wedding-present was the advice to look in the Cyclopædia at article Projectiles near the end.

24 was : —

"We shall act 'As You Like It' after the wedding. Dead-head tickets for all of the old set who will come."

Actually, in one week's reunion we had come to joking.

The next night we got 25 : —

"Alice says she will not read the Cyclopædia in the honeymoon, but is much obliged to Mr. Haliburton for his advice."

"How did she ever know it was I?" wrote the matter-of-fact Haliburton to me.

26. "Alice wants to know if Mr. Haliburton will not send here for some rags; says we have plenty, with little need for clothes."

And then despatches began to be more serious again. Brannan and Orcutt had failed in the great scheme for the longitude, to which they had sacrificed their lives, — if, indeed, it were a sacrifice to retire with those they love best to a world of their own. But none the less did they devote themselves, with the rare power of observation they had, to the benefit of our world. Thus, in 27 : —

"Your North Pole is an open ocean. It was black, which we think means water, from August 1st to September 29th. Your South Pole is on an island bigger than New Holland. Your Antarctic Continent is a great cluster of islands."

28. "Your Nyanzas are only two of a large group of African lakes. The

green of Africa, where there is no water, is wonderful at our distance."

29. "We have not the last numbers of 'Foul Play.' Tell us, in a word or two, how they got home. We can see what we suppose their island was."

30. "We should like to know who proved Right in 'He Knew He was Right.'"

This was a good night's work, as they were then telegraphing. As soon as it cleared, Haliburton displayed, —

BEST HOPES. CARRIER DUCKS.

This was Haliburton's masterpiece. He had no room for more, however, and was obliged to reserve for the next day his answer to No. 30, which was simply,

SHE.

A real equinoctial now parted us for nearly a week, and at the end of that time they were so low in our northern horizon that we could not make out their signals; we and they were obliged to wait till they had passed through two thirds of their month before we could communicate again. I used the time in speeding to No. 9. We got a few carpenters together, and arranged on the Flat two long movable black platforms, which ran in and out on railroad-wheels on tracks, from under green platforms; so that we could display one or both as we chose, and then withdraw them. With this apparatus we could give forty-five signals in a minute, corresponding to the line and dot of the telegraph; and thus could compass some twenty letters in that time, and make out perhaps two hundred and fifty words in an hour. Haliburton thought that, with some improvements, he could send one of Mr. Buchanan's messages up in thirty-seven working-nights.

[These observations bring the history of the Brick Moon to April, 1871, as the attentive reader will observe. In another paper Mr. Ingham will describe the more important of the observations afterwards made by himself and Mr. Haliburton.]