

**FOUR AMERICAN
INVENTORS**

FOUR AMERICAN INVENTORS

BY

FRANCES M. PERRY

**YESTERDAY'S CLASSICS
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THE STORY OF
ROBERT FULTON



ROBERT FULTON

CHAPTER I

A BOY WITH IDEAS

The schoolmaster had left the high stool at his high desk and was walking down among the benches where the boys sat. Most of the pupils looked up to see what he would do.

There was one who did not look up. That boy's curly head was bent over an old book in which he was drawing something. He was so busy that he seemed to have forgotten where he was.

The master stopped beside his bench and looked over his spectacles severely at the boy, who started quickly and held up his work for the teacher to look at. His eyes were glowing with satisfaction, and said as plainly as lips could say, "Is it not good?"

The drawing was well done. It was so good that the master could not scold, but he thought it was his duty to teach the boy to do more useful things. He did not praise him, therefore, but said gravely, "It would be better for thee, Robert, to spend thy time studying thy books."

"I know it, sir, but my head is so full of my own

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ideas that there seems to be no room in it for ideas from books,” answered the boy.

This is one of the stories that the schoolmates of Robert Fulton used to tell about him after he had become famous. It happened long ago in a little Quaker school in Lancaster, Pennsylvania, where Robert Fulton spent his schooldays.

He was born on the fourteenth of November, 1765, on a farm in the township of Little Britain, in Lancaster County. Mr. and Mrs. Fulton were quiet, modest people, and little dreamed that the name of the township would one day be changed in honor of their baby, who kicked and crowed in his old-fashioned, hooded cradle just like any ordinary baby. But the name was changed and the township where the great inventor was born is now called “Fulton.”

When Robert was less than a year old his father sold the farm and moved to Lancaster, the county seat. There Mr. Fulton died about two years later, and Mrs. Fulton was left with a small income to bring up her five young children. As Robert was the oldest boy he grew up with the understanding that he must do something to support the family.

His mother knew how to read and write, and she taught him at home with his sisters until he was eight years old. Then she sent him to school.

His teacher thought him a dull pupil, but found him quick enough at everything except his lessons.

One day the worthy man punished him by striking

A BOY WITH IDEAS

his hands with a ruler. This was no uncommon occurrence, but it made Robert angry and he said with spirit, "Sir, I come here to have something beat into my head and not into my hand."

At another time when asked why he came late to school, he held up a lead pencil and answered, "I have been to the smith's pounding out lead for this pencil, and it is a good one too."

That was doing something useful, and it pleased the teacher. He praised Robert, and the boys begged him to make pencils for them.

Out of school he was looked upon as unusually bright and promising. He was witty and good natured, and every one liked him. He was fond of visiting shops and talking with the men. He was a great pet among them and they not only answered his questions, but sometimes let him use their tools. In that way he learned much more than most boys know about machinery and various trades.

CHAPTER II

WORKING OUT SOME OF THE IDEAS

As Robert Fulton grew older he did better work at school. His quickness in numbers often surprised his teacher, and his school papers were always neat and beautiful.

Still he found more to do out of school than in school. He spent much time drawing; and he improved in that art constantly, although he had no instruction in it.

When he was eleven years old a terrible war broke out between the American colonies and England. A few of the colonists were loyal to the king, but many wanted a new and independent government.

In Lancaster there were Tories, who took the king's part, Quakers, who thought war wicked, and patriots, who were ready to fight for liberty.

There was great excitement everywhere. British or colonial soldiers encamped in many of the towns. Men and boys went to war, leaving behind weeping wives, mothers, and sisters.

WORKING OUT SOME OF THE IDEAS

Robert Fulton's father was dead, and he and his brothers were not old enough to go to the war. But young as he was he loved his country and wished the colonists to win. He never missed an opportunity to show his patriotism.

Just before the Fourth of July, 1778, a notice was put up requesting the citizens of Lancaster not to illuminate their houses as usual in celebration of the day, since candles were very scarce.

Robert was sorely disappointed. The Fourth was a great day to him. He remembered the first Fourth-of-July just two years before. How the bells had rung! How the windows had gleamed with candles! How the streets had blazed with bonfires and how joyous the people had been!

This year he had his candles ready, and had been anxiously awaiting the day. He was not the kind of boy to act against the wishes of the city officers. That would have been a poor way to honor his government's birthday. Yet he did not want to give up his celebration altogether.

After thinking about it for a while he took the candles back to the shop and exchanged them for pasteboard and gunpowder. He took these to the barn and worked quietly the rest of the day.

On the evening of the Fourth he brought out some queer-looking pasteboard tubes with slender sticks in them. When a lighted candle was applied at one end—whizz! away went the stick with a great train of sparks against the black sky.

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The home-made rockets were a surprise to the people of Lancaster. Robert thought them much better than candles.

It would not be safe for every thirteen-year-old boy to make his own fireworks, but Robert knew something about gunpowder. He understood just how much to use and where to put it. He had heard about sky rockets and had an idea how they were made. He drew a plan of one and, before attempting to make any, found out by arithmetic how large a charge of powder to use.

In the war times there were many gunsmiths in Lancaster whose shops were kept open day and night; for the government was in great need of arms for the soldiers.

Robert was so deeply interested in guns that he soon knew more about the making of them than many of the craftsmen who did the work. He made nice drawings of guns, showing all the parts and the use of each. In some of the drawings he showed how the pieces might be made stronger or more beautiful by the addition of certain new parts or ornaments.

When he showed these pictures or plans to the gunmakers they often made use of his suggestions, and found that they improved their arms by doing so.

But there were other ways in which Robert surprised the gunmakers. He could estimate with figures the distance that a musket of given measurements would send a ball. When the gun was finished and the men went out into the field to try its power, they usually found that young Fulton's figures were correct.

WORKING OUT SOME OF THE IDEAS

At this period of his boyhood he frequently went to a drug store to buy quicksilver. His friends were curious to know what he wanted it for, but no one could find out. They questioned and teased and joked in vain. At last they gave up trying to discover his secret. But they paid him for his silence by calling him "Quicksilver Bob." It was not a bad nickname for him, for his brain and his fingers were as active as quicksilver.

In his sixteenth summer Robert was invited by one of his boy friends to go on a fishing trip. His mother was willing to have him go, for the other boy's father would be with them. Moreover they were going up the Conestoga River to a point not far from the home of one of Robert's aunts, and he promised to make her a visit.

He started off in high spirits. For a while he enjoyed the view of the clear stream with its wonderful reflections of grassy hill slopes and overhanging trees. He forgot about gun shops and was content to sit by the hour holding a fishing rod. But at length he began to think of making something, and became restless.

When he and his friends went out on the river to fish they were obliged to use a clumsy square fishing boat. In order to move it from one place to another the boys had to pole it. That is, they stood on the boat and pushed against a long pole with which they could reach the bed of the stream. That was a slow way of getting along and it was a hard one, too.

One afternoon it occurred to "Quicksilver Bob" that the boat could be moved in a much easier way. He was

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anxious to try it, and started off at once to his aunt's to make the promised visit and some experiments.

While there his aunt saw but little of him. He spent his time tinkering in the attic, and before he left he had made a toy boat that could be moved about on the water with tiny paddle wheels. He showed it to his aunt and asked her to take good care of it till he came again. He then got together such materials as he wanted and bade good-by to his relative.

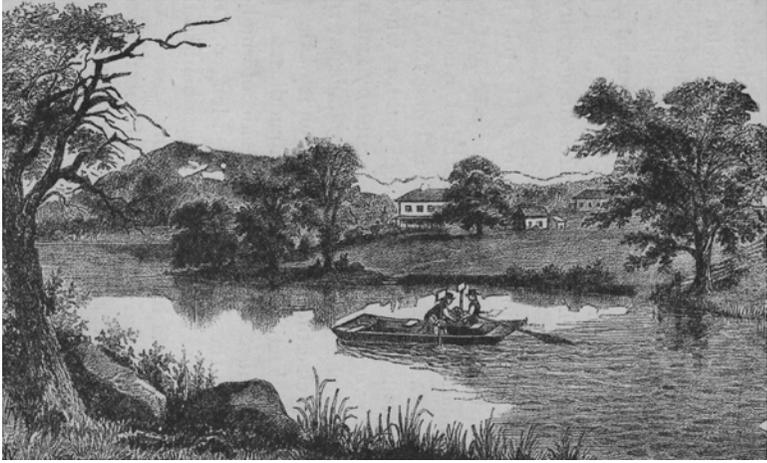
As soon as he rejoined his comrade he told him that he had a plan for moving the fishing boat without so much labor. When the boy learned what the plan was, he was as anxious as Robert to try it.

Both went to work making paddle wheels. They were very rough wheels, made by fastening together at the center two slender poles at right angles to each other. At the four ends of the two poles the boys nailed flat boards or paddles. They put one of those wheels on each side of the boat and fastened them to the ends of a long rod running through the boat. The rod was bent so that it could be turned by a double crank.

"She goes ahead all right," said Robert's friend, Christopher, as the young inventor tried the new craft for the first time. "But how shall we guide her?"

"Oh, I have thought of that," answered Robert. He took a contrivance, not unlike an oar-lock, out of his pocket and fastened it to the stern of the boat. By the help of a paddle working in this socket one could guide the boat while the other turned the crank. They found the paddle wheels a great improvement on the pole.

WORKING OUT SOME OF THE IDEAS



FULTON'S FIRST EXPERIMENT WITH PADDLE-WHEELS

“Why didn’t *you* think of that, Christopher?” asked Christopher’s father, looking on with admiration.

“I wonder why I didn’t,” answered the boy. “It looks easy enough now that Bob has shown me how.”

Robert might have told them this story of Columbus and the egg: One day at the table some men were saying that it was no great thing to sail across the Atlantic Ocean; they could do it themselves. In reply to their remarks Columbus picked up a boiled egg and asked which of them could make it stand on end. All tried in vain. “And yet,” said the great man, “it is easy enough, and you can all do it when I have shown you how.” With that he set it down so hard as to crush the end a little. And the egg stood in its place straight and steady.

CHAPTER III

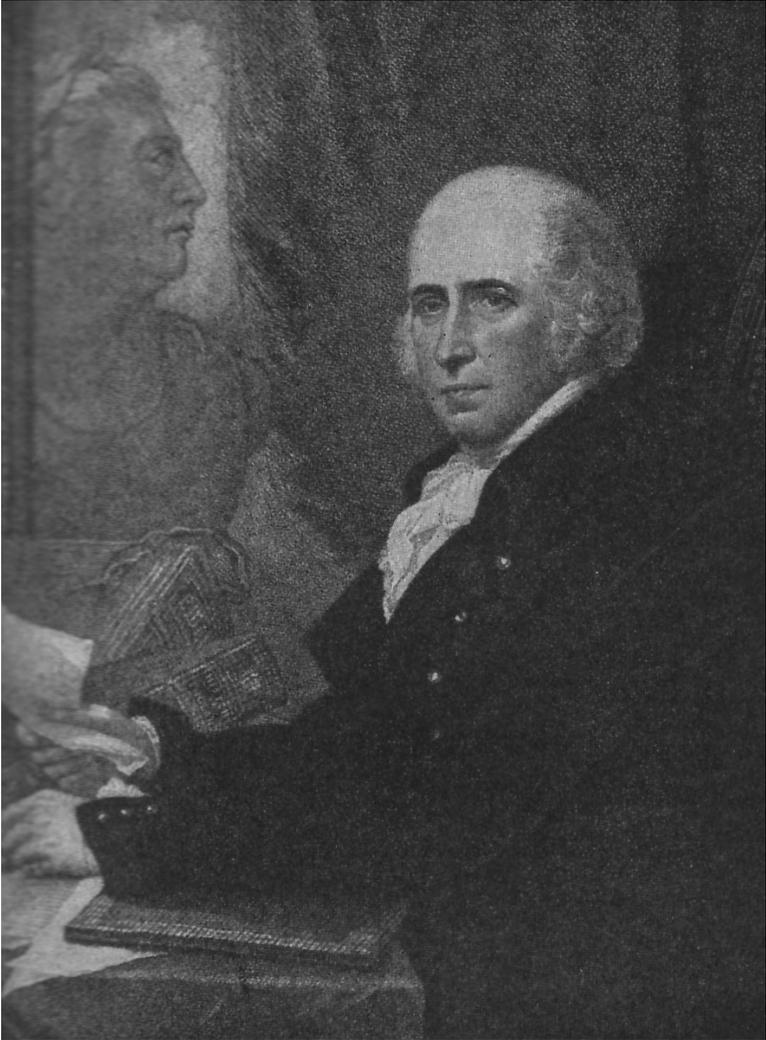
THE YOUNG ARTIST

Robert Fulton had been much with people older than himself. As a result he was unusually sensible and dignified, and appeared older than he really was. At the age of seventeen he thought himself quite a man, and set out to make his own living.

He determined to be an artist. He liked to draw and paint, and spent many hours with pencil and brush, making drawings of machinery or painting pictures. He was successful with both landscapes and portraits. Nothing was too difficult for him to attempt. A picture that he painted during the war represented the Whig boys of Lancaster as vanquishing the Tory boys in a fight. It was exhibited and attracted a good deal of attention.

Although he had had no instruction in the art of painting, he had some talent, and his friends in Lancaster thought his work very good. They called him a second Benjamin West.

Benjamin West was a gifted artist. He was brought up in a plain Quaker home not far from Lancaster. From boyhood he had wanted to be an artist but every one



BENJAMIN WEST

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discouraged him. Notwithstanding the disapproval of his family and his friends he struggled on. He went to England. There he became famous. He received large sums of money for his pictures which were bought by the rich and noble.

His old neighbors heard of his success with surprise, and for a while every boy who could draw hoped that he too might become a famous artist.

Robert Fulton had been encouraged by the success of Mr. West to give much attention to art. He had confidence in his own talent, but when he saw a fine picture he realized that his own work was very crude. He resolved to go to Philadelphia to study.

He spent four years there, studying and painting. His work found many admirers. He soon gained a reputation as a miniature painter. He sold pictures almost as fast as he could paint them. In that way he was able to pay his own expenses and save money.

When he was twenty-one years old he went back to Lancaster to visit his mother. He had saved about four hundred dollars, and with that he bought her a farm in Washington County in the southwestern part of Pennsylvania. It was a good farm of about eighty acres. It had been cleared and the house and barn had been built. The purchase was a wise investment. With a little help Mrs. Fulton and her daughters could make a comfortable living on the farm.

Her son knew that it would be hard to move. The way was long and the roads were poor. Rivers and mountains had to be crossed. He therefore went with

THE YOUNG ARTIST

the family to see them comfortably settled in the new home.

The journey was made in early summer, and it was a pleasant one. Mrs. Fulton was happy to have her manly son with her again even for a short time. It was satisfying to feel that she was on her way to take possession of a farm of her own. All of them, but especially the young artist, enjoyed the picturesque scenery through which they passed.

The farm was just what Mrs. Fulton had often longed for. All worked with a will, and they soon had the house and the garden in good order. Neighbors came from distant farms to welcome them.

Robert felt sure that his mother and sisters would be happy and comfortable in their new home. He could go back to Philadelphia with a light heart. He felt that he ought to go without further delay.

Mrs. Fulton did not wish her brilliant son to stay on the farm and plow. She was proud of him and wanted him to go to the city and become great and famous. Yet it was hard to say good-bye, for it would be a long time before she would see him again.

On his return journey Robert Fulton rode through large tracts of rich, wild land. "Much of this land would make fertile farms," thought he. "But of what use would it be to raise a crop here? How could the farmer get it to market?"

That question came back to him again and again, and some years later he tried to answer it.

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Mr. Fulton had made many warm friends in Philadelphia. Those who understood his work best and valued it most highly advised him to go to England. He realized that he could make no further progress in Philadelphia, and decided to go abroad.

He wrote to the great Benjamin West, who promised to help him if he would go to England. As soon as his resolution became known, his friends in Philadelphia gave him letters of introduction to their friends in England and France. So he did not feel as if he were going altogether among strangers.

He crossed the ocean on a large ship with great white sails. When the sun was bright and a favorable breeze blew, the sails were filled with wind and the vessel flew like a bird over the blue waves. When a storm arose the sails had to be taken in, and the naked masts creaked and the wind whistled through the rigging. At other times there were days of calm when almost no breeze was stirring, and the great sails hung limp and motionless, and the ship floated idly on the sea.

After a long voyage the cry of "Land!" brought all the passengers on deck. Robert Fulton stood among them looking eagerly at the shores of the Old World. There he hoped to see wonderful pictures and meet renowned artists. He told himself that he would learn all they had to teach him, and that one day his work might be celebrated.

The ardor of the young artist was not soon dampened. Mr. West treated him with the greatest kindness. He invited him to his home and introduced him to his

THE YOUNG ARTIST

friends. He was pleased with his young countryman's pictures, and praised their beauty while he pointed out their faults.

The two artists became very fond of each other; they worked and walked and talked together in perfect good fellowship.

With such a powerful friend to introduce him, Mr. Fulton became acquainted with influential men who liked his work and bought his pictures. Every one that met the handsome young American liked him. Strangers were pleased with his fine face and his frank manly manner. When they knew him better they found he could talk as well as he could paint. And best of all, he proved to be a grateful, true, and generous friend. He was impulsive and warm hearted. He loved and trusted those whom he admired, and they could not help loving him in return.

CHAPTER IV

THE ARTIST BECOMES AN ENGINEER

Among Mr. Fulton's new friends there were many who, while somewhat interested in art, were much more interested in other subjects. They liked the young artist the better when they found that he knew about other things besides painting.

Mr. Fulton met, among others, a duke who had given a great deal of attention to canals. As he listened to the nobleman talk he said to himself, "I have found the answer to the question, 'How can the farmers on inland farms of Pennsylvania get their produce to market?'"

The duke was pleased to find Mr. Fulton such an eager listener. Later he was more delighted to hear his clever and original suggestions about canals. He thought that the clear and perfect drawings which he made to explain his ideas were more interesting than the finest paintings.

The two men formed a friendship that became stronger as years passed.

THE ARTIST BECOMES AN ENGINEER

Mr. Fulton, having had his interest in canals aroused, could not drive the subject from his mind. Nor did he wish to do so. To supply the farmers with a cheap and quick means of carrying their produce began to seem a more important matter than painting beautiful pictures.

The principal cities and villages in America were built on the coast or on rivers. Even farmers chose land near navigable water. For supplies were carried from the country to the city and from the city to the country in sloops, schooners, and barges.

Most of the transportation between places away from the water was done by wagons. Men, called teamsters, made a business of hauling goods from one place to another. There were few good roads in America then, for it took a great deal of money to make them. For that reason it cost almost as much as produce was worth to have it hauled to market by horses and wagons.

Some artificial water-ways had been built between places where there were no natural ones. These were called canals. The large freight boats used on them were pulled or towed by horses driven along a path on the bank of the canal. Heavy loads could be transported in that way at small cost. But such canals as were then built were so large and expensive that it was impossible to have many of them.

Mr. Fulton thought the canal was the most practical means known for conveying produce from one part of the country to another. And he was probably right. If you were to take a journey along the Erie Canal to-day,

FOUR AMERICAN INVENTORS

you would find that there are many who still use canals in preference even to railroads. In the summer and fall many fleets of grain barges towed by steam tugs pass along this canal.

But Mr. Fulton knew that his countrymen could not afford to build large canals in all the places where canals were needed. He thought that it would be better to make them smaller and to have more of them.

He wrote a book to explain his idea of an extensive system of small canals joining farms and villages. In the book he showed that such a system would not only benefit those who used the canals but would strengthen the nation. It would increase the value of the public lands in the interior. It would bring the people of different sections of the country into closer relations. They would have common business interests, and the Union would therefore be strengthened.

He showed how canals could be more simply made, and suggested improvements in canal boats.

If a canal should open into a river its waters would join those of the river and flow away towards the sea. So when a canal comes to a stream its waters have to be confined in a great, strong trough that crosses the river just as a bridge does. This is called an aqueduct. Aqueducts were made of stone in Fulton's time and were very costly.

Mr. Fulton thought they could be made of cast iron instead of stone. Others said that iron could not stand the changes in temperature and would break. But one of the stone aqueducts was destroyed in a flood

THE ARTIST BECOMES AN ENGINEER

and the men who rebuilt it followed Mr. Fulton's plan. The iron aqueduct wore so well that others were made like it. Afterwards iron was used commonly for that purpose.

Another expensive feature in canal building is the arrangement by which boats are raised and lowered from one section of the canal to another. Canals have to be level. There can be no slope to them as there is to a river. If the land slopes up, the canal is built in a series of level sections, each higher than the one before it.

It is customary to build locks for moving boats from one level to another. They are large, square tanks rising gradually like steps.

When a boat from above comes to one of these giant stairways its way is barred by big gates. These gates open



LOCKS, AND BOATS GOING DOWN

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inward and the pressure of the water against them holds them shut. Every one of the tanks or locks has a pair of these gates. They are all closed. When the boat is ready to go down, the valves of the canal gates leading to the first lock are opened. The water flows from the canal into this lock until it is as high in the lock as it is in the canal. The pressure of the water on both sides of the gates is then equal and the gates can be opened.

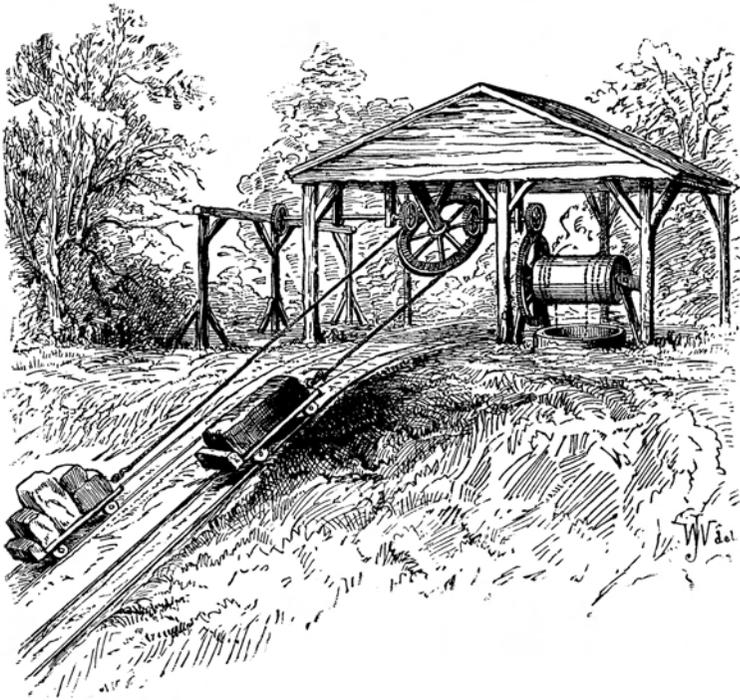
The boat passes into the lock and the gates behind it are closed. The valves in the gates leading to the next lower lock are opened and the water flows out of the first lock into the second until it is even in both. The gates are opened; the boat goes into the second lock and so on, until it is “down stairs.”

If the boat is to go up it enters the lowest lock. The gates are closed back of it; the valves of the upper gates are opened and the water runs from the upper into the lower lock until the water in both is level. Then the gates are opened and the boat goes into the higher lock. Thus step by step it climbs the hill.

Mr. Fulton thought that where locks were needed in small canals they should be made of wood instead of stone. But he believed that only a few of them, were needed.

He planned a cheaper way of moving canal boats from one level to another. His plan was to use double tracks on a sloping surface. One end of the tracks would be in the lower section of the canal; the other in a lock leading to the upper branch.

THE ARTIST BECOMES AN ENGINEER

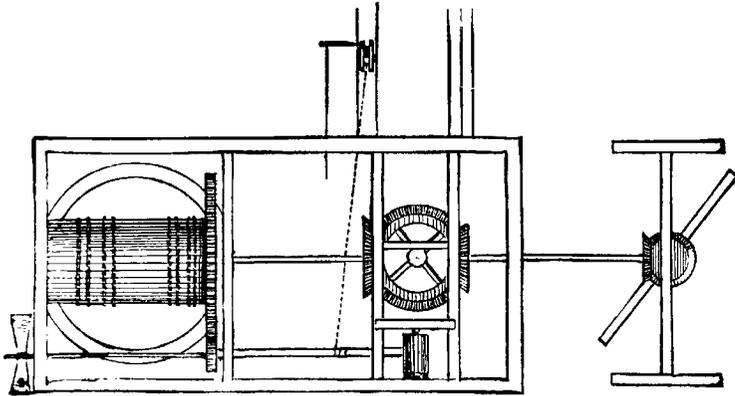


FULTON'S DOUBLE-INCLINED PLANE

When a boat wanted to reach the upper section of the canal a stout car or truck was sent down the slope into the water and the boat was floated upon it. This car was connected by a long chain that passed over a pulley at the top of the hill, with another car on the parallel track. The chain was so long that when one car was at the bottom of the slope the other was at the top. A heavy weight was kept on the second car, and when the car with the boat on it was ready to be brought up hill the weight on the other car was increased until it was greater than the weight of the boat. Then it began to go down hill, and as it went down it drew the car with the boat on it up. When it was in the lock the

FOUR AMERICAN INVENTORS

lower gates were closed and the valves in the upper gates were opened. The lock was filled with water and the boat could be taken on its way in the higher section of the canal.



DETAILS OF FULTON'S INCLINED PLANE

Mr. Fulton's views attracted much attention, and his suggestions were tried in many places with success.

He gave more and more time to engineering and less and less to art. At length he decided that he would make engineering rather than painting his life work. His skill with the pencil was by no means lost in his new business. He found it a great help in illustrating and explaining his plans.

While in England he invented and received patents for several improvements in canals and canal boats. He also invented a mill for sawing marble, a machine for spinning flax, and a machine for removing earth from canal beds.

When he left that country he was well known as an earnest promoter of the useful arts.

CHAPTER V

EXPERIMENTS

In 1797 Mr. Fulton left England to go to France. For some years he lived in Paris in the same house with Joel Barlow, a prominent American statesman and poet of that time. The two men formed a warm friendship. Mr. Fulton illustrated Barlow's greatest poem, the "Columbiad," which was dedicated to him. They worked together and were partners in many business ventures.

Robert Fulton's head was still very full of his own ideas, but he now thought it worth while to try to find room in it for some ideas from books. He studied mathematics, science, and foreign languages.

To earn money to pay his expenses he painted a panorama. The people of Paris had never seen one before. They thought it was very entertaining to see a story told in a succession of beautiful pictures, and went in large crowds to see it.

Study and painting were merely his pastimes, however. He gave his serious attention to making experiments. He seemed to be no longer interested in finding a way for his countrymen to transport food and

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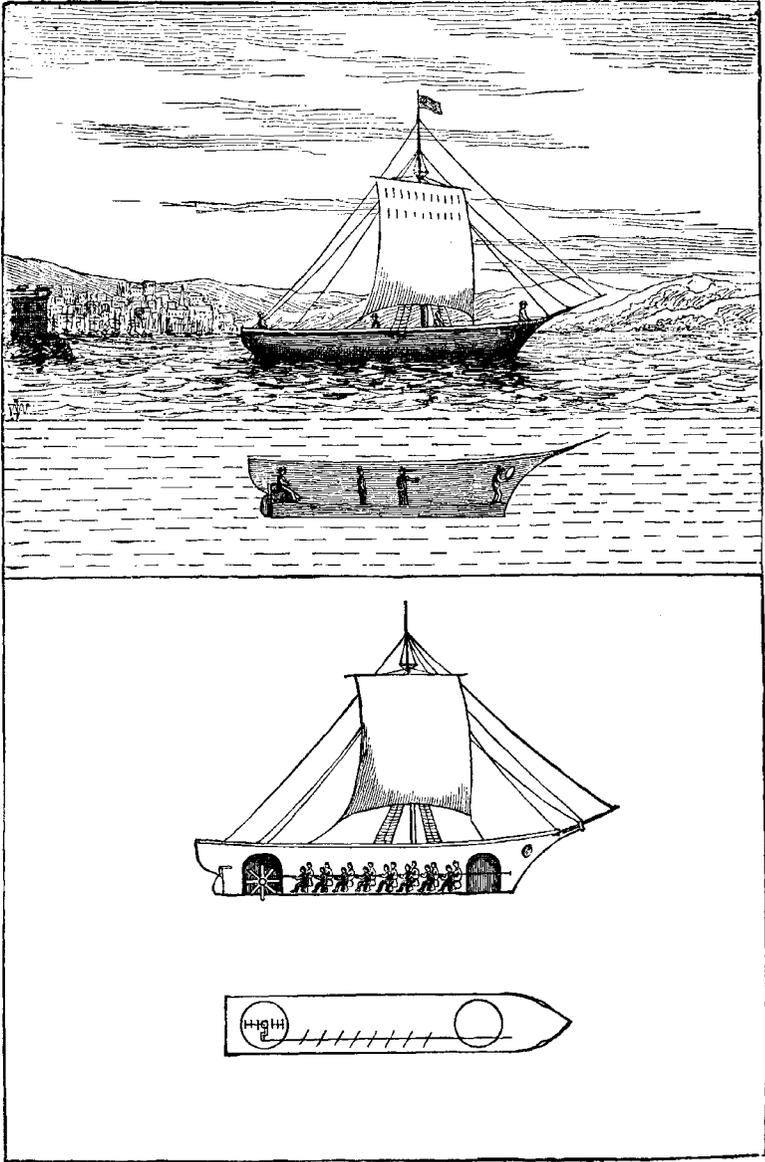
clothing and other necessities of life. He was trying to find a way to blow up warships.

You remember that in his boyhood days during the Revolution, he had spent hours in the gunsmiths' shops. Even then he had realized that gunpowder was a marvelous power, and he had discovered that man can measure and direct its force. He believed that new ways of controlling and using that force ought to be discovered.

He contrived a torpedo that would explode some minutes after the machinery attached to it had been set in motion. He then went to work to make a diving boat in which men could move about under water. With one of these boats a few men could go under a warship and fasten a torpedo to it. When they had it firmly fixed where they wanted it, they would start its machinery. They would have time to get well out of the way before the explosion.

He spent much money and time in his experiments with the diving boat and the torpedoes. He tried to interest the French and English governments in his inventions. Committees were appointed to see whether his invention was of any value. They found it to be all that Mr. Fulton claimed, but they did not like the idea that their splendid warships could be destroyed by a few men. It seemed to them that this invention would put too much power into the hands of the weak.

That had been Robert Fulton's idea in working with the torpedo and diving boat. In those days the seas were ruled by the nations that had the most warships. Many



FULTON'S SUBMARINE BOAT
(FROM AN OLD CUT)

FOUR AMERICAN INVENTORS

wrongs were suffered at sea by the traders of smaller nations whose navies were not strong. Troubles were constantly arising because of wrongs done at sea.

Mr. Fulton thought that if it were possible for a few men to destroy a warship the owners of the great warships would cease doing injury to others. For their own safety the strong would be obliged to agree to fair and just laws governing ocean trade.

So after all, in spite of first appearances, Robert Fulton was still struggling with the old question of how to help along transportation by water.

He had faith in his invention and in its usefulness to men. On one occasion he was offered a reward if he would keep his invention out of use in all countries.

He answered this offer in a very emphatic and patriotic manner. He said: "At all events I never will consent to let these inventions lie dormant, should my country at any time have need of them. Were you to grant me the annuity of twenty thousand pounds I would sacrifice all to the safety and independence of my country."

Finding that both England and France disapproved of his proposed invention, Mr. Fulton resolved to return to his native land.

Before starting on the voyage to America he made careful drawings and explanations of his boat and torpedo. These he left in England, so that in case of shipwreck, as he said, "the result of my studies and experience may not be lost to my country."

EXPERIMENTS

He expected to start in October and arrive at New York in November. He wrote to his friend, Mr. Barlow, who had already gone back to the United States: "I shall be with you I hope, in November, perhaps about the fourteenth, my birthday, so you must have a roast goose ready."

But he spent that birthday at sea. It was the thirteenth of December, 1806, when he landed in New York. He brought with him good health, good spirits, a high reputation, and great hopes. Moreover he had about £15,000, received for past work, many valuable pictures, and, last but not least, a mysterious steam engine.

CHAPTER VI

MAKING THE STEAMBOAT

There was a close connection between Robert Fulton's good spirits and that steam engine.

Do you remember the paddle wheels he made for the old fishing boat on the Conestoga River, when he was a boy? Those wheels were turned by a crank, and the boys had to turn the crank. Robert Fulton had often thought of that boat. How well it went when the crank was turned fast enough! If only an engine could be made for turning the crank, how much better a boat moved by paddle wheels would be than one moved by wind and sails! The steam engine which Mr. Fulton brought from England was intended for that very purpose. And now I will tell you how he got it.

While Mr. Fulton was staying in Paris, Chancellor Robert R. Livingston, a wealthy American patriot and statesman, went to France to act as United States minister to that country. The two men became acquainted.

Mr. Livingston was interested in science and mechanics. He had tried to make a steamboat but had failed. He still believed, however, that a steamboat could be made. Robert Fulton told him that he considered

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the steamboat both a possibility and a necessity. He was surprised that no one who had tried to make such a boat had succeeded, and he had often thought of trying it himself, but he had not had enough money for the undertaking.

Mr. Livingston was eager to have him devote his attention to the subject. He promised to furnish a certain portion of the money needed for the experiment. He also promised to use his influence to secure from the New York legislature the sole right to use steamboats on the waters in the state of New York.

FOUR AMERICAN INVENTORS

Experimenting with steamboats was expensive. So many had tried and failed that it was difficult to find any one who would risk money on a steamboat venture. Mr. Fulton was a practical man and did not act with blind enthusiasm. He counted the cost first, and if a thing was completely beyond his reach he did not attempt it. Before this he had looked upon the steamboat as something impossible, at least for him. But Mr. Livingston's generosity encouraged him to undertake to make such a boat, and with some hope of success.

In 1802, he went to a little village in France. There he made a small model of a steamboat with side wheels turned by machinery. He tried it on a stream, and it was so successful that he returned to Paris and had a large boat made like it.

When the boat was finished, it was launched on the Seine River. That was early in the spring of 1803. Both Mr. Livingston and Mr. Fulton believed that it would prove to be a success. They determined to make a trial trip, and invite their friends and other influential men to be present on that occasion.

But one morning, as Mr. Fulton was dressing, a boy came to his lodgings to tell him that the boat had sunk. When Mr. Fulton heard this his spirits sank too. For a moment he felt that it was useless to make any further efforts towards inventing a steamboat. He finished dressing in haste, and without stopping to eat breakfast, hurried to the place where the boat had been secured the night before. There was no sign of it.

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He found that it was under the water. He soon had men at work trying to raise the wreck. He did not merely stand on the bank and give orders to the laborers. He plunged into the river and worked the hardest of all. He worked all day and far into the night, without food or rest. He did not know that his clothes were wet through and through, that the spring air was cold, or that he had been long without food. He had no thought of himself. His whole mind was bent on saving his boat.

His energy inspired his helpers, and before the next day's sun rose, the fragments of the vessel and its engine were safe on dry land. The inventor examined the wreck and found that the vessel had broken in two in the middle. The framework was light and the machinery was heavy. The rocking of the waves had been too much for the little craft.

The machinery was put together again and a stronger boat was made. In August of the same year some of the distinguished citizens of Paris received cards inviting them to view the first trip of Mr. Fulton's steamboat.

It moved off in fine style, and all were well satisfied except the inventor. The boat did not go fast enough to suit him. But he saw that its speed could be increased by building a stronger engine.

Mr. Livingston was ready to furnish the money for such an engine. Mr. Fulton ordered it made in England. He did not tell what the engine was to be used for but gave careful directions as to how it should be constructed.

It was completed in 1806 and sent to America.

FOUR AMERICAN INVENTORS

Mr. Livingston had succeeded in getting an act passed by the legislature, giving to him and Mr. Fulton the sole right to use boats propelled by "fire or steam" on the waters of New York state for a term of twenty years. The bill was treated as a joke in the legislature. No one thought twenty years too long a time. One man suggested that the term be extended to one hundred or one thousand years; for all thought it improbable that such boats would ever be used at all.

Mr. Fulton had the boat built at the shipyards of Charles Brown on East River. He devoted most of his time during the winter of 1805 to superintending its construction. While it was being made men often stopped to look at the strange craft. Not knowing the inventor they sometimes talked freely in his presence. What they said was not flattering. They thanked fortune they were not so mad as to put faith and money in such a wild scheme. The steamboat enterprise was commonly called "Fulton's folly."

All the money that Mr. Livingston and Mr. Fulton had agreed to put into it had been spent. Still more was needed. They decided to take a third partner, but no one would join them. Mr. Livingston was unwilling to invest any more of his fortune in the venture, and Mr. Fulton had no money to risk.

It was hard to borrow money when he could offer no better security than an untried steamboat. But Mr. Fulton did not find it impossible. He selected men who were intelligent enough to understand and wealthy enough to risk a few thousand dollars. He went to

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them and explained his need. They laughed at first and refused to help him. But they were moved by his glowing words and his confidence of success, and when he left them it was usually with the money that he had asked for.

By his efforts the boat was finished and ready for trial late in the summer of 1807. She was named, in honor of Chancellor Livingston's beautiful home, the "Clermont." She was 130 feet long, 16½ feet wide, and 4 feet deep. The wheels were 15 feet in diameter with a two feet dip. The boiler was 20 feet by 7 feet by 18 feet.

The owners of the boat invited their friends to join them in the first trip up the Hudson. Some refused because they were ashamed to have it thought that they had any faith in the boat. Others accepted, fearing that they would have to condole with their hosts in their disappointment rather than rejoice with them at their success.