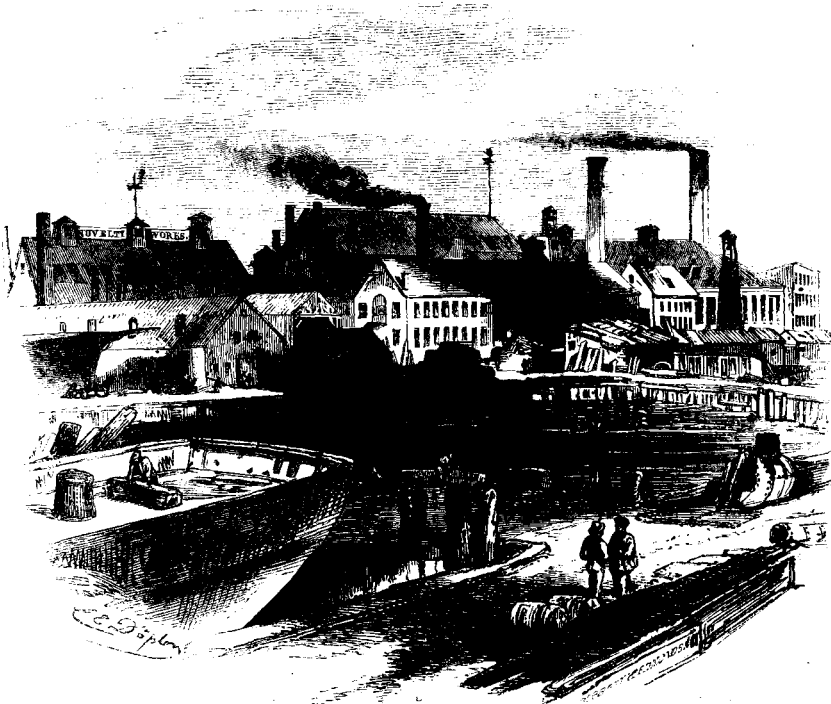


HARPER'S NEW MONTHLY MAGAZINE.

No. XII.—MAY, 1851.—VOL. II.



GENERAL VIEW OF THE NOVELTY IRON WORKS, NEW YORK.
(As seen from the East River.)

THE NOVELTY WORKS,
WITH SOME DESCRIPTION OF THE MACHINERY
AND THE PROCESSES EMPLOYED IN THE CON-
STRUCTION OF MARINE STEAM-ENGINES
OF THE LARGEST CLASS.

BY JACOB ABBOTT.

PERHAPS no one of those vast movements which are now going forward among mankind, and which mark so strikingly the industrial power and genius of the present age, is watched with more earnest interest by thinking men, than the successive steps of the progress by which the mechanical power of steam and machinery is gradually advancing, in its contest for the dominion of the seas. There is a double interest in this conflict. In fact, the conflict itself is a double one. There is first a struggle between the mechanical power and ingenuity of man, on the one hand, and the uncontrollable and remorseless violence of ocean storms on the other; and, secondly, there is the rivalry, not

unfriendly, though extremely ardent and keen, between the two most powerful commercial nations on the globe, each eager to be the first to conquer the common foe.

The armories in which the ordnance and ammunition for this warfare are prepared, consist, so far as this country is concerned, of certain establishments, vast in their extent and capacity, though unpretending in external appearance, which are situated in the upper part of the city of New York, on the shores of the East River. As the city of New York is sustained almost entirely by its commerce, and as this commerce is becoming every year more and more dependent for its prosperity and progress upon the power of the enormous engines by which its most important functions are now performed, the establishments where these engines are invented and made, and fitted into the ships which they are destined to propel, constitute really the heart of the metropolis; though the

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visitor, who comes down for the first time by the East River, from the Sound, in the morning boat from Norwich or Fall River, is very prone to pass them carelessly by—his thoughts intent upon what he considers the superior glory and brilliancy which emanate from the hotels and theatres of Broadway.

In fact, there is very little to attract the eye of the unthinking traveler to these establishments as he glides swiftly by them in the early morning. He is astonished perhaps at the multitude of steamers which he sees lining the shores in this part of the city, some drawn up into the docks for repairs; others new, and moored alongside a pier to receive their machinery; and others still upon the stocks in the capacious ship-yards, in the various stages of that skeleton condition which in the ship marks the commencement, as in animal life it does the end, of existence. Beyond and above the masts and spars and smoke-pipes of this mass of shipping, the observer sees here and there a columnar chimney, or the arms of a monstrous derrick or crane, or a steam-pipe ejecting vapor in successive puffs with the regularity of an animal pulsation. He little thinks that these are the beatings which mark the spot where the true heart of the great metropolis really lies. But it is actually so. The splendor and the fashion of the Fifth Avenue, and of Union-square, as well as the brilliancy, and the ceaseless movement and din of Broadway, are the mere incidents and ornaments of the structure, while these establishments, and others of kindred character and function, form the foundation on which the whole of the vast edifice reposes.

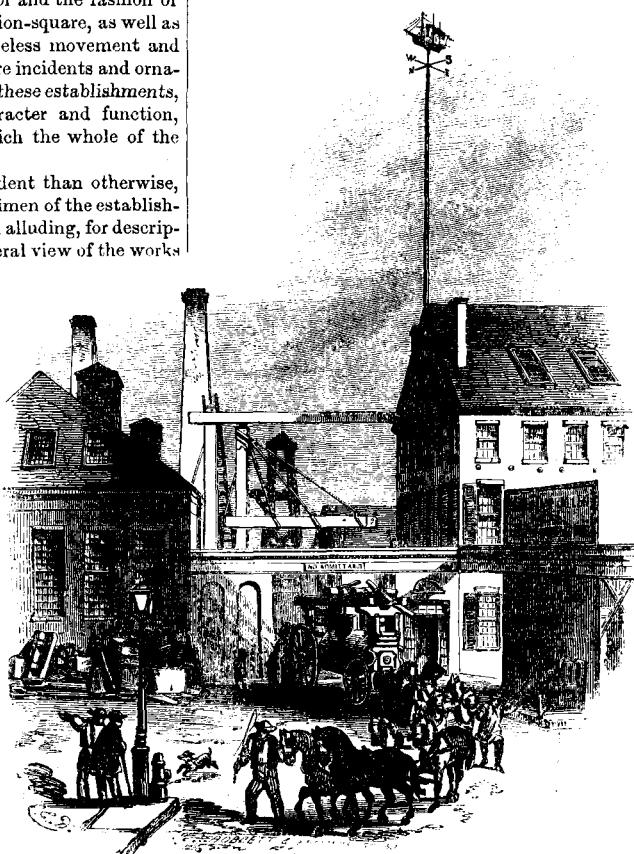
We select, rather by accident than otherwise, the Novelty Works as a specimen of the establishments to which we have been alluding, for description in this Number. A general view of the works as they appear from the river, is presented in the engraving at the head of this article, with the docks and piers belonging to the establishment in the foreground.

The entrance to the inclosure is by a great gateway, through which the visitor on approaching it, will very probably see an enormous truck or car issuing, drawn by a long team of horses, and bearing some ponderous piece of machinery suspended beneath it by means of levers and chains. On the right of the entrance gate is the porter's lodge, with entrances from it to the offices, as represented in the plan on the adjoining page. Beyond the entrance, and just within the inclosure may be seen a great crane used for receiving or deliv-

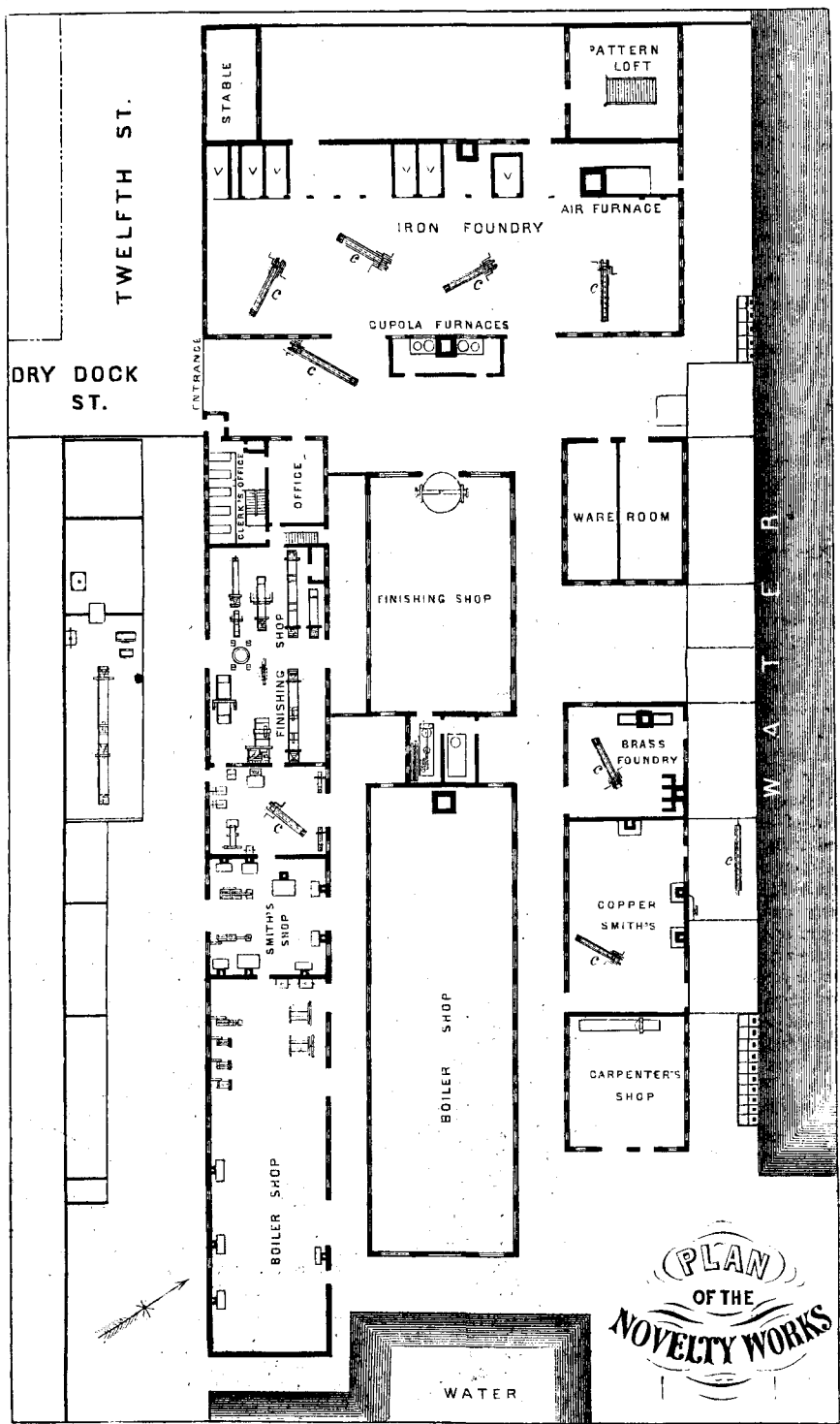
ering the vast masses of metal, the shafts, the cylinders, the boilers, the vacuum pans, and other ponderous formations which are continually coming and going to and from the yard. Beyond the crane is seen the bell by which the hours of work are regulated.

The plan upon the adjoining page will give the reader some idea of the extent of the accommodations required for the manufacture of such heavy and massive machinery. On the right of the entrance may be seen the porter's lodge, shown in perspective in the view below. Beyond it, in the yard, stands the crane, which is seen likewise in the view. Turning to the left, just beyond the crane, the visitor enters the iron foundry, a spacious inclosure, with ovens and furnaces along the sides, and enormous cranes swinging in various directions in the centre. These cranes are for hoisting the heavy castings out of the pits in which they are formed. The parts marked v v v, are ovens for drying the moulds.

Turning to the right from the foundry, and passing down through the yard, the visitor finds himself in the midst of a complicated maze of buildings, which extend in long ranges toward the water, with lanes and passages between them



ENTRANCE TO THE NOVELTY WORKS.



like the streets of a town. In these passages companies of workmen are seen, some going to and fro, drawing heavy masses of machinery upon iron trucks; others employed in hoisting some ponderous cylinder or shaft by a crane, or stacking pigs of iron in great heaps, to be ready for the furnaces which are roaring near as if eager to devour them. And all the time there issues from the open doors of the great boiler-shops and forging-shops below, an incessant clangor, produced by the blows of the sledges upon the rivets of the boilers, or of the trip-hammers at the forges.

The relative positions of the various shops where the different operations are performed will be seen by examination of the plan. The motive power by which all the machinery of the establishment is driven, is furnished by a stationary engine in the very centre of the works, represented in the plan. It stands between two of the principal shops. On the right is seen the boiler, and on the left the engine—while the black square below, just within the great boiler-shop, represents the chimney. Other similar squares in different parts of the plan represent chimneys also, in the different parts of the establishment. These chimneys may be seen in perspective in the general view, at the head of this article, and may be identified with their several representations in the plan, by a careful comparison. The one belonging to the engine is the central one in the picture as well as in the plan—that is, the one from which the heaviest volume of smoke is issuing.

This central engine, since it carries all the machinery of the works, by means of which every thing is formed and fashioned, is the life and soul of the establishment—the *mother*, in fact, of all the monsters which issue from it; and it is impossible to look upon her, as she toils on industriously in her daily duty, and think of her Titanic progeny, scattered now over every ocean on the globe, without a certain feeling of respect and even of admiration.

A careful inspection of the plan will give the reader some ideas of the nature of the functions performed in these establishments, and of the general arrangements adopted in them. The magnitude and extent of them is shown by this fact, that the number of men employed at the Novelty Works is from one thousand to twelve hundred. These are all *men*, in the full vigor of life. If now we add to this number a proper estimate for the families of these men, and for the mechanics and artisans who supply their daily wants, all of whom reside in the streets surrounding the works, we shall find that the establishment represents, at a moderate calculation, a population of *ten thousand souls*.

The proper regulation of the labors of so large a body of workmen as are employed in such an establishment, requires, of course, much system in the general arrangements, and very constant and careful supervision on the part of those intrusted with the charge of the various divisions of the work. The establishment forms, in fact, a regularly organized community, having, like

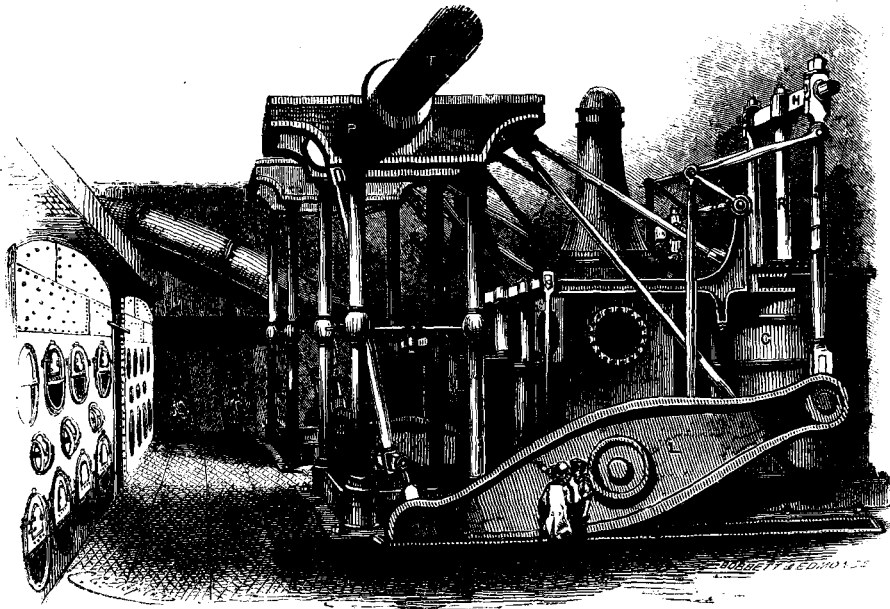
any state or kingdom, its gradations of rank, its established usages, its written laws, its police, its finance, its records, its rewards, and its penalties. The operation of the principles of system, and of the requirements of law, leads, in such a community as this, to many very curious and striking results, some of which it would be interesting to describe, if we had space for such descriptions. But we must pass to the more immediate subject in this article, which is the structure of the engine itself, and not that of the community which produces it.

The engraving on the next page represents the interior of the engine-room of the Humboldt—a new steamer, which was lying at the dock at the time of our visit, receiving her machinery; though probably before these pages shall come under the eye of the reader, she will be steadily forcing her way over the foaming surges of the broad Atlantic. The machinery, as we saw it, was incomplete, and the parts in disorder—the various masses of which it was ultimately to be composed, resting on temporary supports, in different stages, apparently of their slow journey to the place and the connection in which they respectively belonged. The ingenious artist, however, who made the drawings, succeeded in doing, by means of his imagination, at once, what it will require the workmen several weeks to perform, with all their complicated machinery of derricks, tackles, and cranes. He put every thing in its place, and has given us a view of the whole structure as it will appear when the ship is ready for sea.

There are *two* engines and *four* boilers; thus the machinery is all double, so that if any fatal accident or damage should accrue to any part, only one half of the moving force on which the ship relies would be suspended. The heads of two of the boilers are to be seen on the left of the view. They are called the *starboard* and *larboard* boilers—those words meaning *right* and *left*. That is, the one on the right to a person standing before them in the engine room, and facing them, is the starboard, and the other the larboard boiler. It is the larboard boiler which is nearest the spectator in the engraving.

The boilers, the heads of which only are seen in the engraving, are enormous in magnitude and capacity, extending as they do far forward into the hold of the ship. In marine engines of the largest class they are sometimes thirty-six feet long and over twelve feet in diameter. There is many a farmer's dwelling house among the mountains, which is deemed by its inmates spacious and comfortable, that has less capacity. In fact, placed upon end, one of these boilers would form a tower with a very good sized room on each floor, and four stories high. The manner in which the boilers are made will be presently explained.

The steam generated in the boilers is conveyed to the engine, where it is to do its work, by what is called the steam pipe. The steam pipe of the larboard engine, that is, of the one nearest the spectator, is not represented in the engraving.



GENERAL VIEW OF A MARINE ENGINE.

ing, as it would have intercepted too much the view of the other parts. That belonging to the starboard engine, however, may be seen passing across from the boiler to the engine, on the back side of the room. The destination of the steam is the *cylinder*.

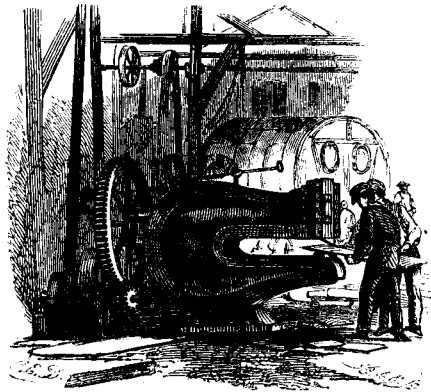
The cylinder, marked C, is seen on the extreme right, in the view. It may be known, too, by its form, which corresponds with its name. The cylinder is the heart and soul of the engine, being the seat and centre of its power. The steam is generated in the boilers, but while it remains there it remains quiescent and inert. The action in which its mighty power is expended, and by means of which all subsequent effects are produced, is the lifting and bringing down of the enormous piston which plays within the cylinder. This piston is a massive metallic disc or plate, fitting the interior of the cylinder by its edges, and rising or falling by the expansive force of the steam, as it is admitted alternately above and below it.

The round beam which is seen issuing from the centre of the head of the cylinder is called the piston rod. The piston itself is firmly secured to the lower end of this rod within the cylinder. Of course, when the piston is forced upward by the pressure of the steam admitted beneath it, the piston rod rises, too, with all the force of the expansion. This is, in the case of the largest marine engines, a force of about a hundred tons. That is to say, if in the place of the cross head—the beam marked H in the engraving which surmounts the piston—there were a mass of rock weighing a hundred tons, which would be, in the case of granite, a block

four feet square and eighty feet high, the force of the steam beneath the piston in the cylinder would be competent to lift it.

The piston rod, rising with this immense force carries up the cross head, and with the cross head the two *side rods*, one of which is seen in full, in the engraving, and is marked S. There is a side rod on each side of the cylinders. The lower ends of these rods are firmly connected with the back ends of what are called the *side levers*. One of these side levers is seen in full view in the engraving. It is the massive flat beam, marked L, near the fore-ground of the view. It turns upon an enormous pivot which passes through the centre of it, as seen in the drawing, in such a manner that when the cylinder end is drawn up by the lifting of the cross head, the other end is borne down to the same extent, and with the same prodigious force. There is another side beam, on the other side of the cylinder, which moves isochronously with the one in view. The forward end of this other beam may be seen, though the main body of it is concealed from view. These two forward ends of the levers are connected by a heavy bar, called the *cross tail*, which passes across from one to the other. From the centre of this cross tail, a bar called the connecting rod rises to the crank, where the force exerted by the steam in the cylinders is finally expended in turning the great paddle wheels by means of the main shaft, S, which is seen resting in the pillow block, P, above. These are the essential parts of the engine, and we now proceed to consider the mode of manufacturing these several parts, somewhat in detail.

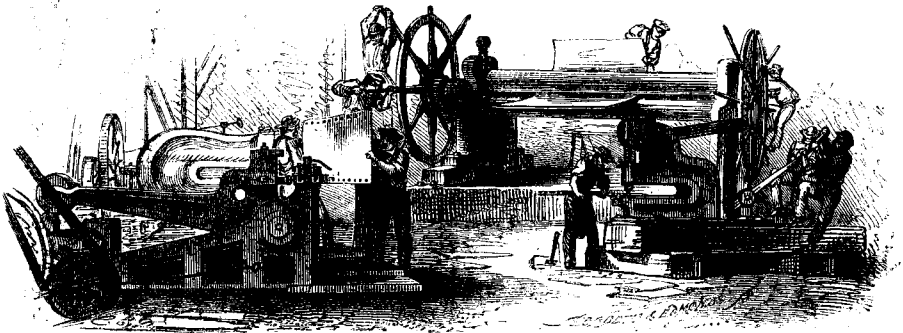
The boilers are formed of wrought iron. The material is previously rolled into plates of the requisite thickness, and then the first part of the process of forming these plates into a boiler is to cut them into proper forms. The monster that fulfills the function of shears for this purpose, bears a very slight resemblance to any ordinary cutting implement. It resembles, on the other hand, as represented in the adjoining engraving, an enormous letter U, standing perpendicularly upon one of its edges. Through the centre of the upper branch of it there passes a shaft or axle, which is turned by the wheels and machinery behind it, and which itself works the cutter at the outer end of it by means of an eccentric wheel. This cutter may be seen just protruding from its place, upon the plate which the workmen are holding underneath. The iron plates thus presented are sometimes nearly half an inch thick, but the monstrous jaw of the engine, though it glides up and down when there is nothing beneath it in the most gentle and quiet manner possible, cuts them



THE CUTTING ENGINE.

through, as if they were plates of wax, and apparently without feeling the obstruction.

The plates, when cut, are to be bent to the proper curvature. The machine by which this



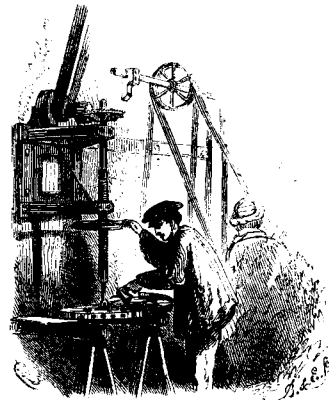
THE BENDING AND PUNCHING ENGINES.

bending is effected is seen above, in the background. It consists of three rollers, placed in such a position in relation to each other, that the plate, in being forced through between them, is bent to any required curvature. These rollers are made to revolve by great wheels at the sides, with handles at the circumference of them, which handles act as levers, and are worked by men, as seen in the engraving.

The separate plates of which a boiler is composed are fastened together by means of massive rivets, and it is necessary, accordingly, to punch rows of holes along the edges of the plates for the insertion of the rivets. This process may be seen on the *left* in the above engraving. Two men are holding the plate which is to be punched. The punch is driven through the plate by means of the great lever, which forms the upper part of the engine. The upright part in front is driven forward by means of the cam in the large wheel behind, a part of which only is seen in the engraving. This cam raises the long arm of the lever by means of the pulley in the end of it, and so drives the point of the punch through the plate. There is a support for the plate behind it, between the plate and the man, with a small opening in it, into which the punch enters, driving before it the round

button of iron which it has cut from the plate.

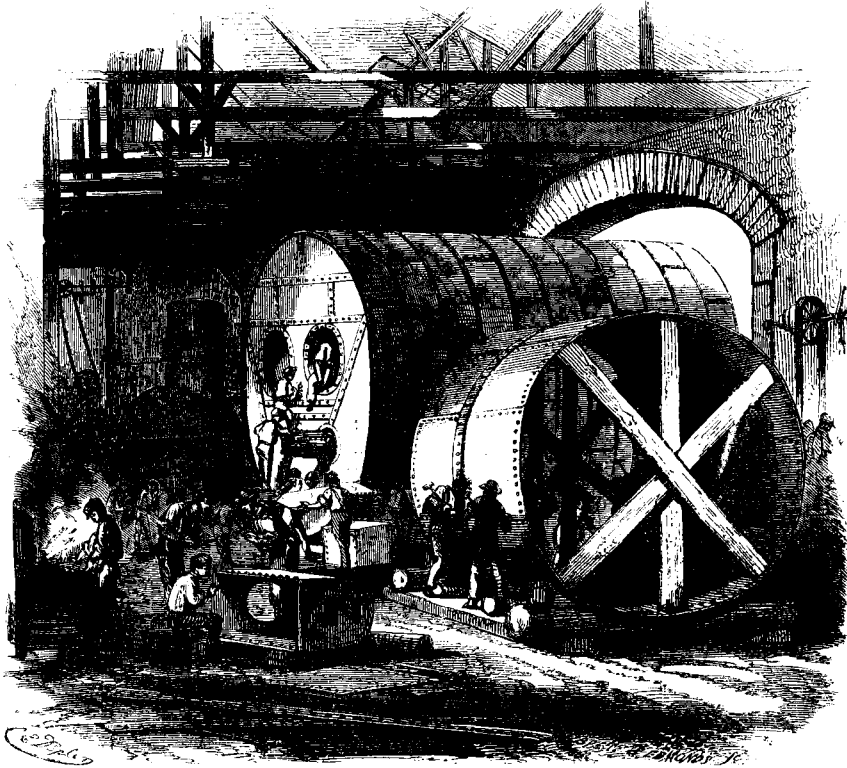
On the right, in the above engraving, is a punching engine worked by men, the other being driven by steam power. These machines are sufficient to make all the ordinary perforations required in boiler-plates. Larger holes, when required, have to be bored by a drill, as represented in the following engraving.



THE BORING ENGINE.

The view below represents the interior of one of the great boiler rooms where the boilers are put together by riveting the plates to each other at their edges. Some men stand inside, holding heavy sledges against the heads of the rivets, while others on the outside, with other sledges, beat down the part of the iron which protrudes, so as to form another head to each rivet, on the

outside. This process can be seen distinctly in the boiler nearest to the observer in the view below. The planks which are seen crossing each other in the open end, are temporary braces, put in to preserve the cylindrical form of the mass, to prevent the iron from bending itself by its own weight, before the iron heads are put in.



RIVETING THE BOILERS.

Sometimes operations must be performed upon the sides of the boiler requiring the force of machinery. To effect this purpose, shafts carried by the central engine to which we have already alluded, are attached to the walls in various parts of the room, as seen in the engraving. Connected with these shafts are various drilling and boring machines, which can at any time be set in motion, or put to rest, by being thrown in or out of gear. One of these machines is seen on the right of the boiler above referred to, and another in the left-hand corner of the room quite in the back-ground. Near the fore-ground, on the left, is seen a forge, where any small mass of iron may be heated, as occasion may require.

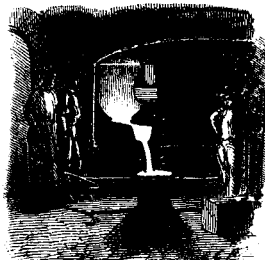
The semi-cylindrical piece which lies in the centre of the room, toward the fore-ground, is part of a locomotive boiler, and is of course much smaller in size than the others, though it is constructed in the same manner with the large boilers used for sea-going ships. The process of riveting, as will be seen by the engraving,

is the same. One man holds up against the under side of the plate a support for the rivet, while two men with hammers form a head above—striking alternately upon the iron which protrudes.

From the boiler we proceed to the cylinder, which is in fact the heart of the engine,—the seat and centre of its power. It is to the cylinder that the steam, quietly generated in the boiler, comes to exercise its energy, by driving, alternately up and down, the ponderous piston. The cylinder must be strong so as to resist the vast expansive force which is exercised within it. It must be stiff, so as to preserve in all circumstances its exact form. It must be substantial, so as to allow of being turned and polished on its interior surface with mathematical precision, in order that the piston in ascending and descending, may glide smoothly up and down, without looseness, and at the same time without friction. To answer these conditions it is necessary that it should be formed of cast iron.

The cylinders are cast, accordingly, in the iron foundry, which, as will be seen by the plan, is on the left, as the visitor enters the works. There is a range of monstrous cranes extending through the interior of the room, as represented in the plan, one of which is exhibited conspicuously in the engraving below. At different places in the ground, beneath this foundry, for it has no floor, there have been excavated deep pits, some of which are twelve feet in diameter and eighteen feet deep, the sides of which are secured by strong inclosures, formed of plates of boiler iron riveted together. These pits are filled with moulding sand—a composition of a damp and tenacious character, used in moulding. The mould is made and lowered into one of these pits, the pit is filled up, the sand being rammed as hard as possible all around it. When all is ready, the top of the mould, with the cross by which it is to be lifted and lowered surmounting it, presents the appearance represented on the right hand lower corner of the engraving below.

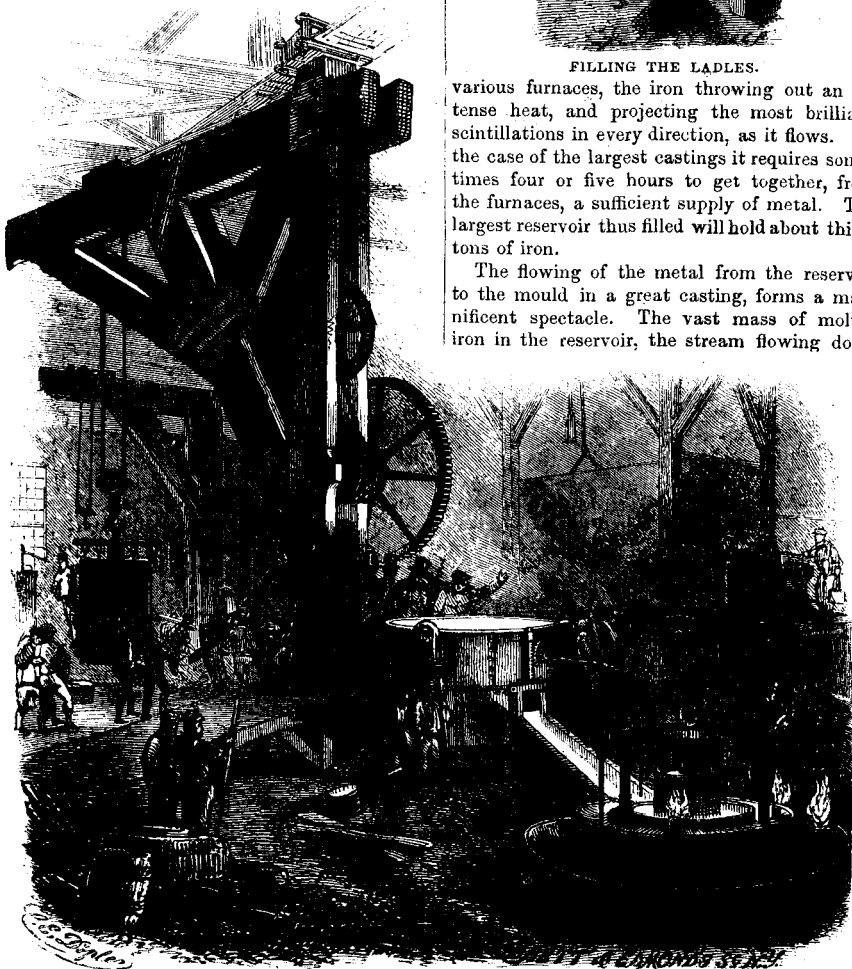
A reservoir to contain the melted metal necessary for the casting is then placed in a convenient position near it, with a channel or conduit leading from it to the mould. This reservoir may be seen in the engraving near the centre of the view, at the foot of the crane. An inclined plane is then laid, as seen in the engraving, to the left of the reservoir, up which the workmen carry the molten metal in ladles, which, though they do not appear very large, it requires *five men* to carry. A party carrying such a ladle may be seen in the engraving in the back-ground on the left. These ladles are filled from the



FILLING THE LADLES.

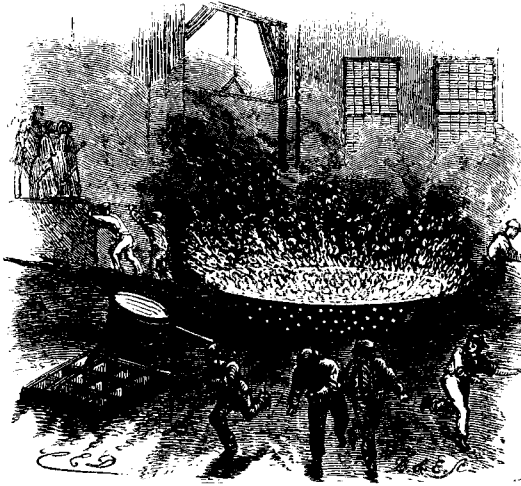
various furnaces, the iron throwing out an intense heat, and projecting the most brilliant scintillations in every direction, as it flows. In the case of the largest castings it requires sometimes four or five hours to get together, from the furnaces, a sufficient supply of metal. The largest reservoir thus filled will hold about thirty tons of iron.

The flowing of the metal from the reservoir to the mould in a great casting, forms a magnificent spectacle. The vast mass of molten iron in the reservoir, the stream flowing down



CASTING A CYLINDER.

the conduit, throwing out the most brilliant corruscations, the gaseous flames issuing from the upper portions of the mould, and the currents of melted iron which sometimes overflow and spread, like mimic streams of lava, over the ground, present in their combination quite an imposing pyrotechnic display. In fact there is a chance for the visitor, in the case of castings of a certain kind, that he may be treated to an



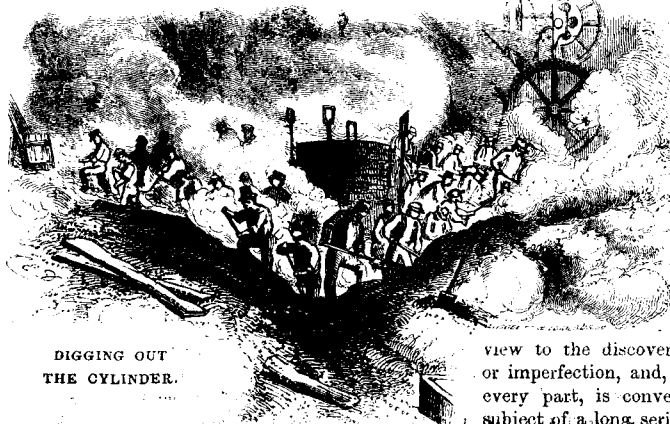
THE EXPLOSION.

explosion as a part of the spectacle. The imprisoned vapors and gases which are formed in the mould below, break out sometimes with considerable violence, scattering the burning and scintillating metal in every direction around.

When the casting is completed it is of course allowed to remain undisturbed until the iron has had time to cool, and then the whole mass is to be dug out of the pit in which it is imbedded. So much heat, however, still remains in the iron and in the sand surrounding it, that the mould

It is necessary that the sand which surrounds these moulds should be rammed down in the most compact and solid manner to sustain the sides of the mould and enable them to resist the enormous pressure to which it is subject, especially in the lower portions, while the iron continues fluid. In the case of iron, the weight of four inches in height is equivalent to the pressure of a pound upon the square inch. In a pit, therefore, eighteen feet deep, as some of the pits at this foundry are, we should have a pressure at the bottom of fifty-four pounds to the inch. Now, in the most powerful sea-going steamers, the pressure of steam at which the engines are worked, is seldom more than *eighteen* pounds to the inch; that of the Cunard line is said to be from twelve to fifteen, and that of the Collins line from fifteen to eighteen. In other words there is a pressure to be resisted at the lower ends of these long castings equal to three times that at which the most powerful low pressure engines are worked, and which sometimes results in such terrific explosions.

When the cylinder is freed from the pressure of the sand around it, in its bed, the great iron cross by which the mould was lowered into the pit, as seen in the engraving of the Casting, is once more brought down to its place, and the stirrups at the tops of the iron rods seen in the engraving below, are brought over the ends of the arms of the cross. The lower ends of these rods take hold of a frame or platform below, upon which the whole mould, together with the cylinder within it, is supported. The arm of the crane is then brought round to the spot. The hook pendant from it is attached to the ring in the centre of the cross, and by means of

DIGGING OUT
THE CYLINDER.

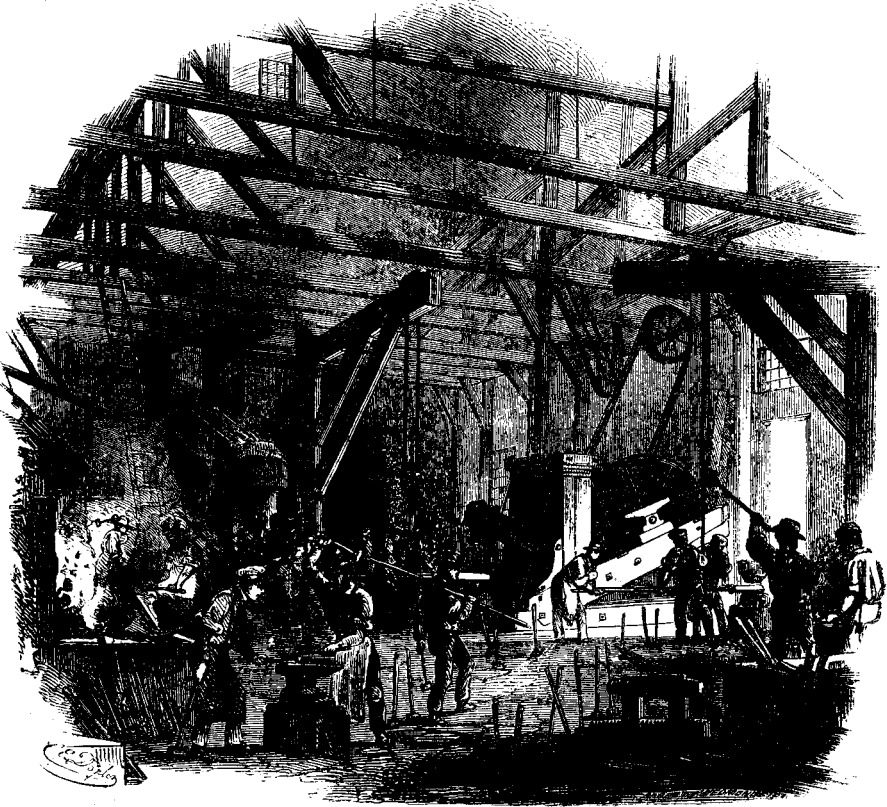
itself and the twenty or thirty men engaged in disinterring it, are enveloped in dense clouds of vapor which rise all around them while the operation is proceeding.

the wheels and machinery of the crane, the whole is slowly hoisted out, and then swung round to some convenient level, where the ponderous mass is freed from its casing of masonry, and brought out at last to open day. It is then thoroughly examined with a view to the discovery of any latent flaw or imperfection, and, if found complete in every part, is conveyed away to be the subject of a long series of finishing operations in another place,—operations many and complicated, but all essential to enable it finally to fulfill its functions.

These cylinders though very massive and pon-

derous are not the heaviest castings made. They are much exceeded in weight by what is called a bed plate, which is an enormous frame of iron cast in one mass, or else in two or three separate masses and then strongly bolted together, to form a foundation on which the engine is to rest in the hold of the ship. The bed plate can not be seen in the view of the engine room already given, as it lies below the floor, being underneath all the machinery. A bed plate weighs sometimes thirty-five tons—which is the weight of about five hundred men. Such a mass as this has to be transported on ways, like those used in the launching of a ship. It is drawn along upon these ways by blocks and pulleys, and when brought alongside the ship is hoisted on board by means of an enormous derrick, and let down slowly to the bottom of the hold—the place where it is finally to repose, unless perchance it should at last be liberated by some disaster, from this dungeon, and sent to seek its ultimate destination in the bottom of the sea.

The engraving below represents the forges, where all those parts of the machinery are formed and fitted which consist of wrought iron. The room in which these forges are situated is called the smith's shop, in the plan. In the back-ground, a little to the right, is one of the trip hammers, in the act of striking. The trip-hammer is a massive hammer carried by machinery. The machinery which drives it may at any time be thrown in or out of gear, so that the blows of the hammer are always under the control of the workman. The iron bar to be forged is far too heavy to be held by hand. It is accordingly supported as seen in the engraving, by a crane; and only guided to its place upon the anvil by the workmen who have hold of it. The chain to which this bar is suspended comes down from a little truck which rests upon the top of the crane, and which may be made to traverse to and fro, thus carrying whatever is suspended from it further outward, or drawing it in, as may be required. All the cranes, both



THE FORGES.

in the smith's shop and in the foundry, are fitted with the same contrivance. These trucks are moved by means of a wheel at the foot of the crane.

On the extreme right of the picture, and somewhat in the distance, may be seen another trip-hammer with a bar upon the anvil beneath it,

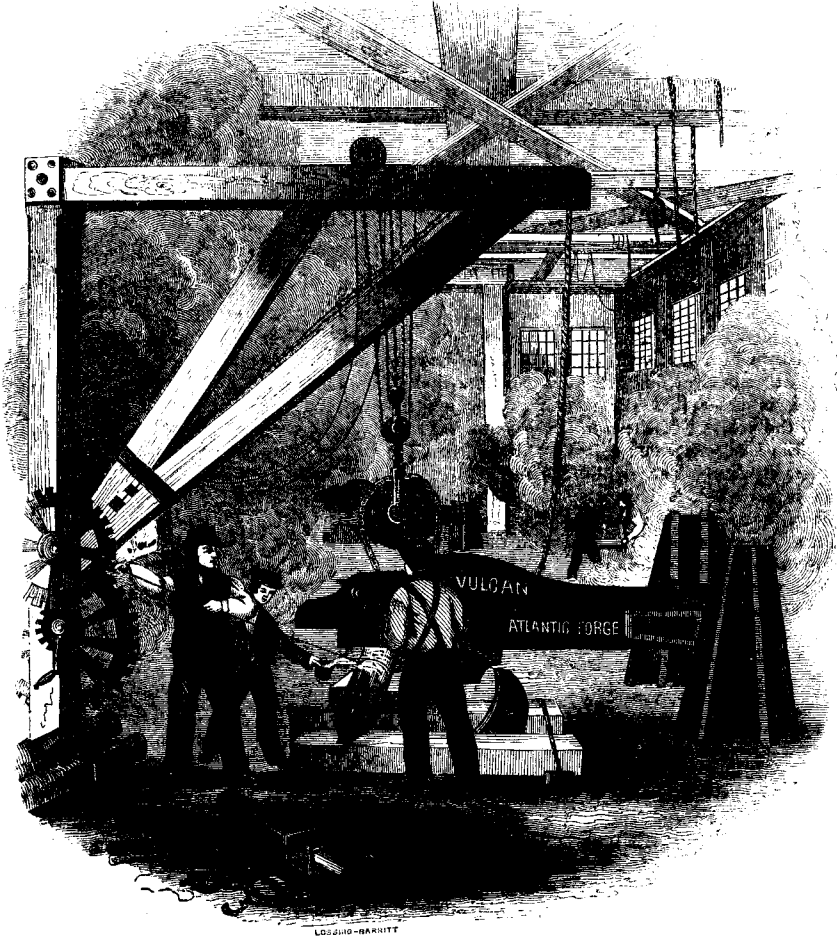
this bar being suspended likewise from a crane. When the iron becomes too cold to yield any longer to the percussion, the hammer is stopped, the crane is swung round, and the iron is replaced in the forge to be heated anew; and at length, when heated, it is brought back again under the hammer as before.

The forging of shafts requires heavier machinery even than this. The enormous mass of iron that is in this case to be forged, is bricked up in a furnace to be heated, and remains there many hours. The masonry is then broken away and the red hot beam is swung round under the hammer, as seen below. It is suspended from the crane by heavy chains, and is guided by the workmen by means of iron handles clamped to it at a distance from the heated part, as seen in the engraving in the adjoining column. The hammer is lifted by means of the cam below it, as seen in the engraving below. This cam is a projection from an axis revolving beneath the floor, and which, as it revolves, carries the cams successively against a projection upon the under side of the hammer, which is partly concealed in the engraving by the figure of the man. When the point of the cam has passed beyond the projection it allows the hammer to fall.

While the process of forging such a shaft is going on, one man throws water upon the work,



HEATING A SHAFT.

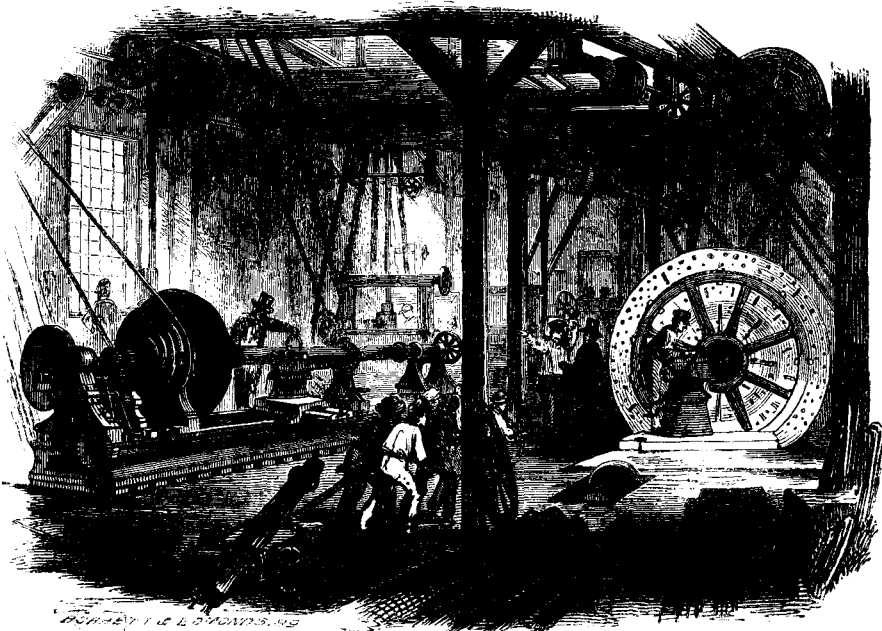


FORGING A SHAFT.

to effect some purpose connected with the scaling of the iron, while another, with an instrument called the callipers, measures the diameter of the shaft, to regulate the size, as the forging proceeds.

The shafts, when forged, are to be turned in a lathe, and the engine used for this purpose is represented on the left in the engraving below.

The shaft itself is seen in the lathe, while the tool which cuts it as it revolves, is fixed firmly in the "rest," which slides along the side. The point of the tool is seen in the engraving, with the spiral shaving which it cuts falling down from it. The shaft is made to revolve by the band seen coming down obliquely from above, at the hither end of the engine. The



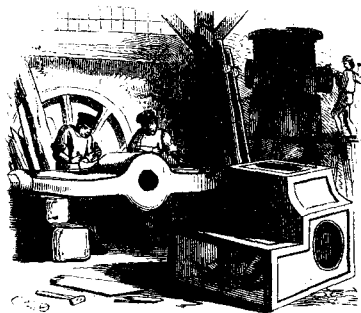
THE LATHES.

wheel by which the band turns the lathe has different grooves at different distances from the centre, in order that the workmen may regulate the velocity of the rotation—as different degrees of velocity are required for the different species of work. The *rest*, to which the cutting tool is attached, is brought slowly along the side of the shaft as the shaft revolves, by means of a long screw which is concealed in the frame of the lathe, and which is turned continually by the mechanism of the small wheels which are seen at the hither end of the engine.

On the right hand of this view is represented another kind of lathe called a *face lathe*, which is employed for turning wheels, and flat plates, and interiors of cavities, and such other pieces of work as do not furnish two opposite points of support. In the foreground are a company of men drawing a massive piece of iron upon a truck, destined apparently to be turned in the left hand lathe.

Although thus a great part of the work in respect to all the details of the engine, is performed by machinery, much remains after all to be wrought and fashioned by hand. In passing through the establishment the visitor finds the workmen engaged in these labors, in every con-

ceivable attitude and position. One man is filing a curved surface with a curved file, an-



FINISHING.

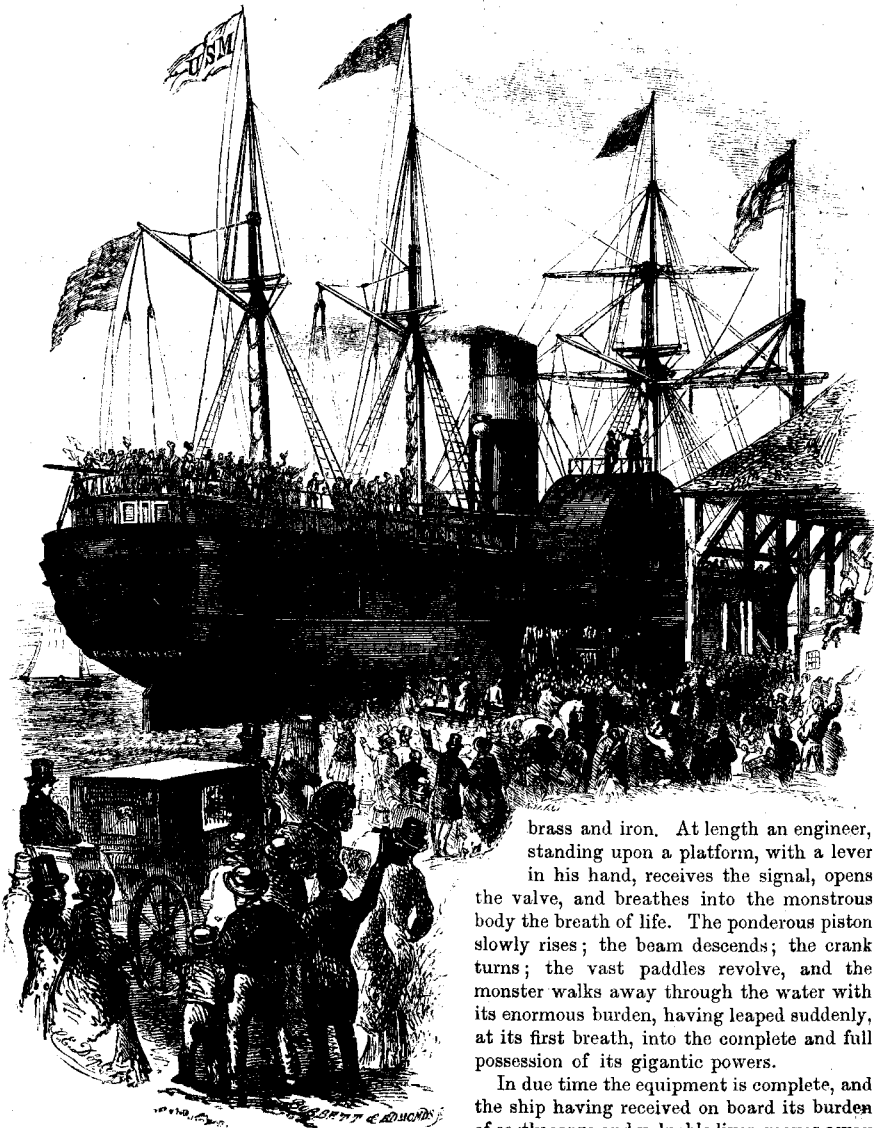
other is hidden almost wholly from view within a great misshapen box of iron: a third is mounted upon a ladder, and is slowly boring through the wall of some monstrous formation, or cutting away excrescences of iron from some massive casting with a cold chisel. In a word, the details are so endlessly varied as to excite the wonder of the beholder that any human head should have been capable of containing

them all, so as to have planned and arranged the fitting of such complicated parts with any hope of their ever coming rightly together.

They do come together, however, at last, and then follows the excitement of the trial. There is nothing more striking in the history of the construction of a steam engine than this, that there can be no partial or private tests of the work by the workmen in the course of its progress—but every thing remains in suspense until all is complete, and the ship and the machinery are actually ready for sea. The immense and ponderous masses which constitute the elements of the mighty structure are hoisted slowly on board and let down into their places. Multitudes of men are incessantly employed for

many weeks in arranging the limbs and members of the monster, and in screwing and bolting every thing into its place. Still nothing can be tried. The machinery is too ponderous and massive to be put in action by any power less than that of the mighty mover on which its ultimate performance is to depend; and this mover has not yet been called into being.

At length the day of trial arrives. The engineers, the workmen, the owners, and perhaps many spectators, have assembled to watch the result. The boiler is filled; the fires are lighted. Hour after hour the process goes on of raising the force and pressure of the steam. All this time, however, the machinery lies inert and lifeless. It is a powerless mass of dead and heavy



brass and iron. At length an engineer, standing upon a platform, with a lever in his hand, receives the signal, opens the valve, and breathes into the monstrous body the breath of life. The ponderous piston slowly rises; the beam descends; the crank turns; the vast paddles revolve, and the monster walks away through the water with its enormous burden, having leaped suddenly, at its first breath, into the complete and full possession of its gigantic powers.

In due time the equipment is complete, and the ship having received on board its burden of costly cargo and valuable lives, moves away

DEPARTURE OF THE PACIFIC FOR EUROPE.

from the shore, with a certain expression of calm and quiet dignity in her appearance and demeanor, which almost seems to denote a consciousness on her part of the vast responsibilities which she is assuming, and of the abundant power which she possesses fully to sustain them all.

CHARLES WOLFE.

IT is probable that to many of our readers the name which stands at the head of this sketch is unknown, and that those who recognize it will only know it as that of the author of the well-known lines upon the death of Sir John Moore—a lyric of such surpassing beauty, that so high a judge as Lord Byron considered it the perfection of English lyrical poetry, preferring it before Coleridge's lines on Switzerland—Campbell's *Hohenlinden*—and the finest of Moore's Irish melodies, which were instanced by Shelley and others. Yet, unknown as the Rev. Charles Wolfe is, it is unquestionable that he was a man possessing the highest powers of imagination, and a powerful intellect, cultivated to a very high point of perfection, and fitting him to become one of the brightest stars of the world of literature. Why he is unknown is then probably a question which will suggest itself to the minds of many, and the answer must be, because he *did* so little for the world to remember him by. The whole of his literary remains, including his sermons, and a biographical sketch, which fills one half of the book, is contained in a moderate sized octavo volume, published after his death by the Rev. J. A. Russell, Archdeacon of Clogher, whose affection for the memory of Mr. Wolfe prompted him to edit and give to the world the fragmentary manuscripts, which are the only lasting and appreciable records of the residence of a great spirit among us. But it may be asked why, with such capabilities and powers as we have stated Mr. Wolfe to possess, he did so little? and to that interrogation many replies may be given. Mr. Wolfe died at the early age of 32, just when the powers are in their full vigor—and in the later years of his life he had devoted himself enthusiastically to the duties which devolved upon him as the curate of a large and populous parish in the north of Ireland. Neither of these reasons, however, is sufficient, for we know that the poetic intellect is precocious, and brings forth fruit early. Shelley, who died younger, left productions behind him, which will hand his name down to the latest posterity; and the comparatively voluminous writings of the witty dean, Sidney Smith, prove that a man may bear the weight of the clerical office, and take an active part in politics in addition, and yet leave enough behind him to keep his name green in the memory of the world.

The true reason why Mr. Wolfe did so little is no doubt to be found in the character of his mind, and this is easily traceable, both in the mild, child-like, almost simple, but intelligent expression of the portrait which forms a frontispiece to the volume to which we have adverted,

and in most of the passages of his life. There was a want of strong resolution, and an absence of concentration so marked, that he seldom read completely through even those books which most deeply interested him—there was a nervous susceptibility, and an openness to new impressions, which caused him as it were to dwell upon every passage he did read, to linger over its beauties, to start objections to its theories, to argue them out, and to develop to its fullest every suggestive thought; and there was in him a spirit of good-nature trenching upon weak compliance, which put his time at the service of all who chose to thrust employment upon him. Added to this, and arising out of his want of steady resolution and earnest will, there was a habit of putting off till to-morrow what should be done to-day, of which he was himself fully sensible, and which he speaks of in one of his letters, as that “fatal habit of delay and procrastination, for which I am so pre-eminently distinguished.”

Charles Wolfe was the youngest son of Theobald Wolfe, Esq., of Blackhall, in the County of Kildare, Ireland, and was born in Dublin on the 13th of December, 1791. The family was not unknown to fame, for the celebrated General Wolfe, who fell at Quebec, was one of its members, and Lord Kilwarden, an eminent man at the Irish bar, and who was afterward elevated to the dignity of a judgeship, was another. At an early age the father of our hero died, and the family removed to England, where Charles Wolfe was sent to a school at Bath. Here, however, at the age of ten years, his studies were interrupted by failing health for a period of twelve months. After that, he was in the establishment of Dr. Evans, of Salisbury; and in 1805 we find him at Winchester school, under the superintendence of Mr. Richards, senior. Here he became conspicuous for his classical knowledge, and his great powers of versification, which gave promise of future excellence. What appears more distinctly, though, than his mental ability at this age, was the amiability of his disposition, and the tractability of his nature. His kindness, cheerfulness, and open sympathy drew to him the love of his fellows; and the esteem in which he was held by his masters may be judged from the fact, that during the whole period of his pupilage his conduct never drew down upon him punishment, or even a reprimand. His tender and affectionate disposition endeared him to his own family, with whom he was an especial favorite; and in connection with this, we may mention one circumstance strongly indicative of his yielding character. In spite of his gentle nature, he, animated no doubt by that desire for glory so common to poetical minds, and which, looking on the brighter side of war, hides its terrors and its horrors from the young and ardent, wished to enter the army; but finding that the idea gave pain to his mother, he immediately abandoned the notion, and appears from thenceforth to have looked upon the clerical office as his destined part in life. Strange transition, from