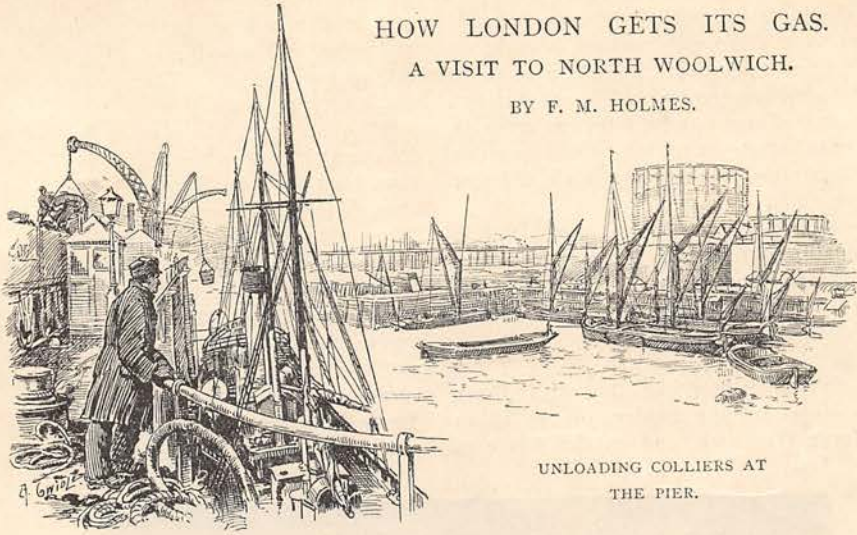


HOW LONDON GETS ITS GAS. A VISIT TO NORTH WOOLWICH.

BY F. M. HOLMES.



UNLOADING COLLIERIES AT
THE PIER.



QUENCHING COKE.

"THERE is one thing about gas I never can understand," said Miss Tomkins.

"Yes?" replied I interrogatively.

"When you burn coal at home, no gas comes; but when it is burnt in a gas-works, they get the gas. What makes the difference?"

"Air," I answer.

"Air?" queries the lady incredulously. "Rubbish!"

"No, it is not rubbish; it is air."

"Oh, you provoking man! Do explain."

"Well, when you burn coal in your fire at home, it is open to the air, and the gas burns in the fire. I have myself seen the gas, and sometimes the tar also, burning in an open coal fire. But at the gas-works the coal is enclosed in red-hot retorts, from which the air is excluded. Consequently, the gas does not burn, but escapes through a pipe provided for the purpose."

"And does the other part of the coal burn?"

"No; what is left in the retort is called coke. You can make coal-gas, if you like."

"Nonsense!"

"I have done it when I was a boy. You get a churchwarden, and fill his head with small coal——"

"Oh, rubbish! What will you say next? Do you think I am stupid?"

"By no means. Nevertheless, you get a churchwarden pipe——"

"A pipe!"

"Certainly; what did you think I meant? You get

one of the old-fashioned long-stemmed churchwarden pipes, fill the bowl with small coal, cover the mouth quite closely with clay, put it in a clear fire, and then presently you can light the gas at the end of the long stem."

"Yes, I think I used to do it when I was a boy," said Colonel Tomkins, settling down to an after-dinner nap.

"And when the gas goes out?" said Miss Tomkins.

"You can remove the pipe, take off the clay, and find a little coke inside. That is what chemists call the destructive distillation of coal."

"Don't use those horrid long words! Some people pretend to understand them, but I don't."

"Well, the coal is destroyed—as coal. Some portion passes off in the form of gases, and the other becomes red-hot coke. And the method pursued in a big gas-works is just the same."

"They do not have large churchwarden pipes?"

"No; but they have thousands of big cylinders of fire-clay, called retorts; these answer to the bowls of the churchwarden pipes. And from these at each end rise upright pipes—called ascension pipes—to carry off the gas to a huge box of water, spoken of as the hydraulic main, where it is cooled."

"And then it is sent up to London?"

"Oh no, not yet. It has to be condensed and purified, and brought up to Parliamentary requirements of illuminating power before it is pumped into London."

"Pumped, did you say?"

"Certainly, in some places. An immense portion of the gas supplied by the Gas Light and Coke Company is manufactured at their big works at Beckton—perhaps twenty miles away from some parts of London they serve, say in the north-west district—and it has to be forced at a certain pressure through two huge pipes, each four feet in diameter; and this is done by steam pumps of a suitable character."

"Oh, well! after all, gas-making is easy enough."

"On the contrary, though the principle of just producing it is simple, yet when the gas has to be made on an immense scale, thoroughly purified, brought up to an uniform illuminating quality, stored so as to be in readiness for any emergency, and forced through hundreds of miles of streets at a sufficient pressure, then it becomes an industry requiring great engineering skill and administrative ability of a high order to conduct it successfully."

"I suppose you have been to some gas-works lately?" said Miss Tomkins, a trifle maliciously; "you seem to know so much about them."

"Yes," I replied, not noticing her little sarcasm; "I have been to Beckton."

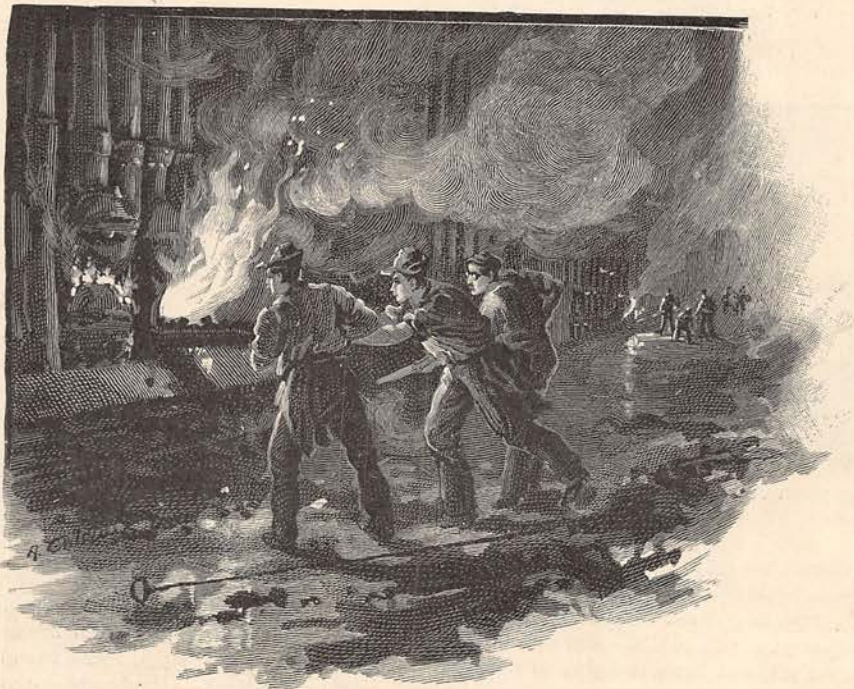
"Where is that?"

"Beckton? It is something like a bit of the Black Country stuck down on the borders of the Essex marshes in North Woolwich, and on the fringe of

hundred acres—are full of good arrangements. But at first when you get there, you seem in a wilderness of works, and would probably discover no plan or arrangement in them. There is a general plan, though, and a very good one.

"We may take the plan as beginning at the pier. You must have seen the pier, Miss Tomkins, when you have been down the Thames. This pier is extensive enough to berth four big steamers and one small one. They bring the coal from Durham and Northumberland, and some of them are large enough to carry two thousand tons a time.

"The coal is unloaded in huge iron buckets, holding twelve hundredweights each. They are swung into, and hauled out of, the holds of the ships by steam cranes; and so cleverly are they managed that they descend through the hatchway and swing over the iron trucks almost without any outside arrangement.



CHARGING THE RETORTS.

eastern London. The ground is frequently black, and heaps of strange-coloured dirt and slag lie about, while busy little engines, drawing long trains of coal and coke, are hurrying hither and thither in all directions—even overhead, on an iron-built railway."

"Overhead? What is that for?" asks Miss Interrogation-point.

"To take the coal direct to the top of the retort-houses. There it can be run out of the coal-trucks just in front of the openings to the retorts."

"What a good arrangement!"

"Yes, all the works—and they cover about three

"A man at the truck knocks aside the 'dodger,' the huge bucket turns a complete somersault within its handle, empties out every atom of coal at once into the truck, is caught in its place again by the 'dodger,' and before you can say 'Matilda Jones,' is being swung into the hold for a fresh supply."

"The dodger!" exclaimed Miss Tomkins. "What names they use! What is that?"

"A piece of forked metal working on a hinge at the top of the bucket. The fork falls so that there is a prong on both sides of the handle. The man in charge knocks up the 'dodger' at the right moment, and round swings the bucket; and then, when it comes upright

again and empty, the 'dodger' is pushed down, and the bucket is fixed firm for its next load.

"Now, the railway runs from the pier over the river bank, and soon passes between two long lines of retort-houses, six on each side, with sidings running off from the line into the houses. Should they be full, or the coal not required in them, the company have huge storage places for reserves.

"What has to be borne in mind is this: that on the other side of this big gas-works is an immense district of a hungry city burning up the gas almost as fast as it is made, and no one knows from day to day what extra demands may arise. Consequently, adequate reserves of men and materials, and of apparatus also, have to be in constant readiness for any contingency.

"Well, now, let us follow the train of coal into the retort-houses. They are the centre and nucleus of all things in a big gas-works.

"They are wonderfully well arranged for their purpose. They are divided into three stages, or floors. That on the ground contains the long line of furnaces which heat the retorts—the *ree*-torts, as the men call them—to a glowing red, and here also the coke drops when raked out of the retorts above. A man quenches it with water; and on a railway running its length, a train of trucks can be drawn by an engine, the coke filled into the trucks, and then whirled away.

"In the next floor above are placed the retorts, and this floor is, so to speak, the vital centre of the works. It is here that the gas is actually made.

"Imagine a long, long building with a black wall on one side full of small round doors, and from near these doors black pipes arise for some height, and then bend backward to a square black box running along the top of the wall.

"Opposite lie huge heaps of coal, where it has fallen from the floor above. A railway runs on that top floor, which indeed does not extend wholly across the building, and through trap-doors in the top floor the coal falls at once from the trucks with a minimum of manual labour, ready to be shovelled into the retorts.

"Ever and anon the long black line of the retort wall is broken by flames playing round the tightly barred doors; but so well is the building ventilated at the roof and sides, that though the furnaces are glowing with heat considerably over two thousand degrees Fahrenheit, no excessive warmth is experienced unless you happen to stand close to an open retort door.

"The wall in which these doors are placed is not the

wall of the building, but of a solid structure running almost the entire length of the building, and in which the retorts are embedded. Within this structure, below the retorts, glow the furnaces, and above runs the hydraulic main, into which the pipes from the retorts conduct the gas. The retorts run right across the structure, which is called the retort-bench, and are closed with doors at each side. They are, so to speak, double retorts, and are made of the most refractory fire-clay, three inches thick, and though always at a nearly white heat, never give way.

"'Would you like to go on the beds?' says someone; and up an iron ladder he springs to the top of the retorts, where runs the hydraulic main.

"'This is called the bed up here,' he remarks; and on following him, we find we are about on a level with the top floor where runs the railway on either side.

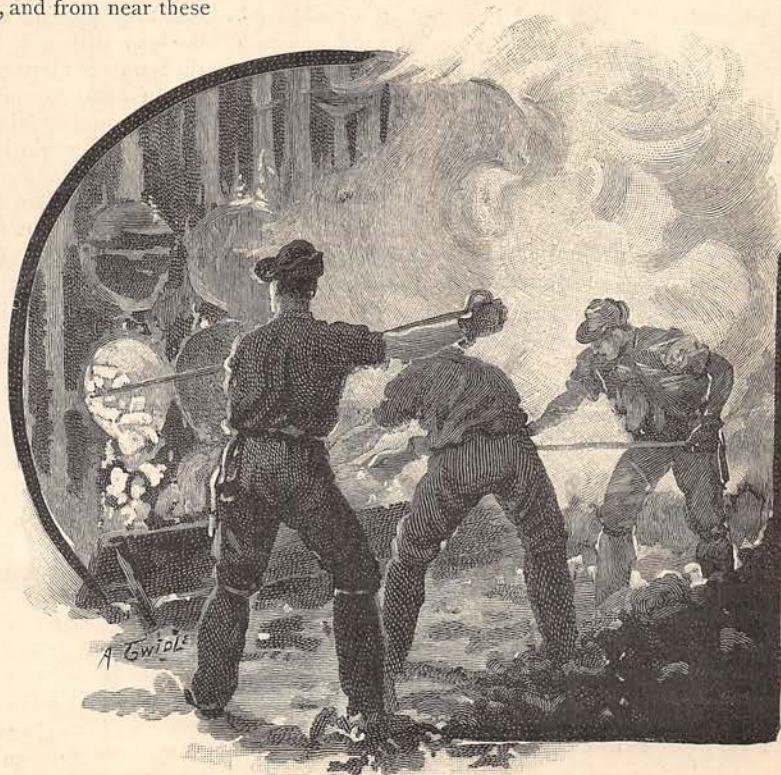
"He kicks away for a minute a thick piece of fire-brick, and we can look down into the furnace flue below. The white hot heat is intense—'about two thousand two hundred degrees Fahrenheit,' says he.

"'How can you tell that?' we ask.

"'By letting platinum weights down into it and transferring them at once into water, and then taking the rise in temperature of the water with a thermometer. We can tell approximately in that way.'

"Hark! there is a whistle. The overseer is summoning another shift of men to work.

"The furnaces and retorts being always hot, the men work in shifts of eight hours—there being thus



DRAWING THE RETORTS.

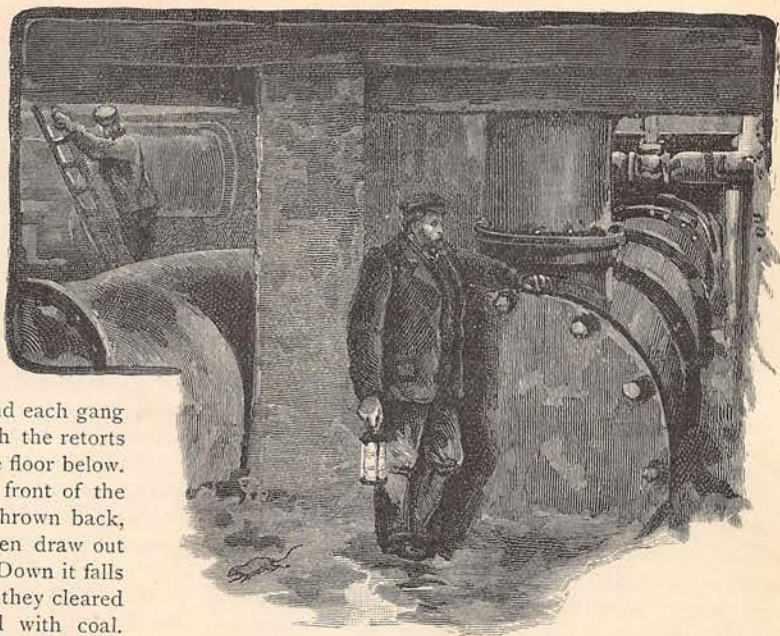
three relays of men. But in addition to this, the eight hours shift is divided more or less into turns of half-an-hour each: that is, half-an-hour's steady continuous work at the retorts, and then a short time of rest. And half-an-hour's strenuous work at the open retort doors is enough at a time.

"We go below from the dusty and somewhat sooty 'bed' to the retort-bench floor. The retorts are all fixed in sets of nine, three upon three, and each gang of men consists of three. Beneath the retorts are openings, leading to the furnace floor below. A long sheet of iron is placed in front of the openings; three retort doors are thrown back, great heat belches forth, and the men draw out the red-hot coke with long rakes. Down it falls to the floor below. No sooner have they cleared out all the coke than they re-fill with coal. They proceed like clock-work. The principal implement used is a long scoop, something like a wide gutter to the roof of a house.

"While the door-opener whirls in shovelful after shovelful to the white-hot retort, causing flame and smoke to belch forth—for so hot is it that the coal begins to burn at once—the other two men load the long scoop with coal as it lies beside the coal-heaps. The leader, or 'scoop-driver,' gives the word, and each man throws in with unerring aim two shovelfuls each; then the leader grasps the long cross-handle of the scoop, and the other two place a bent iron rod under the middle of the scoop, and the three push it into the retort; the leader turns over the scoop, and draws it out again with a flourish. This business is gone through once again, and the retort is full and its door closed.

"Every retort is loaded in the same way—two big scoopfuls and about half-a-dozen shovelfuls—and then the door is closed. By this means of rough measuring, the same amount approximately is always placed in each retort—an amount well within its capacity—and it is ready for drawing (*i.e.*, discharging) in six hours' time.

"The long gloomy thoroughfare, with its forest of



ONE OF THE GREAT MAINS TO LONDON.

clustering pipes, its lofty roof, its darksome corners, its bursts of smoke, lit up by occasional flashes of huge flames, and here and there adown the long lane its groups of men working with dash and go, forms a weird and striking scene. And from here goes forth the gas that will light thousands of homes and thousands of thoroughfares.

"In some of the houses machines are used for charging and drawing the retorts, the scoop and the rake being worked by steam. And in all these immense houses the work goes on just the same, the retorts—and there are more than seven thousand of them—built on the same plan, and filled and emptied in the same way. From the water-box at the top the gas is drawn by revolving fans (called exhaust pumps) through a network of cold pipes, known as condensers, where the coolness causes it to part with its tar; then it is purified from ammonia and sulphuretted hydrogen, and other unpleasant and unsuitable ingredients, by passing through large tanks filled with fresh slacked lime and other materials. Finally, it is measured in gigantic water-meters and then passed on to immense gas-holders—one of which, at least, is 200 feet high—where it is stored and mixed."

"Mixed? With what?" exclaims Papa Tomkins, waking up from his after-dinner nap.

"Oil-gas and water-gas."

"Nonsense!"

"Quite true. That gas you are burning there is a mixture of coal-gas—chiefly that—oil-gas, and water-gas. The oil is Russian petroleum, and its gas enriches the coal-gas in illuminating power. Something like the coal, the oil is passed



ELEVATED RAILWAY SYSTEM FOR DISTRIBUTING COAL TO RETORT HOUSES.

through red-hot retorts, and the water-gas is produced by sending steam through highly-heated coke."

"That is why our gas is often so poor," exclaimed Miss Tomkins: "it is the water-gas in it."

"Not at all. A paternal County Council and a fatherly City Corporation are constantly testing the gas to see that it is up to Parliamentary requirements. If your gas is poor, your burner is more likely to be in fault than the gas itself."

"Oh, well, I suppose gas will soon go out before electricity?"

"The company do not seem to think so, for they are building an additional pier and two additional retort-

houses. These will contain six hundred and thirty more retorts, which can produce more than three million cubic feet of gas a day. You see, gas is used so much for heating and cooking purposes, as well as for lighting."

"Oh, yes, I suppose it is. And how many million cubic feet do they send out now?"

"From Beckton alone, fifty millions a day, in round numbers."

"An almost inconceivable quantity," yawned Colonel Tomkins.

"Well, well," said I, "suppose we do not burn any more of it to-night. It is getting late. Good-bye."

A SIX WEEKS' WOOING.

BY SYDNEY C. GRIER, AUTHOR OF "RICHARD JENKINS, MASTER," ETC.



"CAN you come to tea with me this afternoon, Muriel?"

"No, thank you, Lily dear. I'm awfully sorry, but my brother from India is coming home, and I shouldn't like to be away, you know."

"But Tom is gone to Andridport to play in the match."

"Oh, Tom!" said Muriel Clifford, with fine scorn. "Boys have no feelings. Arnold would not go. He and Gertrude are meeting Hugh at the station, and I want to be back as soon as they are, so I must hurry."

"But I can walk with you to the turning, can't I? Do tell me about your brother. Is he a soldier, or in the Civil Service?"

"He has something to do with forests," said Muriel vaguely. "He lives in a bungalow all by himself, and puts out jungle fires. He hunts, too; and I don't quite know what else he does."

"I suppose he rides on elephants and shoots tigers, doesn't he? How awfully interesting it must be! Good-bye, darling. You'll be sure to tell me all about it, won't you?"

"Oh, yes; good-bye;" and Muriel swung her strap of books over her shoulder and quickened her pace.

She had been rather later than usual in leaving the High School that afternoon, and when she was out of Lily Jardine's sight she forgot the dignity of her sixteen years sufficiently to run up the road for some distance, thus succeeding in reaching home before the arrival of the party from the station. Half an hour later she was seated at the tea-table, observing her newly-returned brother silently, but keenly, through her spectacles. The family were all present, with the exception of the heartless Tom, who had not yet returned from his cricket-match. At the head of the table sat Gertrude, the kind, wise elder sister who had

mothered the rest ever since they were left orphans; at the foot Arnold, the young master at the Grammar School. Hugh, the brother from India, who came between them in age, sat at the side opposite Muriel, tall, brown, and muscular, with a square, honest face. The first flow of eager questions and answers had subsided when he caught his younger sister's earnest gaze fixed upon him, and asked her pleasantly—

"Well, Muriel, is there anything more you want to know?"

"Yes," said Muriel promptly. "I was wondering whether you meant what you said in your letter to Gertrude: that you were going to pay this flying visit home in order to find yourself a wife."

"Of course it is true," returned Hugh. "I shouldn't say a thing like that in joke."

"Hugh, you are not in earnest!" cried Gertrude.

"You expect to prevail upon some unfortunate girl to marry you in six weeks, and go back with you before the end of your three months' leave?" exclaimed Arnold.

"It is someone you have met in India, and you are going to look her up. Isn't that it?" asked Gertrude anxiously.

"No, it's not that. I'm not thinking of anyone in particular," said Hugh placidly. "I do want a wife, and I want you to help me find one, Gertie."

"Oh, Hugh, you are too delicious!" cried Muriel.

"It seems to strike you all as very funny," said Hugh, "but it's no joke to me. I can tell you it's tremendously lonely out there in the jungle, with scarcely anyone to see or talk to from one year's end to another."

"Selfish thing, to want to take a girl out there!" said Muriel.

"Oh, she would have me, you see," said Hugh ingenuously. "And I should be sure to tell her all about the life first, so that she might know what she was coming to. I'm not going back to my work