

THE . GAS . LIGHT

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AND COKE COMPANY

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An account of the progress of the  
Company from its incorporation  
by Royal Charter in the year  
1812 to the present time

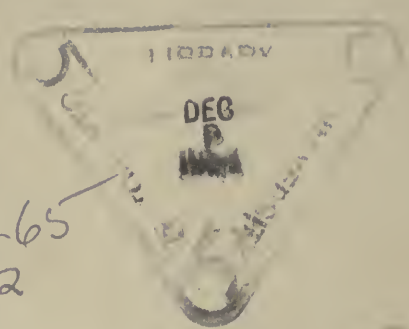
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1812-1912



Orville Woodard

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The Directors desire to express their indebtedness and thanks to those who have supplied material for the preparation of this book, or who have allowed extracts from their own publications to be reproduced.

# THE GAS LIGHT AND COKE COMPANY.

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*Incorporated by Royal Charter dated the 30th April, 1812.*

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Chief Office :  
HORSEFERRY ROAD, WESTMINSTER, S.W.

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“ It seems probable that the discovery of the use of fire, and of some mode of producing it at will, constituted the first important advance of primitive man towards obtaining that command over nature which we term civilization.”

ALFRED RUSSEL WALLACE.

# THE GAS LIGHT AND COKE COMPANY, 1812—1912.

## CHAPTER I.

### INTRODUCTORY.

It is probable that the ordinary man of business, absorbed in the daily routine of his special calling, seldom spares a moment for reflection on the chance beginnings of institutions on whose aid he now depends for his very existence. They have become a part of his world as familiar and unquestioned as the sun's diurnal round, with the cry of the newsboy at dusk and the milkman in the morning. The seventeenth-century Lloyd, who set up his coffee-house as a resort for seafaring gossips, is no more than a myth in the modern shipman's liturgy; and travellers by the night mail from London to Edinburgh, intent on errands of pleasure or of gain, pull the black lamp-shade over the flickering flame and settle themselves as cosily as may be in the carriage corner, without giving a moment's thought to the long labour of Stephenson in the dawn of the century gone by.

Yet neither Lloyd's nor the modern railway sprang full-armed from the inventive brain: these institutions have slowly evolved to the needs of the time, social, political, industrial, which, step by step, induced their development. The steamship and the steam-driven locomotive, again, are dependent for their utility on the supply of coal: without their power of propulsion they are worth no more than their weight as scrap-iron. It is, indeed, hardly too much to say that neither one nor the other could have been invented elsewhere than in our own land, where the delvers have been busy since the time when Dan Chaucer's nimble pen "moved over bills of lading."

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In the year 1812, when our story begins, all Europe was in arms against the "Corsican upstart" who was doing his best to ruin British commerce by making a bonfire of its products wherever found. Byron had just burst into the literary arena with "Childe Harold," and the old gentlemen in tight knee-breeches still snuffed and sneezed over their nightly piquet, or boasted proudly of their granddaughters' playing on the spinet or their skill in the cunning embroidery of screens and samplers. The wife of a Navy paymaster named Dickens, living at Devonport, had given birth to a boy whom we now know as the famous novelist; the great snobographer was yet in small-clothes at Calcutta, while contemporary life was being painted with the nicest touch in the genteel novels of Miss Austen. Up in the North, Walter Scott, as yet neither a Baronet nor the author of "Waverley," was beginning to loom from the heights of Edinburgh as the author of a monstrous fine poem called "Marmion"; the first steamboat was ready for launching on the Clyde; and the labours of Stephenson were fast approaching successful completion. Men about town canvassed the respective merits of Mr. Pitt and Mr. Fox, or contrasted the tragic powers of Mr. Kean with those of the late-lamented Mr. Garrick; and link-boys still waved their spluttering brands at the doorways of Old Drury, where our fathers foregathered to chuckle or explode over the sparkling humours of Mr. Sheridan. Poor old George the Third, almost blind and fast sinking into mental darkness, had perforce surrendered his kingship to that costly sybarite his son, and now sought solace at Windsor by playing on the harpsichord the well-remembered ditties of his homeland or the more ornate compositions of his beloved Handel. Through Westbourne Grove (now one long vista of flaring shop-fronts and vocal with the patter of street hawkers on the kerb) rippled the stream and rustled the trees which survive only in its name; Hackney was market gardens, and country rambles bore home bulrushes, water-flags, or forget-me-nots from the remoter wilds of Shepherd's Bush. In that darksome age the Tubes were not, the Horse Ferry (which gave its name to Horseferry Road) still plied where Lambeth Bridge now spans the river, and the huntsman still wound his horn on the uplands beyond Hammersmith. It was a time when your patent of nobility consisted rather in the possession of a black footman than a black pug or a Pekingese spaniel of ancient and royal lineage, when

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cock-fighting rather than golf was the darling joy of young bloods o' Sundays, and when stories of romantic highwaymen or the spicy quips of old Joe Grimaldi were matters of as keen a relish as are now the study of summer-time batting averages or the Football League tables appearing week by week in winter-time.

Our harder-living forebears had only hard-won sparks from the chafing of flint and steel for the lighting of their rushlights and candles ; matches were to be hailed with distrust some twelve years later as products of the Devil, and receive the name of " Lucifer " in sign of their infernal origin. Gas had first been used tentatively as an illuminant about 1800, but for upwards of twenty years many of the leading clergy were to preach against its introduction into churches as " profane and contrary to God's law." These worthies were of one mind with the Company of Tallow Chandlers who throve by the enactment of 1599 " whereby every Householder from the 1st October to the 1st March in every year for ever should cause a substantial Lanthorn and a candle of eight in the pound to be hanged without their doors." One hundred years later these good men, citizens of London and of substance and authority, who had " always assisted as well in purse as person to add to its grandure," fell into a panic at the introduction of street lamps by rival vendors, and straightway humbly petitioned the Lord Mayor for their suppression, urging " that the aforesaid lamps or lucidaries are merely novel, and should they be encouraged they will cause many more such intrudings upon other Arts and Mysteries whereby the labour and industry of many thousands may be lost and their families impoverished." We have had many more " intrudings " upon " Arts and Mysteries " since then, and still the public cry is " Fiat Lux ! "





CHAPTER II.

EARLY EXPERIMENTS.

The false lure of marsh-gas was probably known in the time when men drew reindeer on their cavern walls, or huddled together in dread at the tramp of the ponderous mastodon. Under many names have men hailed it, but oftenest as an omen of ill or a reminder of unattainable things too long pursued.

It was somewhere about 1600 that a Dutchman, Van Helmont to wit, prying into the properties of fuel, found that coal did "belch forth a wild spirit or breath" which he forthwith named gas, deriving the word, as some say, from the Dutch or German variant of ghost, or, as others will have it, from the German Gast, meaning yeast. However that may be, the close of the eighteenth century found the term generally accepted among scientific dabblers, though still foreign to the lay vocabulary.

A reverend doctor of divinity, Clayton, a Yorkshire rector, some fifty years after the aforesaid Dutchman, having distilled coal in a retort, found likewise that it gave off "a wild spirit or breath," of such force as to burst his glasses. This set the good doctor pondering on means to save the wasted surplus, though to what end he had no inkling. "I kept this Spirit in the Bladders a considerable time, and endeavoured several days to condense it, but in vain. And when I had a mind to divert strangers or friends, I have frequently taken one of these Bladders, and pricking a hole therein with a pin, and compressing gently the Bladder near the flame of a candle till it once took fire, it would then continue flaming till all the Spirit was compressed out of the Bladder; which was the more surprising, because no one could discern any difference between these Bladders and those which are filled with common air."

Leaving the worthy Clayton with his lit bladders like giant gooseberries aflame, we come to another reverend doctor, named Watson, a destined bishop, who, dabbling in the profane "arts and mysteries" of

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chemistry, found that 96 oz. of Newcastle coal weighed but 68 oz. after distillation, and tabulated the leakage, with charming simplicity, as "loss of weight."

Prometheus, unbound and triumphant, was to appear in 1792, when William Murdock, widower, aged thirty-eight, lit up his house



WILLIAM MURDOCK.

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at Redruth with gas. He was a native of the "Land of the Mountain and the Flood," his father, a resourceful miller and mechanic, being close neighbour to the bard who sang its glories, and tenant of a farm pertaining to the ilk of James Boswell, biographer. No man was ever more fitly cast for his rôle on the stage of the world. We are told that when in the Cornish wilds, some mining captains "having attempted to bully him, he quietly locked the door of the room in which they were assembled, stripped, and, making dexterous use of those arms with which Nature had supplied him, administered to more than one of their number a lesson of persuasive efficacy such as they would never forget, and such as he was never called upon to repeat. He was, in truth, of Herculean proportions, and in muscular power nearly unrivalled." This was the man who was to tame the "Wild Spirit" that had startled the Dutch Van Helmont and our own learned divines, and, while working with dogged fidelity on behalf of the great James Watt and his partner Boulton, was to find means, in his hard-earned leisure, for compelling the volatile fiend to the service of man.

The Peace of Amiens in 1802 and the consequent rejoicings gave him the occasion for a public exhibition of the new illuminant at the Birmingham factory of his employers, the date being but a few months later than the first news of similar lighting projects inaugurated across the Channel by a certain Le Bon. This good fellow had obtained a patent in 1799 for his "*Moyens Nouveaux d'employer les Comestibles plus Utilement et à la Chaleur et à la Lumière et d'en Recueillir les Divers Produits,*" and was reported by one of the younger Watts, who visited Paris in 1801, to be bent on lighting up Paris by this means. Experimentally Murdock had been forestalled by a brother Scot, the ninth Earl of Dundonald, who in 1781 had obtained a patent for "the extracting of tar, pitch, etc. . . . from pit coal," and sometimes lit up his hall at Culross Abbey with the by-product, for the amusement of friends. "His Lordship," we read, "had a vessel constructed resembling a large tea-urn; this he frequently caused to be filled and carried up to the Abbey to light the hall with, especially when he had any company with him. On one occasion, after a fresh charge, the workman having applied his light too soon, an explosion took place, which nearly killed some of the men, and tore off the top of the condenser; and one of the workmen's wives passing

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near it at the time was blown off the bank without receiving any other injury than the fright." He was one of a long line of experimenters with gas who conceived of it mainly as a means to divert or astound.

Another Dutchman, "the ingenious Mr. Diller," exhibited his so-called "Philosophical Fireworks" at the Lyceum Theatre in 1788, having earned the "éloges de l'Académie" of our French cousins, four years earlier, for a similar display. On his death in the following year two soi-disant pupils, Mr. Pitt and Mr. Adams, took up his apostolate of light, and dazzled a large public at the New Street Theatre, Birmingham, with a profusion of suns, stars, dragons, Prince of Wales feathers, and other fantastically listed forms of jetted flame.

Meanwhile Murdock was working hard down in Cornwall as the trusted agent of his principals, Boulton and Watt, of Birmingham. "Murdock," wrote the former to his partner, "hath been indefatigable since he began. He has scarcely been in bed, or taken necessary food. After slaving night and day on Thursday and Friday, a letter came from Wheal Virgin that he must go instantly to set their engine to work, or they would let out the fire. He went and set the engine to work; it worked well for the five or six hours he remained. He left it, and returned to the Consolidated Mines about eleven at night, and was employed about the engines till four this morning, and then went to bed. I found him at ten this morning in Poldice Cistern, seeking for pins and castors that had jumped out, when I insisted on his going home to bed."

Such was the man who was first in showing how gas might be "applied to the use and convenience of man."



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## CHAPTER III.

### PRACTICAL PROPAGANDA.

The pioneer worker now recedes into the background, and the impresario arrives. He was, fitly to his occupation, a foreigner, one Winzer, native of Moravia but evidently vagabond by temperament, for we find him at Paris in 1802 vainly trying to obtain from the initiator Le Bon one of his thermo lamps. In the autumn of the same year he arrives in Brunswick, without the thermo lamps but thoroughly master of the whole theory and practice of gas production from black coal to blazing jet. "His Serene Highness the reigning Duke and all his Ministers, and hundreds of the learned and curious, honoured me by their visits."

Finding his learned and curious patrons, however, strangely loath as financial backers, he crossed over to London, where he gave public exhibitions in 1803 and 1804. It was a time when food was at famine prices and riots frequent, the invasion of England by Napoleon was considered to be imminent, and four hundred thousand of our threatened islanders had enrolled as volunteers, finding their own uniforms and receiving no pay. Before this distracted public Winsor (as he now wrote it) appears full of boundless hope, volubility, and perseverance. The way in which this Moravian refugee kept on flooding the town with leaflets, giving demonstrations, answering broadsheets and lampoons, stung by the spite of interested opponents to yet greater vehemence and daring of assertion, is a most breathless spectacle. As a writer of telling advertising matter Winsor was something of a pioneer; and if only the salt of prudence had commingled with his leaping blood, a practical issue might doubtless have been reached much earlier.

In 1804 he took out a patent for "an improved oven, stove, or apparatus for the purpose of extracting inflammable Air, Oil, Pitch, Tar and Acids from, and reducing into Coke and Charcoal all kinds of Fuel"; and in a pamphlet issued during the same year on "The Superiority of the New

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Patent Coke” he instances, as one of many vital objections to the use of coal, that it brings about “the dire necessity of the most *wretched* profession among men—that of our *degraded* and *pityable* chimney sweepers,



F. A. WINSOR.

and which to *ameliorate only* a laudable Society of Philanthropists has been established.” A second pamphlet of the same date gives us his picturesque eloquence in full stream. “The lighthouses on our coasts

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may be rendered like blazing stars to guide our seamen over the watery deep. . . . As to illuminations, they may be carried on to the utmost extent of beauty and variegated fancy, by this docile flame, which will ply in all forms, submit to instant changes, ascend in columns to the clouds, descend in showers from trees, walls, etc., arise from the water, and even in the same pipe with a playing fountain.

“The constant varying of the flames in rooms and gardens, between flaming pyramids, festoons, garlands, roses, flambeaus, etc., etc., afford to the spectator an extraordinary and most delightful sight; cherish the soul, and create good humour, by uniting conveniency, utility, and pleasure.” All the stops—patriotic, artistic, philanthropic, economic, humanitarian, sanitarian—are pulled out to swell the rousing overture. He fences nimbly with objectors, and generally pinks his antagonist. He has no diffidence in avowing the greatness of his evangel. “The attempt to eradicate old-established customs and prejudices, imbibed as it were from the very cradles of our great-grand-sires, who inherited them from Adam, or since the beginning of the world; such an attempt may be called a Herculean task.” To the critics of his estimates he retorts with sublime self-assurance, “I must beg leave to reply that the annual course of our Planet round the Sun and its diurnal rotations round its axis have appeared, and do appear, still more wonderful than my tables of profit; but they are nevertheless true.” Elsewhere, appealing for “the support of great Philanthropic and Commercial men, such as I have now the honour of addressing,” this speedily anglicized exile harps on the patriotic string by predicting that “a National Concern will soon be raised to open a mine of wealth in Britain, and add to the despair of *our* foes in their devices for *our* ruin.” His gas is to be scentless, a cure for asthma and all pulmonary troubles, and conducive to a vigorous growth in plants, since it will generate the elements required for their sustenance “in much greater proportion than even the most powerful action of Solar rays can possibly produce in the common operations of nature.”

How a pot may call the kettle black may be seen in a manuscript note on the back of the title-page of his reprint of “Mr. Nicholson’s attack in his Philosophical [sic] Journal on Mr. Winsor and the National Light and Heat Company with Mr. Winsor’s Defence,” issued in 1807 from offices in Pall Mall where he was installed, on a site now occupied by the

Carlton Club. Here he speaks bitingly of the difference between poor bankrupt Nicholson's "*fine writing* and real practice," blissfully unconscious of what desperate straits were yet to harden his own way. The lengths to which his own "variegated fancy" led him may be judged from his estimates of the profits which were to accrue to the investors: That 120 million pounds sterling annually may be saved "by carbonising instead of burning coal," that 11 millions may be easily saved in yearly income, and that "each share of £50 must yield a yearly interest of £6,000, worth in capital £120,000!" In proof of the practicability of his scheme he lit up part of Pall Mall, on the 28th January, 1807, the gas being conveyed through lead piping, as the cost of iron was then prohibitive.

Thomas Chalmers, the famous Scottish preacher, was among the visitors to Winsor's lectures, and records in his diary for May 20th, 1807, that "The lecturer, Mr. Winsor, is a mere empiric, and even dull and uninteresting in his popular explanations. The Londoners listened with delight, and I pronounce the metropolis the best mart of impudence and ignorant folly." But he concludes, with shrewdness and foresight, "My own conviction is that, with proper precautions, gas will succeed," and this prediction he backed up by installing gas pipes in his new manse.

It must be admitted that rival demonstrators and pamphleteers were as high-flown and pretentious as Winsor himself. Throughout 1808 we find a certain Mr. Hyde respectfully informing the nobility, gentry, and public in general that he will give a grand display of his philosophical experiments in illustration, *inter alia*, of "The cause of Rain, Hail, Snow, Wind, Thunder, Lightning, Earthquakes, Vegetation, Animalization—The Phenomenon of Life, and the Cause of Death," this arrogant blast being only preliminary to the announcement of an "Exposition of Gas Lights, in which the insalubrity of the Carbonated Hydrogen Gas, and the fallacy of the *pretended Inventor's assertions* will be proved by the most *unerring* and *conclusive* experiments, together with the Evils that must inevitably result from the Introduction of Gas Lights."

Strong opposition came from those occupied in whale fishery, as it was thought that the new illuminant would put a stop to the consumption of oil for lighting. Nevertheless, though the learned few remained sceptical or openly hostile, and the illiterate many, led on by interested



NO. 22, PICCADILLY.

THE DANGER

# GAS LIGHTS

MR. BEER has been appointed by the Nobility, Gentry, and  
the general Public,

to give a GRAND DISPLAY

*Philosophical Experiments*

AND

ILLUSTRATIONS

As they were performed in the City with such general Approbation,  
will be repeated

ON TUE. DAY EVENING, MARCH 2 1802

*At the Mansion of the Experiments*

## PART I.

Will consist of a great Variety of appropriate and entertaining  
Experiments, illustrative of the various Occurrences of Nature,  
including the Theory of Combustion—The Nature of  
Respiration—The Cause of Rain, Hail, Snow, Wind, Thunder,  
Lightning, Earthquakes, Vegetation, Animalization—  
The Phenomena of Life, and the Cause of Death.

PART II. Will comprise an EXPOSITION of GAS LIGHTS,  
in which the instability of the Carbonated Hydrogen Gas,  
and the Fallacy of the pretended Inventor's Assertions will be  
proved by the most meriting and conclusive Experiments; to-  
gether with the Evils that must inevitably result from the  
Introduction of Gas Lights.

The whole to conclude with an elegant Display of Philosophical

# FIRE-WORKS,

On Gas Lights, upon Improved Principles.

Does to be open at Seven, and the Lectary to commence at  
Eight o'Clock precisely.—Admittance One Shilling only.  
N.B. Effectual means are adopted to obviate any unpleasant  
Smell in the Room.

J. Dean, Printer, 37, Wardour-street.

opponents, viewed the innovation as a menace to their special privileges or means of livelihood, sturdy supporters had rallied round Winsor. "A very numerous and respectable meeting" assembled on a Friday in July, 1807, at the Crown and Anchor, Strand, and agreed unanimously "that it appeared from the detailed official experiment made with *Mr. Winsor's PATENT LIGHT AND HEAT STOVE*, that it can be used without danger or difficulty—saves the whole produce or value estimated by him—and offers the richest prospect of national and individual benefit." It was resolved therefore, in order "to render this important discovery *more generally beneficial, both to the Government and the Nation*, that the sum of £20,000, or one-fifth of the subscription, should be vested by *DEED* in a Committee for lighting a street, etc., in London and Westminster, and for the grand object of obtaining a *CHARTER OF CORPORATION*." Thereafter follow the names of the sponsors, including a Duke, a Viscount, a Baron, a Baronet, two Knights, and a long retinue of distinguished esquires, a further clause adding discreetly "that it be left to the discretion of the Committee to add such honorary members as may prove useful to this undertaking."

We see then that no chance of cajoling or conciliating the affluent or the influential is to be let slip: the giant snowball has begun to move, its girth swelling with every roll from its pushful starters, and Winsor himself appears zealous and indefatigable among his backers, anticipating by a hundred years the "follow up" system so loudly exploited by our American cousins and the more lively among our own traders. Members of Parliament are respectfully invited "to a constant free admission (to Winsor's demonstrations) every Tuesday evening during the present session, to enable them to speak to facts whenever this important National Concern is brought before them as legislators."

The Charter is sought, and a sedulous canvassing has begun.



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## CHAPTER IV.

### THE COMPANY IS BORN.

In a prospectus dated May, 1808, Winsor gives us an exact definition of his project, as "the providing streets, squares, and houses with Gaseous Lights, by means of conducting tubes underground from distant Furnaces, on the principles as houses are now supplied with water."

As we have seen, Murdock had lighted the Birmingham factory



SAMUEL CLEGG.

of Messrs. Boulton & Watt many years earlier, and another servant of the company, Samuel Clegg, says, "In 1805 I erected a Gas apparatus at the cotton mill of Henry Lodge, Esq., near Halifax, which was the first in the kingdom." In the same year Watt, writing from Glasgow to his partner at Birmingham, says, "The new lights are much in vogue here." Murdock, again, was responsible for an installation carried out by Boulton & Watt for the firm of Phillips & Lee, cotton spinners, of Manchester, first tried there about 1804, and completed in 1807. But all such installations

(and they increased rapidly in the manufacturing districts) were isolated supplies, and to Winsor alone must be given credit for the idea of widespread illumination from a central source.

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The whole learned world seems to have gazed with scornful wonder on his claims, and where privilege or interest was threatened the opposition was keen and ruthless. "An Heroic Epistle to Mr. Winsor" (1808), aided by a drawing by Gillray, pours ridicule on the whole enterprise, in a series of some three hundred Popean couplets. Only a few months after the decisive meeting of promoters "Lord D. [Dundonald] does *assure* Sir William [Paxton] that gass although proper to *light up Factories* is by no means adapted for lighting up *elegant apartments*, he will find on tryal, that to be the case, therefore he better *save unnecessary expense*, nor can there be any *saving* in the expense of Candles or other Lights unless in a *Large Factory*. In *family Dwellings* it never will answer or pay *charges* under the Expenses of *Furnace pipes* and *attendance*, etc., etc."

Winsor, indeed, announces on the 11th June, 1807, that he has it "in command from his Royal Highness the Prince of Wales to light up his conservatory next Monday evening," but level-headed business men are not to be lured by the capricious support of a royal spendthrift.

The Chancellor of his Majesty's Exchequer, besought for a Charter, warily refers his suppliants to his Majesty's Most Honourable Privy Council, who in turn, dreading the responsibility of a decision in so doubtful a matter, counsel the presentation of an humble and dutiful memorial direct to his Majesty in person, which is forthwith done. Arrived thus at the summit of authority, his Majesty, as shy of action as his Ministers, refers it back to the Privy Council, who pass it on to his Majesty's Attorney and Solicitor General, and these gentlemen finally report "that such charter could not properly be effected from his Majesty, and that an Act of Parliament would be required to carry it into execution."

In 1808 the provisional committee, acting on behalf of the subscribers, publish a very temperately worded plea in favour of the Company's aims, wisely disclaiming any originality for Winsor's scheme, and frankly disavowing their belief in his estimate of profits. "His publications, indeed, are but ill adapted to promote his cause, and the exaggerated calculations which the sanguine mind of a discoverer is naturally disposed to indulge in have, to superficial observers, thrown an air of ridicule and improbability on the whole scheme." Everything is now done to forestall such criticisms as Winsor's noisy truculence had been too apt to 'arouse. £15,000 was soon subscribed, of which some £5,000 had been spent by May, 1808, a



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fifth of this sum being for law costs mainly incurred by the presentation of the petition for incorporation. In reporting the unsuccessful result of their efforts the committee declare of Winsor that, making due allowance for the severe stress of "pecuniary embarrassments, personal fatigues, and mental sufferings . . . upon an ardent and irritable mind, the Trustees have had great reason to be satisfied with his conduct . . . and that, in all his pecuniary transactions, he has acted (as far as your Trustees possess the means of forming a judgment upon them) with strict integrity."

The meeting thus summoned deciding that the project should be carried forward, a Bill authorizing incorporation was presented to Parliament, only to meet with the vigorous opposition of Murdock, who straightway lodged a petition against it, and thus precipitated an inquiry before a Committee of the House of Commons. Mr. (afterwards Lord) Brougham appeared as Counsel for Mr. Murdock, while the interests of the embryo Company were in the charge of Messrs. Warren & Harrison. The first witness called on behalf of the Company was Mr. Accum, a chemist of Soho, who steadily upheld the excellence of Winsor's light and coke, claimed perfect safety and practicability for his process, but shied when pressed for the exact grounds of his conclusions, on the plea that such valuable secrets could not be given away. The evidence of Mr. George Lee, who followed on behalf of Mr. Murdock, admitting the excellence of Winsor's gas lights in Pall Mall, served mainly as proof that earlier and equally efficient application had been made at his works by Messrs. Boulton & Watt from plans of Murdock's devising. He estimated that gas was 70 per cent. cheaper than candles and 50 per cent. cheaper than oil as an illuminant, and denied that it had proved in any way harmful to the health either of his work-people or his family. Sir Robert Peel asked him, "Would not the public be better supplied by a corporate body?" and was answered, "I think that the public is always injured when competition is diminished." This, stated briefly, was the gist of Watt's objection\* to the granting of a Charter—that it gave undue importance and protection to a single body to the undoing of present or potential rivals, and that the public service and convenience would suffer in exact ratio to the stability thereby assured to the Company. Murdock himself, feeling deeply that his pioneer work was being unjustly

\* Voiced by James Watt, jun., before the Committee.

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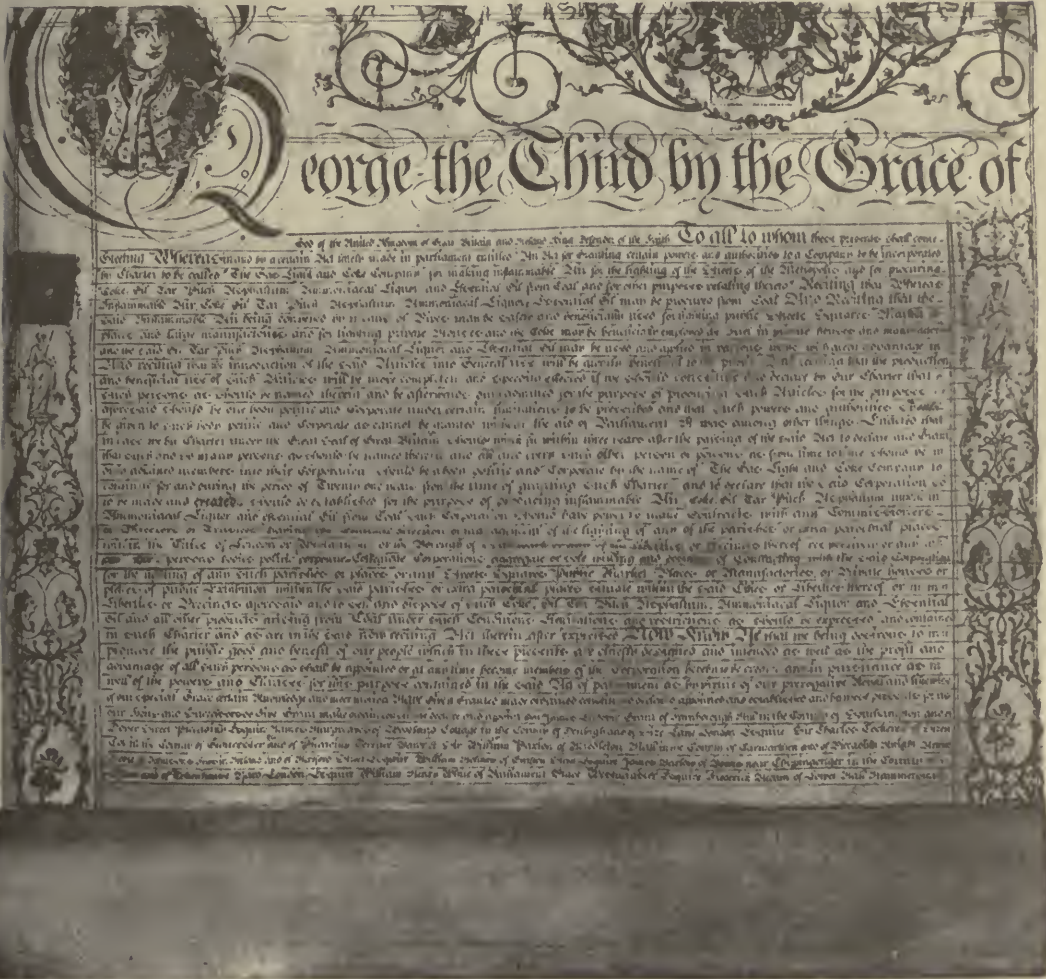
overlooked or slighted, and spurred on by Boulton and Watt, who were scared by the threatened invasion of fields they had so long tilled undisputed for their own profit, issued, on the 4th May, 1809, "A Letter to a Member of Parliament . . . in vindication of his character and claims," urgently appealing for his vote against the Bill. "Messrs. Boulton, Watt & Co. are not a body corporate, nor have they solicited any subscription, nor do I think they are likely to do so, yet I believe the articles above mentioned will be brought, by their means, into general use; and as to the *MANUFACTORY, it is already established.* This allegation of the bill [of undue delay in adapting a known process to the public need] being entirely without foundation, will, Sir, I trust, be rejected by the Committee of your house (*in which ALL that come are to have VOICES, by the votes, 1st May instant*); but then, unhappily, the bill will have no leg to stand upon! In which case, my prediction, expressed in the beginning of this Letter, as to the failure of the bill, will be accomplished; towards effecting which desirable purpose, I humbly beg leave, Sir, to request your attendance in your Committee, upstairs, *AGAINST THE SAID BILL.*"

The charge of touting for a monopoly is refuted in a very moderate and plainly worded circular by James Ludovic Grant, the chairman of trustees, issued simultaneously with Murdock's above-quoted appeal, all intention of hindering the operations of rivals being directly disclaimed. It was not so much the prior right of discovery which Murdock claimed as the prior right of exploitation, and, since he had taken no steps to protect his process, it is not surprising that the House was but lukewarmly in favour of a man who only awoke to its value when threatened by the far-seeing enterprise of a wittier rival.

The Bill was subsequently lost by a vote of the House on the third reading, when but ninety members were whipped up to the telling, and of these two-and-fifty were found among the "Noes." In the following year (1810), however, the application being renewed, with more modest demands in respect of capital, Parliament passed an Act enabling his Majesty to grant a Charter; yet 1812 arrived with the Charter still ungranted, as "the public prints and general notoriety have long since informed" the subscribers. A Charter was finally secured, in April of that year, the capital being restricted to £200,000 in lieu of £1,000,000 originally prayed for.

# COKE COMPANY, 1812—1912.

There followed more meetings at the Crown and Anchor, Strand, a general shaking of hands all round, voting of thanks to Mr. Chairman,



## THE CHARTER.

James Ludovic Grant, Esq., for his hardy persistence in keeping the Company's claims continually before the public and the authorities, despite continual rebuffs, foregoing the ease and comfort of his country residence



## THE GAS LIGHT AND

in order to keep in touch with metropolitan cities in high places—a man evidently of solid worth and ballast, without whose steady piloting the project had certainly run aground. Thereto were added thanks to John Pedder, Esq., of the Middle Temple, their Secretary, “for his constant diligence, solicitude, and ability throughout the various proceedings to obtain the charter.” Finally the report of these congratulations says of Winsor—and the voice sounds like Winsor’s own, spoken with a touchingly deferential tremor in it, as hinting of hardships long borne—“that it is his intention and unalterable determination to devote his services to the objects, and to license his patent to the use of the intended Company, and that under the immediate guidance of its directors, relying wholly and entirely upon the justice of those directors, for such salary as his labours may be deserving of, and placing his entire confidence upon the Proprietors at large [i.e. shareholders], for such remuneration as his past services and aids in originating this undertaking may, in their liberality, deem him entitled to.”

And so, after long travail, The Gas Light and Coke Company is born.





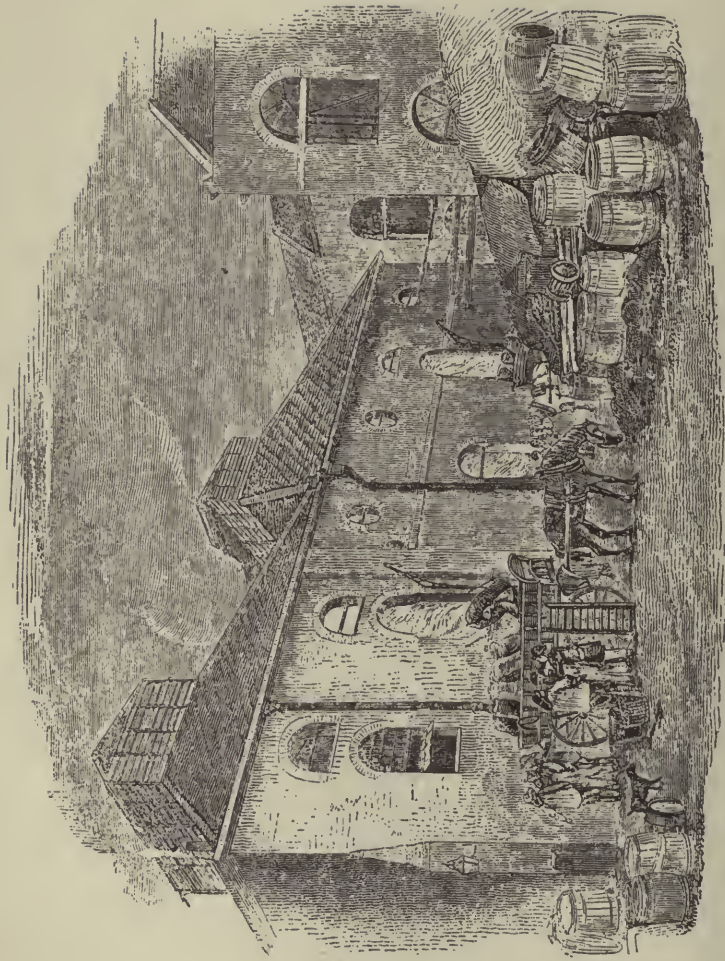
ENTRANCE TO CHIEF OFFICES, HORSEFERRY ROAD, WESTMINSTER.



BOARD ROOM, HORSEFERRY ROAD.



RENTAL OFFICE, HORSEFERRY ROAD.



HORSEFERRY ROAD, WESTMINSTER, GAS WORKS, 1842.

CHAPTER V.

THE START.

On the 24th day of June, in the fifty-second year of the reign of his Majesty King George the Third and in the year of our Lord 1812—to follow the breathless circumlocution of the recorded minutes—the now incorporated Gas Light and Coke Company held their first meeting at No. 27, Norfolk Street, in the Strand, in the County of Middlesex, and thereat the Governor, Deputy-Governor, and Directors, nominated, constituted, and appointed in and by the before-mentioned Charter, did personally administer to each other and take the several oaths prescribed and appointed. Grant was fitly named Governor, while Accum as “Practical Chymist” appears among the Directors.

In addressing the proprietors in January of the following year, Grant reports, as mouthpiece of the whole Board, that “their great and leading object will be to give you the most clear and perspicuous detail of their proceedings; by which they hope you will be thoroughly informed of the nature and extent of your present establishment, the amount and application of your Funds, and the means they have taken to produce the fair and confident hope there now is of compleat success in this undertaking.”

It would seem that Winsor, Accum, and Hargreaves, the Deputy-Governor, had so far been responsible for all that pertained to the technical incidence of output and distribution. The present report announces that Samuel Clegg, lately a neophyte in the workshops of Boulton and Watt, “has been unanimously brought into the service of the Company at a salary of £500 per annum,” and an early premonition of Teutonic invasion occurs in the nomination of one Gottschalck as Accountant, and another Buchholtz as clerk to the Secretary. £1,700 appears among disbursements as purchase money for a wharf, and £3,175 as cost of the Charter.

An explosion at the works was of extreme ill omen to the public, who still looked askance on the new lights as a trafficking with the infernal

THE GAS LIGHT AND



## COKE COMPANY, 1812—1912.

powers. A coloured cartoon issued a month after the occurrence shows one of the startled onlookers exclaiming, "This carbonin Hydrogen gas will kill as many as Bony!" But in spite of disappointments with machinery which utterly broke down, although constructed—in Winsorian phrase—"upon principles which are constant and unerring in their operation," in spite of hard knocks from their own supporters and stealthier blows from outsiders, the Directors kept on smiling, and the Company's mains slowly but surely extending throughout the cities of London and Westminster. In December, 1813, Westminster Bridge was lighted by gas, and in the following year the old oil lamps were removed from the Parish of St. Margaret, Westminster, and replaced by the new gas lights. A further contract was secured for illuminating a toy-house then erecting for the Prince Regent on a bridge over the canal in his park, where the trees now shiver to the roaring of the King of Beasts. Other contracts are triumphantly announced for lighting most of the Government offices, but their execution seems to have been long held over. The pagoda in St. James's Park, specially illuminated on the visit of the Allied Sovereigns in 1814, was burnt to the ground owing to the rashness of Sir William Congreve, who insisted, against the wishes of Samuel Clegg, on letting off fireworks as a preliminary to the general lighting up; and the public readily blamed the gas for the catastrophe, and its misjudgment was never rectified. We do not know whether popular clamour was really to be feared, though the inarticulate and unlettered hungry are always apt to glut their ire on whatever is new and misunderstood as a probable cause of their discomfort. It was a time of great distress and rioting against the introduction of machinery, and 40,000 cotton weavers had lately come out on strike. However, in June, 1813, it had been resolved that the Secretary "do provide a brace of pistols, a short sword, and a great coat for the watchman at the Works, and do lay the expense of the same before the Court," since the policeman on his beat was not then known. The Secretary for the Home Department, acting on an anonymous letter sent him by a scaremonger following the explosion, had ordained an inspection of the works by a committee of the Royal Society, in which proposal the Directors readily acquiesced as the best means of allaying public mistrust and proving the gross exaggeration of the reported calamity. The report of the inspecting body was so favourable that a Bill seeking for extended



## THE GAS LIGHT AND

powers was presented to Parliament and passed rapidly through the House, and thereafter the Directors steadily boasted that their operations were "under the controul and inspection of the Minister for the Home Department."

Though profits were so far nil and future prospects decidedly hazy, the Directors made a brave show of prosperity, grew convivial, and dined with the Proprietors at £1 per head at the City of London Tavern on the 24th August, 1814. Tactful men! For this was only preliminary to a further call of £5 upon each share, and they knew well how amenable we all grow "over the walnuts and the wine."



CHAPTER VI.

WINSOR.

In 1813 the Directors decided to vote Winsor an annuity of £600, unless the 1 per cent. due to him on the net profits should exceed that sum. This grant was subject to revision annually for five years subsequent to its making, and was allowed only "in consideration that he shall contribute, whenever called upon by the Board of Directors, such further information and assistance in his power, as may best tend to the benefit and advancement of the interests of this Company." This proviso involved Winsor's election as a Director, and to this position he was subsequently voted by a large poll.

Meanwhile rival companies were quickly springing up on all sides. These were steadily opposed in Parliament by the Chartered Company, who sent out vehement circulars, though their professed objections were only directed against any new companies being accorded special privileges which they did not themselves enjoy, or to their trespassing on areas already fed by their own mains, themselves having religiously refrained from competing in districts already bespoke by rival companies. We soon find Winsor junior issuing a prospectus for the providing of gas light, but declining any engagement "in London or its *immediate vicinity*, that being the range allotted by his Majesty's charter of April, 1812, to the Gas Light and Coke Co., of which his father is the Founder."

The Company at length, tired of their founder and his experiments—always on the point of success but yet never quite coming off—had finally docked his pension of £600,\* although throughout 1814 he had regularly assisted at their councils, and often acted as chairman. "In January, 1815," he writes, ten years after this date, "the payment of the annuity was suspended, under pretence of saving it for my family against

\* In 1820 he was voted an annuity of £200, which he enjoyed until his death, when it was transferred to his widow.

## THE GAS LIGHT AND

the public demands of several creditors. To satisfy those in part, all my property was gradually sold and mortgaged, and when my income was suddenly suspended I withdrew to Paris to avoid a prison for my reward in England"—for the Marshalsea still harboured financial derelicts, among whom the father of Charles Dickens was soon to be numbered.

Nothing daunted by this set-back, he immediately starts a campaign for the general adoption of gas by our Gallic neighbours. "La lumière produite par les huiles répand une fumée qui noircit tout et donne très souvent une odeur désagréable ; celle par le Gaz est exempte de fumée et d'odeur. La plafond qui est au-dessus, conserve toute sa blancheur. Vous pouvez juger de l'économie du temps que procure cet éclairage, on n'a plus de lampes à nettoyer, d'huile à répandre, de mèches à préparer." The circular is signed "Winsor, auteur du Systeme d'éclairage par le Gaz, en Angleterre, fondateur de la compagnie, incorporée par Charte Royal, a Londres, et breveté par S. M. Louis XVIII. pour l'emploi de ce système en France." A Company was floated, kept going for a few years, but ended in smoke and the bankruptcy court in 1819, and Winsor's own flaming spirit slowly flickered, and finally went out in 1830, his body being laid in the blackness of a tomb in the cemetery of Père la Chaise, at the age of sixty-seven years. His son and namesake served the Company first as employee, and afterwards, from 1850 until 1872, as Director.

Later, and for the most part technical, writers on the history of gas lighting have been very severe on the "ignorance and impudence" of one whose "vanity and cupidity iron-plated him against all ridicule," forgetting in their over-righteous scorn that their own chances of usefulness were only rendered possible by the zeal of a forerunner who, against fearful odds, stubbornly refused to be silenced, or to let his light lie hid under a bushel. If Winsor blew his own trumpet, it is at least obvious that there was no one else to do so for him ; and only by loud and continual blasts was attention to be challenged and held. Ignorant as he was of effective means to the realization of his great scheme (and this is patent even to the lay student), the Company cannot be blamed for dropping so quickly an incompetent pilot, whose counsels were proving daily more and more disastrous. None the less, his unquenchable faith removed mountains from the pathway of progress, and we may at least refrain from stoning a dead prophet whose vision is now fulfilled for our enjoying.

CHAPTER VII.

EARLY TROUBLES.

The early years of the Company's working were marked by desperate straits, and no dividend was paid until 1817, leakage from gasholders and the abuse of users on whose consumption there was practically no check, save by a system of spying, being largely responsible for these lean years—for it must be borne in mind that there were no meters in use in the early days of gas. Cash demands on the Company were at this time politely postponed, and from other evidence the enterprise seems to have been hovering between life and death. How primitive was the early installation may be gathered from the purchase of brewer's vats as gasholders, and the Minutes recommending timber instead of brick in the construction of later models as being cheaper and equally efficient. Old gun-barrels were recommended for use as service pipes in a practical treatise of the period, though we have no evidence that the Chartered Company had recourse to these. Great expense was entailed by obedience to the recommendations of the Royal Society's examining committee that all gasholders should be enclosed in strong buildings, and that no gasholder should exceed 6,000 cubic feet in capacity. These recommendations, though obviously futile, were prompted by fear of explosion, and so great was the mistrust and misapprehension of scientific men that even the great Sir Humphry Davy asked mockingly if they would like the dome of St. Paul's for a gasholder, to whose query Clegg prophetically replied that he hoped one day to see them of equal size.\* Working-class opposition was equally strong, so that Clegg was himself obliged to light the lamps on Westminster Bridge for the first few nights, owing to the stubborn refusal of the lamp-lighters to do so.

A warning was issued to consumers, with an apologetic prelude to the upright among them, but sternly concluding that "if any person shall be found consuming the Company's gas, within the hours of sunrise

\* They had already exceeded this before Clegg passed away. The girth of one of the gasholders at Beckton is 785 feet, within which the dome of St. Paul's might be very comfortably contained.

## THE GAS LIGHT AND

and sunset, or beyond the hours agreed for, the supply of gas will be immediately discontinued, and the communications with the Mains cut off." Various devices for obviating "wilful and negligent mismanagement," productive of waste or explosion among private users, were concocted and triumphantly announced, only to prove ineffectual



DAVID POLLOCK.

and be discarded. Matters were further embarrassed by the desertion of Clegg, on the refusal of a demand for a higher salary, for the service of a rival Company. Already in November, 1813, two of the Directors, Hargreaves and Holmes, appear to have been at loggerheads with the first Governor, flatly disclaiming the proffered resignations tendered by him on their behalf. Thereafter Grant becomes less assiduous in his attendance, and finally disappears at the close of the year from the Company's proceedings, being succeeded some months later by David Pollock, a barrister of repute who had long acted as Deputy-Governor.

Ready money was sought by putting up the wharf in Cannon Row and the house in Pall Mall—both too hastily acquired—for sale, and after some delay they were sold, the latter for £500, a price which will raise an envious sigh in the bosom of present-day applicants for a site in the heart of highest clubland.

COKE COMPANY, 1812—1912.

Clegg had invented his gas-meter in 1815, but it had to wait ten years and undergo many modifications before it was rendered practically effective. "The cost of every article required in a gas establishment was enormously dear. Retorts were £20 per ton, street mains £14 per ton, and other things in the like proportion. The skilled labour so essential to success could not be obtained at any price. It had to be made out of the raw materials; that is, the persons who were both able and willing to learn had first to be found and then to be instructed."\* Add to this that the value of the various by-products was little realised, and there is small wonder that the price of gas stood at 15s. per 1,000 cubic feet.

Nevertheless, in July, 1817, the Directors are able to announce an increase of over £8,000 in rental during the twelve months just elapsed, and to declare a dividend of 6 per cent. on the shares. Twelve months later the increase was doubled and a dividend of 8 per cent. declared, at which figure it remained for a number of years. Anonymous writers were still busy warning the public, both through the daily press and by pamphlet, that gas was both dangerous and unhealthy, though its advantages as an outdoor illuminant were grudgingly admitted. Application to Parliament for an increase in capital was granted without opposition, and the Charter made perpetual; and the same report which announces this records also the downfall of a rival undertaking which had been created, by the refusal of Parliament to sanction the wide freedom and unlimited powers which were sought for it at the instigation of several former officials of the pioneer Company. The adoption of the new lighting in private houses now rapidly increased, and anonymous champions were not wanting to replace the once numerous detractors. A correspondent in the *Sun* for the 13th May, 1823, demonstrating the superiority of coal gas, says: "I have it in every part of my house, to the entire exclusion of tallow and oil, my chamber and nursery having the light burning regularly through the whole night. The health of my family has not in the least suffered from it, and the use of it in the drawing and dining rooms appears to tend to preserve the original appearance of delicate coloured chintz furniture, carpets, and gilt ornaments, or rather that

\*Samuel Clegg, jun., "Treatise on Coal Gas."

## THE GAS LIGHT AND

the injurious effects of other modes of lighting have not been at all discernible. Its convenience, safety, cleanliness, and avoidance of grease spots, renders it so desirable, that though its expense might be treble what it now is, and the great economy now experienced, not to be felt, I would certainly not desist from the use of it."

This verdict was strengthened by the official report of the Select Committee of the House issued about the same time, which says "that the danger likely to arise from Gasometers and Gas Works is not so great as has been supposed, and that, therefore, the necessity of interference by the legislative enactments, pointed out in the Reports referred to them, does not press at the present period of the session." The report here quoted is dated February 24th, 1814, but it was not published till 1823, when it appeared simultaneously with independent reports of Sir William Congreve, who in the meantime had been appointed inspector, under the Home Office, of Metropolitan Gas Works. The statistics which he gives show the Company's output at its three stations (Peter Street, Brick Lane, and Curtain Road) to be well ahead of its rivals. "The whole annual consumption of coals by the three different stations was 20,678 [chaldrons], the quantity of gas produced 248,000,000 cubic feet: the whole number of lamps lighted by this company 30,735, through 122 miles of mains."

The Company had found means and, presumably, obtained leave to exceed the maximum capacity of 6,000 cubic feet advocated by the Royal Society, for the average of their gasholders is given at thrice that figure.



CHAPTER VIII.

CRITICISMS AND MISFORTUNES.

For the steady working of this period the Company was very largely indebted to their Engineer, George Lowe, who was appointed



GEORGE LOWE.

Superintendent of their Curtain Road Works in 1821, at a salary of £400, and quickly proved himself so wide-awake that the Company (grown wiser since Clegg's defection) ensured his retention twelve months later by adding £300 to his salary and transferring him to Brick Lane. The Minutes recording this voluntary recognition and advancement note the Directors' appreciation of the great improvement in setting and charging of retorts which brought about a great saving in wear and tear, and a greater output of coke. Two years later the proposal to establish a Company for oil-gas lighting (of which Sir William Congreve had become a warm partisan) was rejected

by Parliament after an exhaustive investigation before a Special Committee of the House. For this result the Chartered Company had again to thank their able Engineer, whose evidence in favour of coal gas was presented with admirable clarity and conviction.



## THE GAS LIGHT AND

As regards the administration, though David Pollock and Thomas Livesey were repeatedly re-elected to office as Governor and Deputy-Governor respectively, the management of the finances was subjected to severe and very damaging criticism both from within and from without the Company's own body. In 1825 appeared a pamphlet addressed to the shareholders by "an old proprietor" (inspired by Mr. Director Barlow, who had lately lost his seat on the Board through undue insistence on the examination of documents that were denied him) which claims to demonstrate "beyond the power of controversion, first, that the auditors have, at sundry times, reported *half a million of value* as paid, without having at any time defined the *Consideration* for which it was paid; and, secondly, that there is a discrepancy of *one hundred and forty-four thousand seven hundred pounds* to be accounted for." This would seem to be connected with the sudden disappearance of Mr. Secretary Pedder, and the discovery of considerable defalcations. The agitation seems to have borne fruit in a resolution passed by the General Court on the 1st November, 1826, "That an account of the Income of the Company be laid before the Proprietors at each Half-Yearly Meeting, distinguishing the sources from whence derived . . . and that an account of the current or permanent expenses of the Company incurred in and appertaining to the same half-year be also exhibited." That such accounts were intended to be exhaustive is proved by the detailed list, which appears in the motion, of items to be rendered. The relatively immense outlay sunk in opposing rival claims before Parliament was set off, in 1826, by the Company relinquishing their mains and right of lighting on the Surrey side of Westminster Bridge to the Phoenix Gas Company, the proceeds of this deal being put aside as a reserve fund.

A Mr. Joseph Box, on the 3rd November, 1829, having moved "That a Committee consisting of 12 Proprietors be now appointed to revise the Company's Bye-laws and examine its affairs with a view to economy," was promptly overruled by the acceptance of a wholly irrelevant amendment, "That this Court do now adjourn," an example of grim and heartless humour happily rare in the Company's records. A very different resolution had been passed five years earlier, in connection with the shortcomings of the Coke Manager, "That the directors, having taken into their favourable consideration the very lamentable and distressing

COKE COMPANY, 1812—1912.

situation of the wife and numerous family of Mr. Rice Williams, and the destruction that awaits them should the prosecution proceed against him by the Company, Do therefore recommend, approve and agree that the Court of Directors should relinquish criminal proceedings against him on the pure principles of humanity to his wretched and disconsolate wife and large helpless family." Humane feelings in the directorate were again testified in 1832, when Lowe, having suffered a severe illness which rendered impossible a strenuous pursuit of his former duties, was retained at £400 per annum for four days' work per week (having all his week-ends from Friday night to Tuesday morning entirely free), and an extra £100 as the Company's agent on the Coal Exchange. He had just taken out patents for enriching ordinary gas with coal naphtha, and for making Prussian blue from ammoniacal liquor.

In 1846 Pollock resigned office on his appointment as Chief Justice of the Supreme Court of Bombay, and William Bateman, who had been elected Deputy-Governor upon Thomas Livesey's resignation in 1840, reigned in his stead.



# THE GAS LIGHT AND

## CHAPTER IX.

### THE DAWN OF AMALGAMATION.

In 1849 a Consumers' Gas Company was started under the auspices of the City Corporation as a desperate protest against the exactions of the many competing Companies then existing, but it was soon abandoned on finding—as the much-scolded Companies had forewarned the promoters—that it was impossible to combine the low price of 4s. per 1,000 feet with a profit on the working.



F. J. EVANS.

In 1850 Bateman died, and in the following year falling dividends, caused by the ruinous stress of competition, impelled the Directors to nominate a special committee to consider the question of amalgamation; but no effective action followed on their deliberations. The same year had seen the adoption of clay retorts by the South Metropolitan Company, due to the initiative of Thomas Livesey, and three years

later they are reported to be successfully working in the stations of the Company on whose Board he had formerly served.

In 1855 increased prosperity brought up the dividend, which had languished for some years, from 4 to 6 per cent., and the Directors

*COKE COMPANY, 1812—1912.*

testified to "the zeal and promptitude shewn by every officer of the company in the discharge of greatly augmented duties" by voting an increase of 5 per cent. on all salaries. This concession called forth a letter of thanks signed by 33 officers—how small a fraction of the number that would subscribe to it nowadays! Special thanks and an increase of salary were shortly afterwards voted to Frederick John



J. ORWELL PHILLIPS.

## THE GAS LIGHT AND

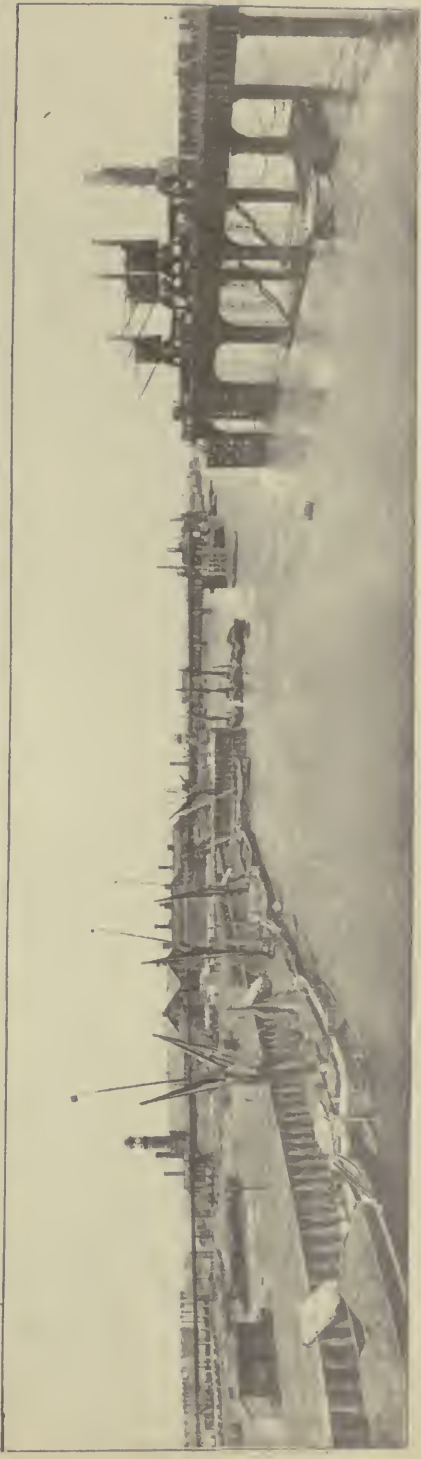
Evans, the Company's Chief Superintendent of Works, as being responsible for the greatly increased efficiency and economy of production which enabled the Directors to declare a dividend at double the figure announced seven years earlier.

In 1860 public agitation against the so-called monopoly of private Companies was definitely set going by the Parish Boards, who then applied to Parliament for powers to render the management of gas undertakings subsidiary to parish purposes.

In 1862 the Board luckily secured the services, as Secretary, of John Orwell Phillips, under whose masterly sway that policy of consolidation was achieved which, through temporary and comparatively trivial sacrifices, has conduced to the lasting welfare both of the Company and the consumers whom it serves. It is not too much to say that under Phillips the Chartered Company arose from the position of a second-rate Company to rank as the first and largest in the world, while its capital increased tenfold. In the following year George Lowe retired from the chief engineership after 42 years' service, and was succeeded by Frederick John Evans.

In 1865 the Proprietors were so well pleased that they voted a gratuity to the staff of 5 per cent. on salaries all round, and a present of 1,500 guineas for allotment among the Directors for their able conduct during a difficult period. The satisfaction of the shareholders, however, was far from being felt by the general public, whose murmurs were daily growing louder and more insistent, and a series of fully documented articles in the *Daily News* gave expression to the general discontent in a most trenchant fashion.

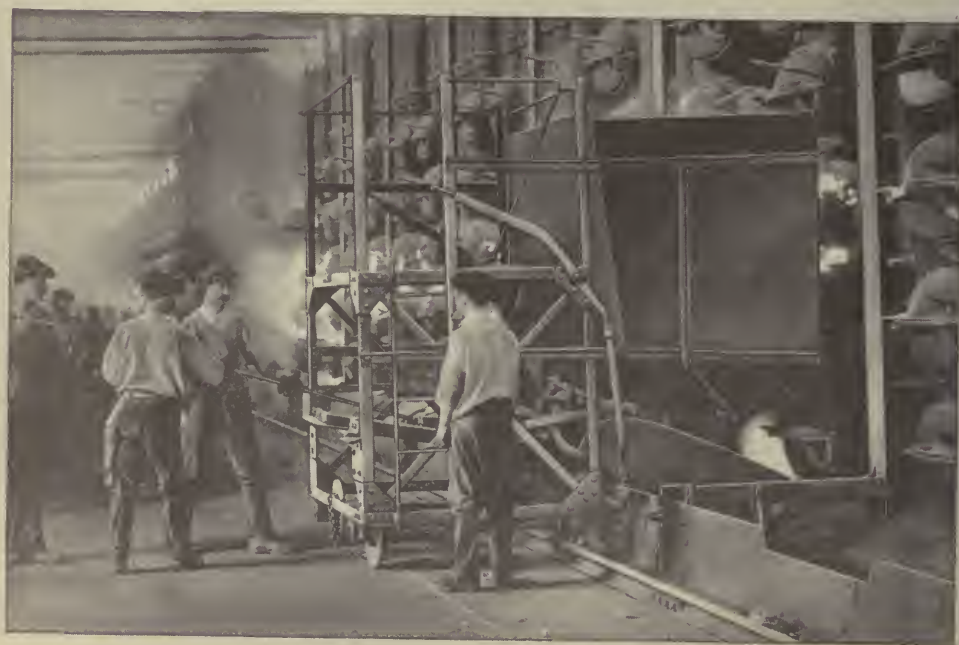
In the year 1866 the Board of Trade, the Metropolitan Board of Works, and the City Corporation were all agitating for a restriction of the powers and a heightening of the obligations of the thirteen Companies who between them supplied London with gas. The public were then paying about £1,700,000 a year for their supply, and witnesses before a Select Committee of the House of Commons were able to show conclusively that London gas was dearer and its quality inferior to that supplied to the inhabitants of many other large towns. It was thought that this was due to abuse of the powers granted by the Act of 1860, which permitted the companies to arrange for the



VIEWS OF BECKTON.



VIADUCT AND RETORT HOUSES, BECKTON.

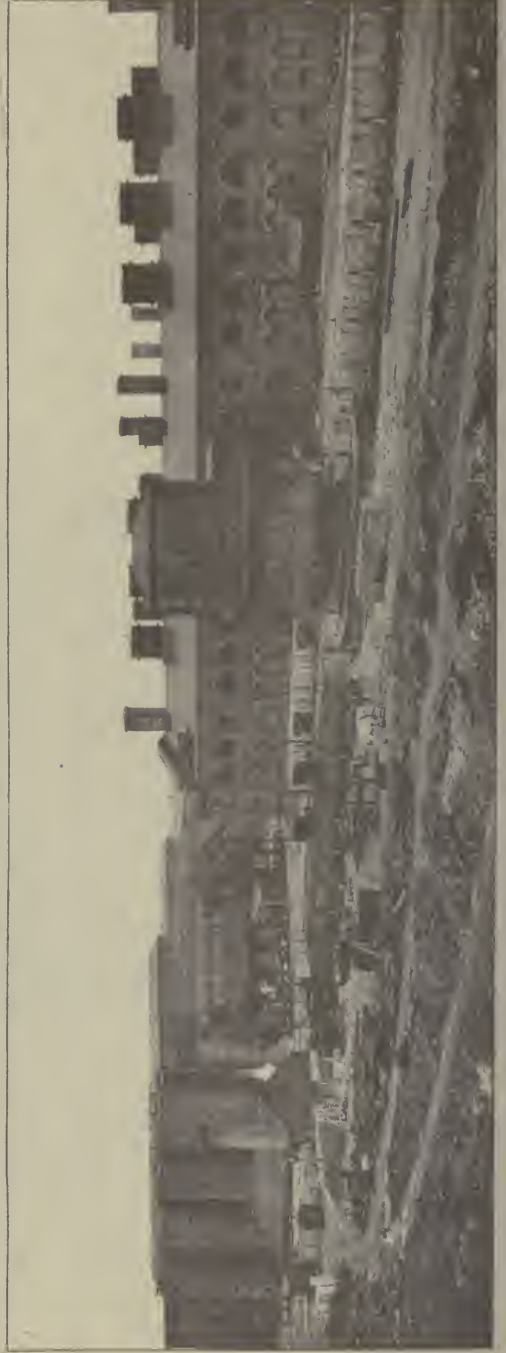
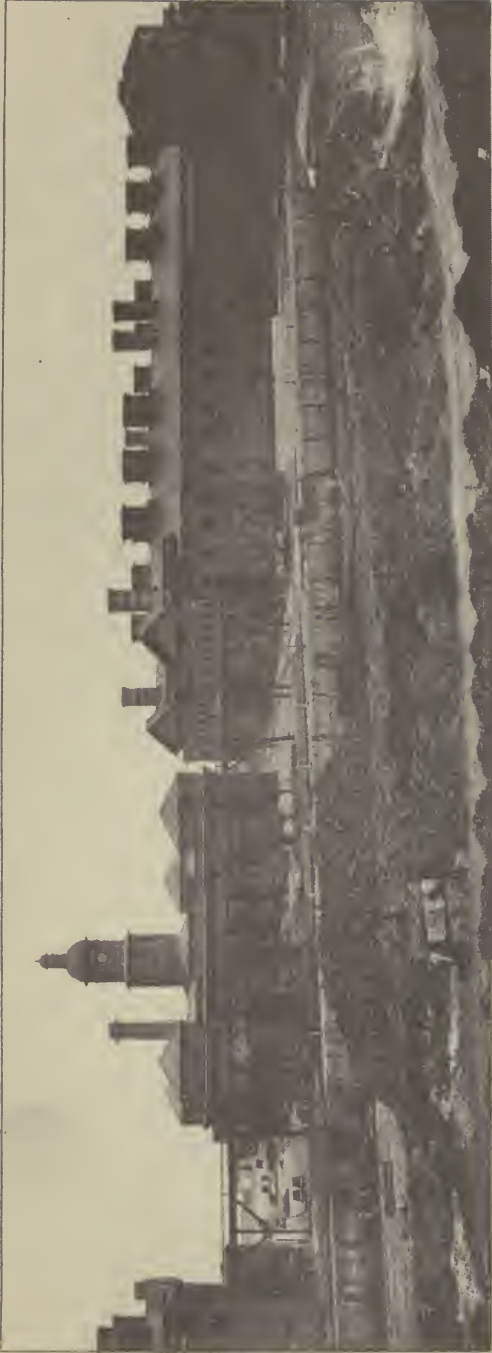


FILLING FIRES, BECKTON.



TAR AND AMMONIA PRODUCTS WORKS, BECKTON.





VIEWS OF BROMLEY WORKS.

## COKE COMPANY, 1812—1912.

lighting of allotted districts, and so avoid the ruinous competition which had resulted when all encroached on the fields of their rivals. This practically abolished competition, and though Parliament had confirmed the restriction of dividends to a maximum 10 per cent. (as enacted in 1847) the quality of the gas steadily deteriorated, while each Company, exempt from all fear of being ousted by a rival, exacted larger profits. No special tax was contributed as payment for this immunity, and the discontent of consumers became acute.

Overtures were made by the City Corporation for buying out the Companies' rights, with a view to a municipal supply, but these came to nothing. A second Committee of the House in the following year advocated amalgamation as the only means of satisfying both the Companies and the public, and a periodical revision of price, with a fixed maximum, by arbitrators to be appointed by the Board of Trade. The Companies—somewhat haughtily, as it now seems to us—rejected the Committee's recommendations, interpreting Parliament's past restriction to a dividend of 10 per cent. as a guarantee that had become a permanent right; and the Committee therefore urged that powers for the supplying of gas should be granted to local authorities. Thereupon the threatened Companies came forward with their Amalgamation Bill. This unfortunately fell through, but 1868 saw the passing of the City of London Gas Act, whereby the Chartered Company, the City of London Company, and the Great Central Company came to a working agreement, reserved their right to a maximum dividend of 10 per cent., obtained power to raise money by loans, and submitted the details of production and finance to the supervision of Government officials. Simultaneously the Company's Bill for the erection of new works at Barking received the Royal Assent. These were to be erected on land of which the Directors had announced the purchase twelve months earlier as "available for the Company's purposes, at North Woolwich, in the Essex Marshes, with a frontage to the river." This we now know as Beckton, a perpetual memorial to Simon Adams Beck, the then Governor of the Company. They had been driven thus far afield by the compulsory closing of certain of the Company's Works in the City and by the refusal of Parliament to sanction the acquisition of land in the Hackney Marshes, owing to its proximity to Victoria Park,

## THE GAS LIGHT AND

the rural seclusion of which was held to be threatened by the neighbourhood of gasworks.



S. ADAMS BECK.

The first pile of the river wall was driven by the Governor in November, 1868, and gas was first made there just two years later.

CHAPTER X.

AMALGAMATION ACHIEVED.

In 1870 the Directors reported amalgamation with the City of London Gas Light and Coke Company and the Great Central Company. In 1871 the Equitable Gas Light Company consented to absorption in the rapidly expanding body of their elder rival, and in the same year the Victoria Docks Gas Company's rights and property were acquired by purchase. The new Act empowering this union also granted the valuable right of further amalgamations with any other metropolitan gas company without renewed application for special Parliamentary sanction. In 1872 Frederick John Evans, who had served the Company as Engineer for thirty-five years, retired on a well-earned pension, and was elected to the Board; and the same year saw the Company swallowing up the Western Gas Light Company, and obtaining powers to raise an additional million of share capital to meet the cost of extensions.

Towards the close of the same year (1872), although the Directors announced an advance of "10 per cent. on the already handsome rate of wage," the stokers without any warning left their work, with the avowed intention of combining with other malcontents to plunge London in darkness. The difficulty was only bridged over by the aid of other Metropolitan Gas Companies in augmenting the supply of gas and by borrowing workers from the Corporation of London, the Metropolitan Board of Works, the Police, and the Company's Contractors, all of whom provided substitutes for the discontented, and thus defeated "the projectors of an organised conspiracy." £30,000 was the estimated loss to the Company by reason of the strike; but they announce that it "will not have been incurred in vain if it be found the hold of designing and unprincipled agitators on too well paid but easily misguided men be shaken off."

In 1875 the site of the Blackfriars Station (acquired with the City of London Company) was sold to the Corporation of London for £170,000,

## THE GAS LIGHT AND

thus facilitating improvements on the Victoria Embankment; and in the following year the Westminster Station was given up. The Imperial and Independent Gas Companies gave up separate working, and threw



THE HON. RICHARD HOWE BROWNE.

in their lot with the Chartered Company in 1876—a most important event, since the operations and responsibilities of the undertaking were nearly doubled thereby. In the same year Beck retired from the Governorship (being succeeded by the Hon. Richard Howe Browne),

## COKE COMPANY, 1812—1912.

after having served on the Board for twenty-eight years, of which eight had been passed as Deputy-Governor and sixteen as Governor. He passed away seven years later at the ripe age of eighty years.

In 1879 application was made to Parliament "seeking powers to apply capital to the purchase or manufacture of engines and apparatus, which they proposed to sell or let on hire, with the object of encouraging the use of gas, during the day as well as by night, for cooking, warming and other purposes."

In 1880, for an explosion of gas in Tottenham Court Road, the Company paid nearly £20,000 compensation; and the same year brought them another trial in the death, after forty-three years' service, of Frederick John Evans, the Engineer and Designer of the Beckton Works, and successor to George Lowe as Chief Technical Adviser to the Board.

In 1883 the long-protracted negotiations for amalgamation with the London Gaslight Company were at last consummated, and to mark this important event the Directors issued a short summary of the progress of the enterprise since the setting out in 1812. This is the first report to bear the signature of William Thomas Makins as Governor, and seems to have been prompted by the wish to reassure shareholders as to the Company's power to withstand and overbear all competition from electric lighting Companies, of which a great number were then applying to Parliament for working powers. In 1878 the Court had appointed a special Committee "to investigate the question of producing light by means of electricity, together with its cost and illuminating power as compared with an equal amount of light when produced by gas." These gentlemen reported, among other things, "we are quite satisfied that the Electric Light can never be applied indoors without the production of an offensive smell which, undoubtedly, causes headache, and in its naked state it can never be used in rooms of even large size without damage to the sight."

It is to be feared that the wish was father to the thought, for a serious rival had entered the field, and was only to be held at bay by the most strenuous activity. It must, however, be borne in mind that at the time of this report being presented the carbon filament light, enclosed in a vacuous glass globe, had not been invented.

## THE GAS LIGHT AND

In order to bring the history of amalgamation up to date it is necessary to state here that the West Ham Company was absorbed by The Gas Light and Coke Company in 1910, and that the Barking



SIR WILLIAM THOMAS MAKINS, BART.

Company and the Chigwell, Loughton and Woodford Company were also amalgamated with this Company as from the beginning of the current year, 1912.

CHAPTER XI.

IN OUR OWN DAYS.

The growth of interest in electricity as a means of lighting was symptomized in 1882 by the passing of the Electric Lighting Bill, granting Companies the right of exploitation in public areas. Attention had been focused by an Electrical Exhibition held at the Crystal Palace in 1881-2, and by a joint exhibition of Gas and Electric Lighting in the following year. In 1879 Electric Light had been introduced into Billingsgate Market, but abandoned. In 1880 it was tried in South Kensington Museum, and the following year in the House of Commons and many of the principal streets of the City. In all these cases, however, there were various breakdowns which damped enthusiasm for the new illuminant. Nevertheless in 1881 it was adopted in the workshops at Woolwich Arsenal and in the British Museum, where the huge arc-lights spit and simmer to this day.

The coming of the electric light synchronized with the letting out of gas-stoves for heating and cooking, on which the Company now seriously embarked. The Smoke Abatement Committee of the National Health Society afforded the Company an excellent opportunity for propaganda by their request—which was readily granted—for a gratuitous supply of gas for their exhibition of apparatus.

In 1883 overtures were made and terms fully settled for amalgamation with the South Metropolitan Company, but the Surrey-side public, fearing that the price of gas would be raised to the higher rate then ruling on the farther side of the river, started an agitation against the proposal, which induced the Board of Trade to reject it.

The year 1885 saw the disastrous ending of many of the newly started Electric Companies, and the Metropolitan Board of Works cancelled an agreement for electric lighting of the streets "because of the sudden extinction of many of the lights during the hours when they ought to have been constantly burning."



## THE GAS LIGHT AND

In 1890 the name of Mr. Corbet Woodall, the present Governor, first appears in the Directors' Minutes as one of two proposed as



JOHN WILLIAM FIELD.

referees in the assessment of damages in a claim against the South Metropolitan Gas Company for encroachment at Nine Elms.



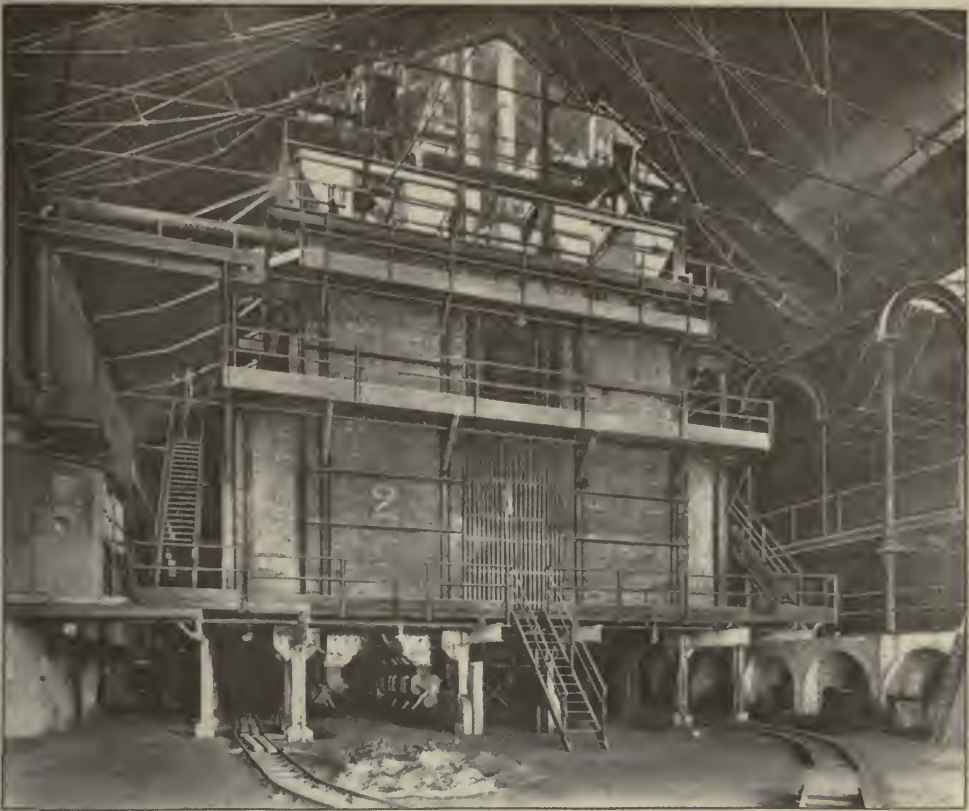
GAS PUMPING HOUSE, BROMLEY.



FIDDES-ALDRIDGE STOKING MACHINE, FULHAM.



COKE HOPPERS, FULHAM.



VERTICAL RETORTS, KENSAL GREEN.



INCLINED RETORT HOUSE. KENSAL GREEN.



PRESSURE-RAISING PUMPS, WESTMINSTER.

*COKE COMPANY, 1812—1912.*

In the preceding year the first plant for carburetted water gas had been installed at Beckton, 1889 thus marking an epoch-making event in the history of gas manufacture.



DAVID MILNE WATSON.

The indispensable John Orwell Phillips was compelled to retire in 1893, owing to falling health, after having served as Secretary and General

## THE GAS LIGHT AND

Manager for thirty-one years; and John William Field, who came over from the Imperial Company, filled the dual office throughout the decade following.

The year 1894 was rendered important by the introduction of automatic penny-in-the-slot meters, enabling hundreds of thousands of poor folk to pay their way as they go along, without the Damocles sword of debt impending above them. The humble penny will light the student for seven hours, or cook a full dinner for six hungry workers. The number of pennies taken from automatic meters during the year 1911 reached the stupendous total of 231,636,536—equal to a weight of 1,993 tons.

The closing years of the century put a new weapon into the hands of the gas producers in their struggle with the now firmly established electric lighting Companies. This was the invention of the Austrian Von Welsbach, now commonly known as the incandescent mantle, which so greatly increases the light-giving power of gas.

In 1902 the Governor (Col. W. T. Makins) was honoured by his late Majesty, King Edward VII., with a baronetcy.

As our narrative has proceeded—with prosperity more and more assured, and gas more and more of a commonplace in the public mind, which was so startled at its introduction, we have found little to record that will be interesting to the general reader. We have only had to insist on the coming and going of worthy men who have made that prosperity possible. In 1903 David Milne Watson and Henry Rayner became General Manager and Secretary respectively, and in 1905 Thomas Goulden became Chief Engineer. In 1906 Sir William Makins died, after having served on the Board for forty years, of which twenty-three had been passed in the Governorship during a most energetic period in the Company's annals. He was succeeded by the present Governor, Mr. Corbet Woodall, under whose guidance the prosperity of the Company has advanced by leaps and bounds, and the Company's employees have been admitted to the great advantages of Copartnership. To Mr. Woodall, too, must be attributed the inauguration of a most successful School for young Apprentices, who are taught in specially designed workshops on the Company's premises in Horseferry Road all the practical details of Gas-fitting. In this good

*COKE COMPANY, 1812—1912.*

work the Company is admirably supported by the London County Council, who arrange for the boys to receive, concurrently with their



ULICK JOHN BURKE.

practical training, an excellent general education at the Council's neighbouring Technical Schools in Vincent Square, Westminster.



## THE GAS LIGHT AND

Practically all the special conveniences of the electric light are equally available for incandescent gas light. Ignition at any distance; shadowless lighting and the unequalled brilliancy and whiteness of high-pressure gas lamps, are a few of the advantages enjoyed by consumers of gas by modern methods, to which is always to be added its cheapness. Nor are these advantages set off by any objection on the score of hygiene. "Gas consumed in modern incandescent burners can be used for lighting without detriment to health—being found, in fact, to assist ventilation by the increased circulation of the air." So says the Medical Superintendent of Lewisham Infirmary, F. S. Toogood, M.D., in reporting on experiments made for investigating this question and also for comparing the relative merits of open fires and gas radiators.

As to the power and cheapness of gas as an outdoor illuminant, it is only necessary to cite the experience of the City of Westminster, which has recently discarded electricity for the older means of lighting, effected a saving of £10,000 per annum thereby, and nearly doubled its power of illumination, as proved by the independent photometrical tests of the City Engineer.\*

In 1907, Mr. Ulick J. Burke, who had been a Director of the late Imperial Gas Company and of this Company for a period of 39 years, was elected to his present post of Deputy-Governor.

\* See *Journal of Gas Lighting*, January 16th, 1912.





F. W. GOODENOUGH,  
CONTROLLER OF GAS SALES.



P. ADAMS,  
SUPERINTENDENT, RENTAL DEPT



E. E. RUDGE,  
COKE MANAGER & CHIEF OF STORES



A. BEVIS,  
ACCOUNTANT.



H. RAYNER,  
SECRETARY.



J. HATCHWELL,  
REGISTRAR.



T. MILNE,  
SALESMAN.



W. McDOWALL,  
STORES BUYER.



W. F. FAGAN,  
MANAGER OF STOVE & METER WORKS.



T. WILTON,  
SUPT. OF PRODUCTS WORKS



C. A. CUNNOLD,  
ENGINEER, KENSAL GREEN



T. S. LACEY  
ENGINEER, NINE ELMS.



R. BIRKETT,  
ENGINEER, BROMLEY.



J. N. REESON,  
ENGINEER, BECKTON.



T. GOULDEN,  
CHIEF ENGINEER.



J. W. RANDELL,  
ENGINEER, FULHAM.



A. H. SOLOMON,  
ENGINEER, SHOREDITCH.



A. C. McMINN,  
ENGINEER, BOW COMMON.



W. B. REIDIE,  
ENGINEER, STRATFORD.



H. S. REESON,  
DISTRIBUTING ENGINEER.





BECKTON, FROM THE RIVER.

(From a Painting by W. L. Wyllie, R.A.)

CHAPTER XII.

A GLIMPSE OF BECKTON.

Midway between East Ham and Woolwich the electric tram-car halts at the Beckton Road, from the entry of which a long wooden barrier has been flung back to admit the vehicles that are continually passing in and out of the Company's domain. As you go forward, on your left are vast heaps of steaming sludge stretching away like a glimpse of chaos, and farther away to the right rise mastheads, looped derricks, coloured funnels, and the mazy tackle of great ships. Between these two, nine miles from Charing Cross, and amid the dreary Essex flats, lie the famous Beckton Works of The Gas Light and Coke Company. Cannons boom all day long from the proof butts at Woolwich, goats browse disconsolate in the swampy fields that surround them, and sirens wail from the river that forms the Company's southern boundary. Here two long T-shaped jetties run out into the Thames, studded with tall giraffe-necked cranes, the chains of which evolve their characteristic music as they swing round and draw up dark burdens from the great colliers straining like hounds at leash in the racing tide below. Thence to landward rise nine huge gasholders, black-lined against the fog like Titan's crowns, and about them lie 350 acres of ground covered with workshops incessantly astir, where some four thousand workmen labour daily.

Down at the jetties steam colliers of two to four thousand tonnage are unloading day and night, by means of twelve large hydraulic cranes that obediently take up a ton of coal at each grab, unclench their huge fists, and let fall their black handfuls into trucks lined up on the pier-front. Each truck is checked in its passage over a weighbridge, and drawn thence by steam locomotive to feed the hungry retorts that swallow up hundreds of tons of coal throughout the day and night. About a million tons of coal arrive at the pier-head during a year, for

## THE GAS LIGHT AND

the producing of gas that is pumped into London at the rate of thirty to sixty million cubic feet per day. Forty miles of railway run, on the level or overhead, throughout the works.

We mount the locomotive, and, braving the jolts and the smoke, pass rapidly along the metals to one of the retort houses, with a string of coal-laden trucks lined up behind us. Shrill whistles demand right of way; and are answered in warning of the on-coming wheels; the short-armed semaphores fall to beckon us onward, or rise sharply to forbid our passage, and above the retort-house entries peer the changing red and green of the signal lamps' blinking eyes. The locomotive dives under an archway into the gallery and draws up its freight for discharging. Here we alight, and crawl down a perpendicular iron ladder, powdered with coal-dust, to the floor below.

The retorts glare and roar, like hungry monsters that are never appeased; and feeding time never ceases. Look! A retort's mouth opens, gapes forth singeing breath and a shower of sparks; a long black arm shoots out from the feeder, pushes out the white-hot cinders at the farther end, and, withdrawing, leaves behind a fresh charge of fuel. The hot cinders fall into a trough running in front of the retorts, and are carried down it by a revolving chain, steaming and hissing as they pass under the sprinklers that play on them at intervals. Thence they are lifted into the storage bins for further use in the form of coke.

The gas thus begotten of the "sulphurous and tormenting flames" must pass through the purifying processes, and we move on to the inspection of the purifiers, which perform that mysterious purging before the gas is fit for use by the public. Thence, skirting the stacks of coal—at times nearly 200,000 tons of it are ready for translation—over the network of rails, past the nine gasholders, and so out of the works and into Winsor Terrace, that commemorates the great imaginer of an undertaking that others have lived to realize.

Turning out of the village we enter the Tar and Liquor Works, where the various residuals incidental to gas-making are prepared for the markets of the whole world. At the outset of gas-making almost the only residual that possessed any commercial value worth speaking of was the coke. For many years the tar and ammonia were

## COKE COMPANY, 1812—1912.

practically thrown away, and when the tar first became an article of commerce it was sold at a farthing the gallon.

“Oh! Gas-making,” say all our friends, with an air of amused condolence, when told the subject of our researches and scribbling. “How uninteresting!” Is he a motoring man? Go to Beckton, we say, and watch them turn out dockfuls of tar for the making of dustless roads. Is he a farmer? Beckton can supply him with countless tons of sulphate of ammonia for the enrichment of his crops. Is he a painter? Beckton helps to supply him with colours. Is he a printer? His linotypes are dipped in ink that Beckton products help to make. Is he a doctor? Beckton products are to be found in his dispensary. Is he an Army or Navy man? Beckton helps in the making of explosives that he must use in warfare. Is she a lady? Then Beckton gives her dyes for transforming that last season’s gown of which she has grown weary, or charms against the ravages of moths. There is at least that much of interest in by-products alone.

We pass a glass-sided outhouse, full of rifles all a-row, and another long shed where 600 men are dining in a club of their own controlling, where tipping and gambling are strictly tabooed. And with the advent of Copartnership the whole army of workers have become not so much employees as sharers of the duties imposed on a social body, and partakers of its prosperity. The Company has realized that to make a good workman, with a full sense of his rights and the responsibilities which their enjoyment implies, is also to make a good citizen.





# THE GAS LIGHT AND

## CHAPTER XIII.

### SUPERANNUATION AND SICK FUNDS.

Every one regularly in the Company's employ—whether engaged directly on the works, in the production of gas, or with the means of its conveyance in the outside world, or with the direction (whether technical or clerical) of the Company's affairs at its offices, workshops, or sales-rooms—is comprised in various schemes of superannuation.

In 1841 the Court of Proprietors resolved by ballot "that the sum of £250 per annum be appropriated out of the profit and loss account by half-yearly payments . . . for the formation of a superannuation fund for the benefit of the officers of the company contributing thereto." As regards workmen, the Court of Proprietors in 1823 authorized the appropriation of £1 10s. 0d. weekly in aid of the Sick Fund for their benefit, and in 1841 this contribution was increased to £5 weekly. In 1851 the Directors reported the break-up of the Superannuation Fund, started ten years earlier, the withdrawal of all sums (with their accrued interest) that had been paid in by the staff, the resumption by the Board of £2,500 which had been contributed in its support, and the setting aside of this sum as a nucleus of a fund for the voluntary pensioning of approved applicants.

All those on the official staff, as registered at the head office, now come compulsorily under a scheme which was started on the 1st January, 1905, Company and employees contributing monthly in equal shares. The Fund accumulates, at interest, in the hands of the Company. The main feature of this scheme is that any member who attains the age of 60, after having served the Company for ten years or upwards, may retire on a pension, and must do so (unless expressly retained) at 65, the annuity then payable being an eightieth part of his final salary, multiplied by the number of years which he has passed in the Company's employ, with a maximum of forty-eightieths.

## COKE COMPANY, 1812—1912.

There are two Workmen's Provident Societies : one for outdoor workmen (meaning those employed elsewhere than on the Company's own works or premises), and the other for indoor workmen (or those whose work is confined to the Company's own domains). The former was established in 1872 and the latter in 1877, but the conditions in force are practically the same for both. Those conditions are naturally much affected by the provisions of the new National Insurance Act, but the Directors of the Company have now under consideration a scheme for combining the benefits of that Act with those of the Provident Societies in such a way as to preserve, as nearly as possible, the advantages of both.



# THE GAS LIGHT AND

## CHAPTER XIV.

### COPARTNERSHIP.

The system of Copartnership inaugurated by the Directors in January, 1909, now embraces more than nine thousand employees of The Gas Light and Coke Company, and is a sincere tribute to the successful innovation of the late Sir George Livesey, which the South Metropolitan workers have been enjoying for upwards of 22 years.

According to this scheme, the Company's regular workers receive a bonus on their salaries and wages, gradually increasing as the price of gas falls below the standard price of 3s. 2d. The price of gas being now 2s. 6d., the bonus is 5 per cent. This bonus is placed to the credit of each worker in a special pass-book, and invested in the Company's Ordinary Stock as soon as it can pay the price of £5 of such Stock. Thereafter one-half of the accumulated bonuses is applied to the purchase of further Stock, and the rest may either be withdrawn in cash or left in the Company's keeping to gather 4 per cent. interest. Any sums so left may be supplemented by savings which will earn the same rate of interest.

This scheme, which has the great advantage of giving every worker a direct interest in the efficient discharge of his duties, is mutual; for the same reduction which wins him additional bonus earns also for the Company the right to a higher dividend in accordance with Parliamentary stipulations.

The Company have always refused to discriminate, for good or ill, between union and non-union workmen. In this policy, at once tactful and humane, they have persisted, maintaining an attitude of absolute neutrality towards all workers who efficiently fulfil their contracts. This principle of open-dealing is happily exemplified in the system of organised instruction of its staff on which the Company is now engaged. During the summer months demonstrations are given to some 1,200 gasfitters, and the learners "learn

*COKE COMPANY, 1812—1912.*

to do by doing" under the direction of an expert lecturer and the foreman fitter who aids him. Those desirous of qualifying for appointments as Inspectors receive exhaustive instruction in the science, mechanism, and finance of all that concerns their calling; those engaged as salesmen take part in organised discussions as to the best methods of reaching and satisfying buyers, their criticisms and suggestions being reported to headquarters without any hint of individual authorship, lest any diffidence or shadow of distrust should tend to stifle independent opinion, and so rob the Company of the very real value derived from its free expression.

A lad of fourteen may enter the workshop for gasfitters specially installed at Horseferry Road, and receive a year's training in the craft, supplemented by a few hours weekly in the London County Council Technical Classes held in Vincent Square, hard by. Should he emerge with credit after a year or eighteen months of wage-earning probation, his foot is on the first rung of the ladder reaching through every grade of promotion to the highest staff appointment.



## APPENDIX

AS TO THE

### ENGINEERING HISTORY OF THE COMPANY.

#### THE CARBONIZATION OF COAL.

Every comprehensive and intelligible account of coal-gas manufacture, whether on a small and experimental or on the largest scale, must begin with the retorting of the raw material, bituminous coal, technically termed "carbonization." In carrying out this process, naturally the earliest tentatives aimed simply at the production of gas in sufficient quantity for the immediate purpose. This is quite easy. All that is necessary is to submit the coal enclosed in an air-tight receptacle to the action of a simple furnace until all the gas, with its accompanying tar and ammoniacal liquor, has been expelled by the heat, through a pipe provided for the purpose. There will remain in the retort a quantity of residual "coke" weighing about 70 per cent. of the original weight of the coal. Illustration No. 1 shows Murdock's method of making gas for lighting Messrs. Phillips & Lee's cotton mill in Manchester, followed by Boulton & Watt, and submitted in 1808 to the Royal Society, in a paper for which a Rumford Gold Medal was awarded. It must, therefore, be regarded as quite the high-water mark of gas-making apparatus at that period. It will be noticed that the operation of such a retort must be intermittent and irregular in a high degree.

The retort was charged *in situ*, but the coke could only be emptied by hoisting the retort bodily from its seat (for which purpose a swinging crane was provided) and turning it upside down. While this was being done the gas connection had to be broken, and a gas-tight trap closed to shut off communication with the storage holders and any other retorts in action. This was plainly a wasteful and

laborious arrangement. The quality of the gas produced and also the rate of its production must have varied greatly. It would take ten or twelve hours for the heat from outside to penetrate such a mass of coal, and the fuel consumption must have been heavy. Glance now from this primitive device to the almost modern-looking arrangement figured in Accum's Fifth Edition as in use by 1819, at the Westminster works of the Chartered Gas Company (Illustration No. 2). The retort here is a cylindrical vessel of cast iron, 6 ft. 6 in. long by 12 in. inside diameter, weighing about half a ton. It has a separate "mouth-piece" at the front end, bolted to a flange on the retort, from which rises the ascension pipe" to carry off the gas, etc., and the mouth is closed by a movable lid, secured by means of a cross-bar and screw. The lid is made gas-tight by a luting of loam. The "ascension pipe" terminates at its upper end in a "bridge pipe" which connects it with a "dip pipe," shown pointing downwards into the "hydraulic main." The latter is a pipe large enough to collect the gas from many "dip pipes," and it always contains a quantity of fluid maintained at a fixed level. Into this fluid the gas pipes dip, whence their name, and are thereby automatically trapped, or "sealed," so as to prevent the back flow of gas into the retort when the latter is not working, or when the lid is off. The invention of the hydraulic main and dip-seal has been attributed to Samuel Clegg.

The successful gas retort was not produced until fireclay was substituted for iron. The idea itself dates from 1820; but it was many years later that the secrets of successful working and structural durability were fathomed. The physical differences between the two materials are obvious. Fireclay is non-metallic, baking into a highly refractory, porous substance of great strength under compression, but of small cohesion. Retorts made of it, whether moulded or built up of tiles and shaped pieces, stand a much greater heat than iron. Their expansion with heat, unlike that of iron, is one with brickwork, so that it is possible to build them into the ovens, or settings, as solidly as their constructional weakness renders necessary for support. The porosity when new, and tendency to accumulate a carbonaceous deposit inside, was at first disadvantageous, until it was discovered that the proper way to work them was to relieve them of the back pressure

## THE GAS LIGHT AND

of gasholders and other plant. This meant the introduction into large gasworks of the "Exhauster" or pump for drawing the gas away from the retorts as fast as it is evolved. When there is no back pressure of gas in the retort, whether made of iron or clay, the deposition of carbon on the interior is greatly diminished, and even the clay retorts cannot leak. The successful combination of the fireclay retort and the exhauster mark the beginning of modern conditions in coal carbonization; and finally ended the opening chapters of development as regards carbonizing methods.

For wellnigh half a century the "through" clay retort, 20 ft. long, set in benches of "sevens," "eights," and "tens," charged and drawn by smartly trained, muscular stokers working in gangs of six, three a side, made all the gas for London. There are many living who regret the manful handwork of the old stoking gangs, and who were genuinely grieved when the advance of machine stoking could no longer be resisted. Illustration No. 3 shows a modern retort house, with the latest triumph of mechanism for working the horizontal "through" retort—the Fiddes-Aldridge simultaneous coke-pushing and coal-charging machine. Fired with "producer furnaces," on the regenerative principle originated by the late Frederick Siemens, this gas-making plant is capable of producing gas at the rate of 13,000 cubic feet per ton, with only the hand labour required for directing the ingenious machinery which expels the coke at the far end of the retort, and with the same movement lays the fresh charge of coal in its place. The once arduous toil of drawing the red-hot coke out of the retort by hand rakes and filling by means of the coal scoop is thus not only abrogated but also improved upon in principle; which is true engineering. For real engineering progress in the substitution of mechanical power for manual labour does not consist in the mere exchange of steel and steam for flesh and blood, but in the more effectual accomplishment of the desired end.

### MANY INVENTIONS AND INNOVATIONS.

The second half of the last century was a period of continuous improvements and growth in the London gas industry. The Company

## COKE COMPANY, 1812—1912.

were encouraged to transfer as much as possible of their manufacturing work to a new site down the river below Barking; and accordingly, in due course, the great Beckton station, then and still the largest gasworks in the world, arose on the edge of the tideway and the Essex marshes.

As time passed, it became plain that, while some of the old up-town stations must go, others could be advantageously retained and remodelled. The last Metropolitan amalgamation gave the Company the Nine Elms station—their only works on the Surrey side. The useful centrally situated station Fulham, higher up stream; Kensal Green, in the west; Shoreditch; Bromley-by-Bow; Bow Common; and Stratford, are all good strategic positions for manufacture or supply or both, reinforced by Beckton. The existence of these different works, all possessing particular features, has set many problems to the engineering staff. During the period that followed the suppression of the uneconomical and obsolete stations, which it would not have paid to improve, carbonizing methods took several fresh departures. "Direct" firing of the retort settings gave place to "generator furnaces," in which small coke, or "breeze," is gasified by imperfect combustion to Carbon Monoxide, subsequently burnt in the setting with air heated regeneratively. The result is better and more regular heat in the retorts, lower temperature in the furnaces, greater facility for laying off the retorts for the Sunday rest, and a considerable saving on fuel account.

About the early "'eighties" came the suggestion to incline retorts at such an angle with the horizontal—about  $32^{\circ}$ —as would retain the layer of coal upon the sloping floor of the retort, while facilitating the subsequent discharge of the coke by gravitation. Exhaustive experiments were instituted, first at Kensal Green and afterwards at Bow Common, where, under the care of Mr. John Wilton, the system was brought to a high degree of success. The latest idea in retorting, which is now being worked on a gradually extending scale, is a revival of the effort to secure continuous carbonization in vertical retorts, a process which has now attained a marked degree of success and which is likely to mark the commencement of a new epoch in the economical carbonization of coal.



## THE GAS LIGHT AND

It is now necessary, in order to form a comprehensive picture of the Company's gas-manufacturing operations, to hark back to the period at the beginning of the last decade of the past century, when the question of the quality of the gas supply of London suddenly became menacing. The Company for many years sold two qualities of gas. The higher (and higher-priced) quality, made and distributed in a limited area of the West End, called "cannel gas," was of 20 candle-power. The remainder, and by far the greater bulk of the output, was called "common coal gas," and was of 16 candle-power. The time came when the more expensive quality of gas was by common consent agreed to be not worth the extra price, and its manufacture was abandoned. The so-called common coal gas could not be produced of the statutory quality without enrichment of the bulk by a proportion of cannel coal, the cost of which in time became prohibitive. Accordingly, the Company were fain to cast about for a cheaper substitute; and the late Mr. G. C. Trewby, then Chief Engineer, turned his attention to carburetted water gas, which was becoming the staple illuminating gas of the United States.

After many disappointing experiments in other directions, the Improved Lowe process of manufacturing carburetted water gas by the reaction of steam with highly heated carbonaceous fuel, and combining therewith the "cracking" into gas of either crude petroleum or the heavy residuum of petroleum distillation, was perfected as a trustworthy method of manufacturing luminous gas of any quality requisite for town supplies.

Illustration No. 4 represents an installation of water gas plant.

### THE PURIFICATION OF GAS.

Crude gas contains both temporary and permanent impurities—using the term in its widest sense. The temporary impurities, the removal of which is attended with various degrees of difficulty, comprise tar and water of distillation; the latter always charged with ammonia and some other gases which the finished gas is better without.

Next comes the purification of the gas from sulphur, chiefly present in the offensive form of sulphuretted hydrogen. This is a

## COKE COMPANY, 1812—1912.

highly necessary and important operation, and its complete performance is insisted upon by the public authorities, under tests which reveal the minutest trace of the impurity.

About 1850 Mr. F. J. Evans applied, at the Westminster station, a method of revivification of foul dry lime *in situ* which was ingenious. After the gas had been shut off an air inlet was opened and a connection made between the purifier box and the retort-house chimney, which drew a current of air through the lime. The same purifier could then be used again, but apparently only once more, and for half the former period. At the same period Mr. Evans made the really great discovery of the natural property of iron oxide used in purification to revivify on exposure to air. This now universal process in gas purification was therefore first tried in England in the works of the Company. The large scale on which the process of gas purification is carried out now necessitates the employment of elaborate mechanical devices for handling the heavy materials. The spent oxide, when so heavily charged with sulphur as to no longer revivify in contact with air, is sent to the Tar and Products Works at Beckton, where the sulphur is recovered and used for the manufacture of sulphuric acid.

### THE STORAGE AND OUTPUT OF GAS.

After having been measured, the gas is stored in the huge receivers, properly called gasholders, which are so conspicuous a feature of modern town landscapes.

Simple as the principle of the gasholder is—an inverted bell rising and falling in a basin of water—the working out of the problem of gas storage on the scale required and under the conditions presented by the first town gasworks generally, and the Westminster station in particular, was no easy task.

At Westminster the water-logged subsoil prevented the sinking of gasholder tanks beneath the surface, and the never-failing ingenuity of Mr. Clegg was called upon to deal with the problem of storing gas by other means. He designed a "revolving gasholder," illustrated by

## THE GAS LIGHT AND

Fig. 5, which was erected at these works. The illustration has been prepared from the original drawing, executed in the best style of mechanical draughtsmanship, preserved in the archives of the Engineering Department, Horseferry Road. It was a clever device and served its purpose, but was costly and difficult to repair, besides occupying much room relatively to its capacity.

Clegg went further, and invented the "collapsible" gasholder. Although it is impossible to applaud this particular product of Clegg's teeming mind, it is fair to him to state that he did not put forward this bizarre form of gasholder except as a special solution of a particular problem. Whenever he could, he erected holders of the cylindrical bell form which was destined to hold the field; and what is more, he dispensed with housing and with gravity counterpoising for the purpose of equalizing the delivery pressure. The magnificent gasholders of the present day, as shown in Fig. 6, standing staunchly in their naked strength against all the winds that blow, are therefore lineal descendants of Clegg's simplified holders of wellnigh a century ago.

Yet there is far more to Clegg's credit. He invented the gas governor. Only a gas engineer can fully appreciate the glory of this achievement. Whatever changes time may hold in reserve for the operations of manufacturing and purifying gas, the holder and the governor will keep their standing as indispensable to the proper conduct of a public gas supply service. We call the gasholder a compensator, a magazine, and an economic equalizer; the weight varies as the holder rises and falls in the tank, especially in the case of the "telescopic" holders of modern practice, which are constructed of several "lifts" to economize the cost of the tanks. Therefore, some means must be found for equalizing the resultant pressure of the gas at the outlet, and this is supplied by the "governor" invented by Clegg, and first used at Westminster (Illustration No. 7). It works on the principle of causing a valve in the gas pipe to open or shut in the inverse sense of the pressure changes. The gas pressure is caused to buoy up a small gasholder bell, or a flexible diaphragm, to which is attached the valve. As the pressure rises and lifts the valve nearer to its seat, the flow of gas is automatically checked.

### THE RESIDUAL PRODUCTS OF GAS MANUFACTURE.

In the long technical and commercial history of the Company the importance of the second term of its title has never been overlooked. Coke has always bulked largely in the working order and the business dealings of the Company, as the early accounts show. Nevertheless, it is to be observed that this valuable product has never been regarded in any other light than as a residual—that is, as secondary to the gas manufacture. Mr. Clegg, in the early history of the Company, rightly understood that its fortunes depended in the first place upon the discovery and following of the best possible carbonizing results in gas. The coke therefore had to take care of itself, at least in respect to manufacture—although, of course, any carbonizing process which produced inferior coke would be heavily handicapped. The establishment of this fundamental principle in those early days, when it would have been so easy to mistake the way to commercial success, is not the least of Mr. Clegg's services to the novel industry—and obviously the question could not have arisen nor been answered under the wholly different conditions of private gas manufacture. The enormous production of coke at Beckton and the other works of the Company has necessitated the provision of important engineering works to deal with it in the cheapest and most economical manner. Even the furnace ashes and clinker are carefully treated for the recovery of whatever is useful or saleable in them.

Next to coke the valuable gasworks residuals are ammoniacal liquor and tar. In the early years of the Company the latter residual commanded a high price, which, however, was not long maintained. The time came when tar and, in addition, ammoniacal liquor became nothing more than waste products of such an inconvenient character as to make it exceedingly difficult to dispose of them. It was always felt, however, that this mysterious essence, tar, hid in its black depths many secrets, and chemists never wearied of probing into its possibilities. So long as chemistry remained chiefly analytical, its application to tar was limited to simple fractional distillation, which resulted in the

## THE GAS LIGHT AND

discovery of various grades of valuable distillates from naphtha to pitch. When chemical science advanced to the synthetic stage, and began to build up compounds, the derivatives of coal-tar proved a fascinating field for the exercise of this new department of invention. So in course of time the coal-tar dyes and drugs appeared. This wonderful growth of chemical industry on the coal-tar side was not productive of corresponding advantage to the sellers of the tar, who could not resist the impression that they were not getting their fair share of the fruits of all this industrial development. To some extent the same suspicion attached to the trade in sulphate of ammonia, subsequently developed as a result of the high place assigned by scientific agriculturists to this form of nitrogenous manure.

The net result of these considerations was that the Company decided to embark upon the working up of their own residuals, and the great Tar and Products Works at Beckton, on a site adjacent to the gas-works, was started. It is not too much to aver that by going into this ancillary manufacture the Company helped to set up fresh standards of quality in the numerous products of the industry, and the Beckton brands soon established a reputation second to none in the trade.

It is through the Tar and Products Works that the Company reaches out its services to all lands. We cannot express this interesting truth more forcibly than it is put in the following communication from a writer in the company's service, who prefers to sign himself "W. K." :—

"This Company's sales of Tar and Ammonia Products amount, in round figures, to upwards of £350,000 yearly; and by far the major portion of this represents exports, either by the Company direct or through merchants and dealers in this country. The Company's market for products is world-wide, and it is safe to say that there is no country in the civilized world which their goods have not entered.

"Among the principal products produced at Beckton, and in order of their importance, are Sulphate of Ammonia, Pitch, and Creosote. The first named is the leading nitrogenous manure; and a vigorous propaganda carried on by makers in various parts of the world has assisted in the education of agriculturists to an appreciation of this valuable 'plant food,' resulting in benefit both to the producer and

## COKE COMPANY, 1812—1912.

consumer; to the former by prices that are maintained owing to improved consumption, and to the latter by larger and better crops.

“Pitch has a variety of uses, probably well known to most people, but one of the chief outlets is with coal mines, which employ the material as an agglomerant in the manufacture of briquettes from small coal and coal dust. Pitch is shipped from Beckton in whole cargoes at a time in boats specially chartered for the purpose. Creosote, third of the products mentioned, is used for the pickling of timber, and the trade in the article is rather interesting in view of the change that has come over it within the last few years. Our principal market for this material is in the United States of America, where, as one can appreciate, the endless miles of railroad, for ever increasing, call for innumerable railway sleepers, etc., and incidentally for creosote to pickle and preserve them. America, in her early days of railroad building, and with her vast virgin forests containing an apparently inexhaustible supply of timber, was very prodigal in the use of sleepers, and laid them down without treating them in any way to preserve them, happy in the assurance that when they rotted there was plenty of timber to replace them. However, even the vast American forests could not withstand for ever the great inroads made upon them, and the rapid increase in the price of timber forced this fact upon the railway companies, so that steps had to be taken to prolong the life of the sleepers, or ‘ties,’ which is the American name for them. This opened up an enormous and ever-growing demand for creosote. Originally, shipment of the oil in barrels was sufficient to meet requirements; later large iron drums were used, but in recent years so great has the demand become that creosote is shipped principally by tank steamers, in quantities of a million gallons or more at a time. It is loaded in bulk direct from store tanks on this side into the steamer’s tanks, and in due course is pumped thence into the huge installations erected at various American ports. In the same way creosote is now conveyed to various other parts of the world. Fortunately, this means of transport was quite available, as tank steamers were already employed in the petroleum oil trade. These tank vessels, bringing to England and the Continent bulk cargoes of petroleum oil, were glad of

## THE GAS LIGHT AND

return freight in the form of creosote, instead of going back in ballast. The only difficulty in connection with this bulk oil business results from the necessity of having to accumulate exceedingly large stocks; and when, as sometimes happens from forces beyond control, tank boats are at all late in coming in, storage capacity is taxed to its utmost limits, which at times gives rise to considerable anxiety.

“It might be supposed from the foregoing that one had only to say a word and orders for creosote would pour in; but, on the contrary, supply has kept pace with demand, and orders have to be searched for, as in the case of the various other products sold. The Company have a special office—called the ‘Salesman’s Office’—to deal with the sale of their large quantities of by-products. Situated in the heart of the City, it is well placed for meeting with clients both from home and abroad, and also for keeping in close touch with the many shipping interests affected.

“Among other products produced at Beckton are:—Anthracene, Benzole, Toluol, Solvent Naphtha, Green Oil, Naphthaline, Pyridine, Black Varnish, Disinfecting Fluids, Carbolic Acids, Nitrate, Liquid, Muriate and Anhydrous Ammonia, Cyanides of Potassium and Sodium, Prussian Blues, etc. It has always been a feature of this Company’s manufacture of by-products, as of other things, that a high standard of quality is aimed at. Trouble is no deterrent, and, to give an idea of the amount of detail that is entered into, it may be mentioned that in Prussian Blues alone the Works make, if required, over sixty distinct qualities, shades, and forms, and it speaks volumes for the care exercised by the Staff at Beckton that serious complaints are hardly known.”

### THE DISTRIBUTION OF GAS.

Clegg’s heaviest task was to justify the Company’s existence on the novel grounds of a public supply service, and he had to do it single-handed. Murdock had never thought of attempting such a venture; and Winsor, the man of ideas who had made it possible, could not carry it out. There was no help, comfort, or advice to be had anywhere. The scientific pontiffs scoffed at the proposal. The general public and the polite world were rather disposed to laugh at it when they did not

## COKE COMPANY, 1812—1912.

foolishly oppose and savagely lampoon it. The charming little engraving with which this chapter is adorned (see page 76) is quite exceptional. Most of the caricaturists of the period attacked gas supply as virulently and as grossly as they did vaccination, steam locomotion, and every other beginning of material progress.

The immediate problem was to convey the gas under the slight but positive pressure of the holders through the streets to any distance; with branch pipes to supply public street lamps and private houses, and to keep all this strange and untried system of conduits constantly charged with gas under pressure. The necessity of observing the latter condition was recognised from the very beginning, having regard to the risk of explosion if air returned into the pipes; and this requirement differentiated the service entirely from the otherwise analogous water supply, which could be safely cut off at will.

These difficulties were, however, ultimately successfully overcome, and now gas can be conveyed with ease in cast-iron mains or steel pipes to the most distant parts of the Metropolis.

As already mentioned, Mr. Clegg perceived the need of measuring the supply to private consumers, and invented the first dry gas-meter as early as 1815. Unfortunately, it was not a success. It was designed upon the principle of a pair of bladders for containing the gas, one to fill while the other emptied, enclosed in a tin case. The bladders were weighted so as to throw a certain pressure, and the change-valves were mercurial. Probably owing to the lack of proper ammonia purification it was impossible to find a membrane that would stand longer than a few months. Meanwhile Clegg had devised what the ever-admiring Accum calls a "Gas Meter or Self-acting Gauge," really a station meter, for checking the carbonizing returns—as is done to-day in every gasworks. This was a wet meter similar in outer appearance to the instruments known by the same name to-day; but the measuring apparatus was different, being akin to the revolving gasholder. The transference of gas from one measuring chamber to another space was sudden, through a horizontal slot, which must have caused considerable oscillation and rendered the machine unsuitable for consumers' use. Indeed, S. Clegg, junior, who was not likely to belittle his father's fame in this



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connection, observes in his "Treatise" that it was Mr. Samuel Crossley who, after many years, succeeded in making the wet gas-meter "a commercial machine." Before this consummation, so early as 1819, another "Chartered" engineer, Mr. John Malam, improved the wet meter considerably, in the sense of simplifying the parts and adapting the instrument to general use. When Mr. Clegg parted with his patent rights in his invention to Mr. Samuel Crossley, he still retained his personal interest in his bantling, and constantly helped towards its improvement. His last patent is dated 1858. Mr. F. J. Evans also took a useful hand at the same task.

Although the wet meter has never been surpassed in accuracy of measurement, and for this reason is still employed in scientific work, the practical inconveniences attending its use by consumers—chief of which are the liability of the water to freeze, and the obligation to inspect and re-water it several times a year—attracted favourable notice to the consumer's "dry" meter. This latter form of the instrument, now adopted by all the London gas companies and the majority of English gas undertakings, is entitled to recognition as the child of The Gas Light and Coke Company. It was born of parents connected with the Company, who also first abandoned the wet meter in its favour. Mr. John Malam, following Mr. Clegg, patented a dry meter in 1820. Like all the early attempts to solve this difficult problem, this apparatus embodied the principle of the common bellows. The gas was admitted into the expanding chamber, the capacity of which was the unit of measurement, and the number of times it was filled gave the total quantity of gas passed by the instrument, as recorded by a train of counting mechanism. Experience demonstrated that this principle was unreliable, and in 1844 Mr. Croll and Mr. Richards (an inspector of the Company) hit upon the improved method adopted in all modern meters of the class, in which the gas acts first upon the outside of a pair of metal discs enclosed in a gas-tight case, the lateral displacement of which constitutes the element of measurement, while the full inlet pressure of the gas effects the movement. The accuracy of all meters used for the sale of gas is guaranteed by the official stamp of the supervising local authority. It is probable that the gas-meter as we have it to-day is a fairer instrument for ascertaining the quantity of the commodity passing from seller to

## COKE COMPANY, 1812—1912.

buyer than most weighing or measuring methods used in retail trade.

Within recent years a remarkable impetus has been given to the use of gas by small householders by the successful introduction of the prepayment meter. All devices of the kind possess the common features of an additional gas inlet valve capable of being opened by a manual operation in which a coin plays the part of a physical connection, combined with a reverse action closing the valve by the ordinary progression of the indicating train of wheels. Thus the means of admitting gas to the meter and the ordinary measuring action of the instrument are not interfered with by the "penny-in-the-slot" accessory mechanism.

### HIGH-PRESSURE BULK TRANSMISSION.

The peculiarity of the Company's supply conditions—having so large a proportion of the total gas manufacture concentrated at Beckton—called for a whole scheme of transmission in bulk for many miles of open roadway and crowded streets, which was entirely novel. Nothing like the Beckton gas-pumping service was ever previously seen in gas engineering, and therefore everything connected with it had to be planned and carried out without any guidance from experience. It speaks highly for the carefulness, foresight, and skill of the engineers who designed these works that they never failed to fulfil all requirements, and have never given any serious trouble in operation. A great deal has been heard of the bulk transmission of high-pressure gas in various parts of the world, but little attention, even in mechanical engineering circles, has been bestowed upon this, the first enterprise of the kind, and still the largest.

The system originated in the plain necessity for bringing the Beckton gas to London. A pair of 48-inch cast-iron mains were laid direct from Beckton to Bromley-by-Bow, and, diverging at this point, proceed with various cross-connections northwards to Stoke Newington, and westwards to Fulham. Originally the idea was to work with the pressure of the Beckton holders only, but it was soon shown that this was not nearly enough.

A pumping station at Beckton with a maximum delivery capacity of about  $4\frac{1}{2}$  million cubic feet per hour, at a gauge pressure of 48 in.

## THE GAS LIGHT AND

of water, starts the gas on its way to Bromley. Here four sets of engines and pumps are appropriated to the Beckton service. They are capable of serving several purposes, being mostly used to supplement, from the local gasholders in which Beckton gas has previously been stored, the direct Beckton trunk main passing westwards. Two other sets normally keep up a sufficiently high initial pressure of the Bromley gas, but the whole pumping strength can be turned on at need to succour the Beckton supply.

Latterly a good deal of high-pressure lighting has been done directly from the trunk mains, where these happen to lie handy for the purpose, an excellent testimonial to the steadiness with which the pressure is maintained.

### THE APPLICATION OF GAS TO THE PRODUCTION OF LIGHT, HEAT, AND MECHANICAL POWER.

Modern applications of gas have profoundly influenced the principles and methods followed in its manufacture and distribution. Space will not permit of an exhaustive account of these applications in all their great variety. Truly, the founders of the vast industry of gas supply "wrought better than they knew." If the most extravagant of Winsor's dreams have not come true, the Company he fathered fills a larger place in the organized life of London, and does far more for the Metropolitan public than those who grudgingly witnessed its birth could have deemed possible.

At first and for many years the lighting business of the Company was administered on the basis of the illuminating power or "quality" of the gas prescribed by Parliament.

About the beginning of the last quarter of the past century definite steps began to be taken by the Company, together with the other Metropolitan gas undertakings, to popularize the domestic use of gas for cooking and other purposes besides lighting.

Accordingly, gas-cooking and heating and water-warming apparatus was cultivated, and the stove-hiring system was adopted. An epoch-marking exhibition of such appliances was held, with the support of the Company, at the Crystal Palace in 1882. Before this

## COKE COMPANY, 1812—1912.

period so novel was the idea of selling gas for its fuel value that no instrument for ascertaining its calorific power existed. Eighteen years more had to elapse before the habitual determination of the calorific power of gas as an element of its commercial value became general with the more progressive gas companies. Irresistibly with the advance of the general recognition of the superior significance of the fuel value of gas, respect for the artificially magnified illuminating power standard of quality declined. A great revolution in the method of obtaining light from gas had in the meantime been successfully completed. In 1885 Ritter von Welsbach invented the incandescent "mantle" gaslight, known by his name; and by the end of the century, after many vicissitudes, this system of gas-lighting had established itself in popular favour. Inasmuch as this principle of lighting by gas depends wholly upon the action on the highly refractory substance of the mantle of the non-luminous Bunsen flame, the temperature of which has more relation to the chemical composition of the gas, and its properly ordered combustion, than to its illuminating power—the traditional valuation of gas by the latter property alone sank to the level of a superstition. In due course the Company procured from Parliament the alteration of the illuminating power standard to 14 candles, and were the first to accept, provisionally, a statutory standard of calorific power. Actually, the luminous efficiency of the gas which is legally rated as of 14 candle-power for 5 cubic feet develops in the Welsbach mantle anything from 18 to 60 candle-power per cubic foot. It is, therefore, on this basis, a 90 to 300 candle gas, according to its method of treatment. Thus, instead of remaining content with a lighting service of half the luminous value placed at his disposal by the Company, and duly charged to him, the consumer now has an enormous advantage over the apparatus of the testing station, and, if he so chooses, the Company, by their system of maintaining his mantles in proper condition at a small fixed charge per burner, will see that he gets it.

This change of the principle of valuing gas has gone far to free the hand of the engineer in the way of manufacture. Instead of being condemned to one system of carbonization, and within a limited range at that, he is now at liberty to choose from several distinct

## THE GAS LIGHT AND

methods every one of which makes for economy of coal. His choice may range from the "chamber" plan of carbonizing coal in large masses, on the model of the metallurgical coke-ovens of modern colliery practice, or he may fill up his inclined or horizontal retorts; or select vertical retorts, worked either intermittently or continuously. By any of these systems it is possible to extract 13,000 cubic feet per ton from the same class of coal that could only be trusted to yield 9,500 cubic feet of 16 candle gas, or, in Clegg's day, gave barely 7,000 cubic feet to the ton. No other coal-consuming manufacturing process can show a more progressive economy of the raw material. No Gas Company has been more prompt to take advantage of all modern improvements in manufacture and distribution than The Gas Light and Coke Company, or uses them to better effect, as the repeated reduction of the price of gas during the last five years proves.



COKE COMPANY, 1812—1912.

**OFFICERS:**

General Manager	.. .. .	D. Milne Watson.
Chief Engineer	.. .. .	T. Goulden.
Secretary	.. .. .	H. Rayner.
Accountant	.. .. .	A. Bevis.
Registrar	.. .. .	J. Hatchwell.
Controller of Gas Sales	.. .. .	F. W. Goodenough.
Superintendent of the Rental Department		P. Adams.
Salesman	.. .. .	T. Milne.
Coke Manager and Chief Officer of Stores		E. E. Rudge.
Stores Buyer	.. .. .	W. McDowall.
Distributing Engineer	.. .. .	H. S. Reeson.
Superintendent of Tar and Ammonia		
Products Works, Beckton, E.	.. .. .	T. Wilton.
Resident Engineers of Works :		
Beckton, North Woolwich, E.	.. .. .	J. N. Reeson.
Stratford, E.	.. .. .	W. B. Reidie.
Bromley-by-Bow, E.	.. .. .	R. Birkett.
Bow Common, E.	.. .. .	A. C. McMinn.
Great Cambridge Street, N.E.	.. .. .	A. H. Solomon.
King's Road, Fulham, S.W.	.. .. .	J. W. Randell.
Kensal Green, W.	.. .. .	C. A. Cunnold.
Nine Elms, S.W.	.. .. .	T. S. Lacey.
Manager of Stove and Meter Works :		
Laburnum Street, N.E.	.. .. .	} W. F. Fagan.
Harwood Terrace, Fulham, S.W.	.. .. .	
Stratford, E.	.. .. .	

THE GAS LIGHT AND

ITEMS OF INTEREST.

Nominal Share Capital raised ..	£22,822,965	} £29,154,146.
Nominal Loan Capital raised ..	4,661,705	
Amount of Premium Capital ..	1,669,476	
Number of Shareholders .. ..	32,528	(December, 1911).
Coal Carbonized.. .. .	1,816,962	tons (year 1911).
Oil used for Carburetted Water Gas	13,401,101	gallons (year 1911).
Coke Made .. .. .	1,150,202	tons (year 1911).
Gas Sold .. .. .	25,484,985,000	cubic ft. (year 1911).
Amount of Gas Rental .. ..	£3,223,590	(year 1911).
Revenue from Tar and Liquor Products .. .. .	£356,224	(year 1911).
Number of Consumers, Ordinary ..	283,421	} 714,323.
Number of Consumers, Automatic	430,902	
Number of pennies collected from Automatic Meters during year 1911 .. .. .	231,636,536	= 1,993 tons in weight.
Number of Stoves on Hire, Ordinary	174,776	} 495,382.
Number of Stoves on Hire, Automatic	320,606	
Number of Workmen employed ..	12,637	(December, 1911).
Amount paid in salaries and wages	£1,140,898	(year 1911).
Number of Staff Officers .. ..	895	(December, 1911).
Number of Copartners .. ..	9,700	(April, 1912).
Number of Miles of Main .. ..	2,489	(December, 1911).
Area of District supplied .. ..	125	square miles (about).
Price charged for Gas to Ordinary Consumers, North of Thames, for the past 6 years :—		

			s. d.	
1907	.. .. .	2 11	per 1,000 cubic feet.	
1908	.. .. .	2 10	.. ..	
1909	.. .. .	2 9	.. ..	
1910	.. .. .	2 8	.. ..	
1911	.. .. .	2 7	.. ..	
1912	.. .. .	2 6	.. ..	

COKE COMPANY, 1812—1912.

Statement showing the growth of the Company, and the effect of Amalgamations, as regards Gas consumption.

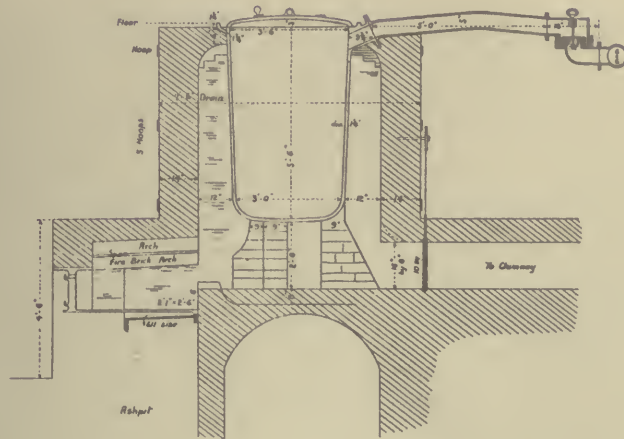
THE GAS LIGHT & COKE COMPANY.		GAS COMPANIES AMALGAMATED THEREWITH.	
Year.	Output of Gas in thousands of cubic feet.	Name of Company.	Output of Gas in thousands of cubic feet.
1869	1,285,602		
1870	2,353,577	{ City of London	533,661 (1869)
		{ Great Central	465,667 (1869)
1871	3,183,777	{ Equitable	447,746 (1870)
		{ Victoria Docks	52,000 (1870)
1872	3,441,724	Western	591,680 (1871)
1873	3,914,973		
1874	4,167,008		
1875	4,610,871		
1876	9,472,281	{ Imperial	3,782,472 (1875)
		{ Independent	545,227 (1875)
1877	9,934,489		
1878	10,635,890		
1879	11,403,803		
1880	11,671,391		
1881	12,169,636		
1882	12,683,857		
1883	14,824,547	London	1,587,751 (1882)
1884	15,251,603		
1885	15,870,076		
1886	16,276,565		
1887	16,788,208		
1888	17,288,017		
1889	18,105,229		
1890	18,536,085		
1891	19,232,716		
1892	19,117,072		
1893	18,244,140		
1894	18,242,349		
1895	19,294,801		
1896	20,115,728		
1897	21,022,676		
1898	20,977,374		
1899	21,656,746		
1900	21,357,687		
1901	21,160,142		
1902	21,033,542		
1903	20,528,644		
1904	21,084,334		
1905	21,018,423		
1906	21,546,879		
1907	22,014,097		
1908	21,946,331		
1909	22,540,035		
1910	25,014,949	West Ham	1,894,637 (1909)
1911	25,484,985		
		{ Barking	180,137 (1911)
1912	...	{ Chigwell	128,376 (1911)



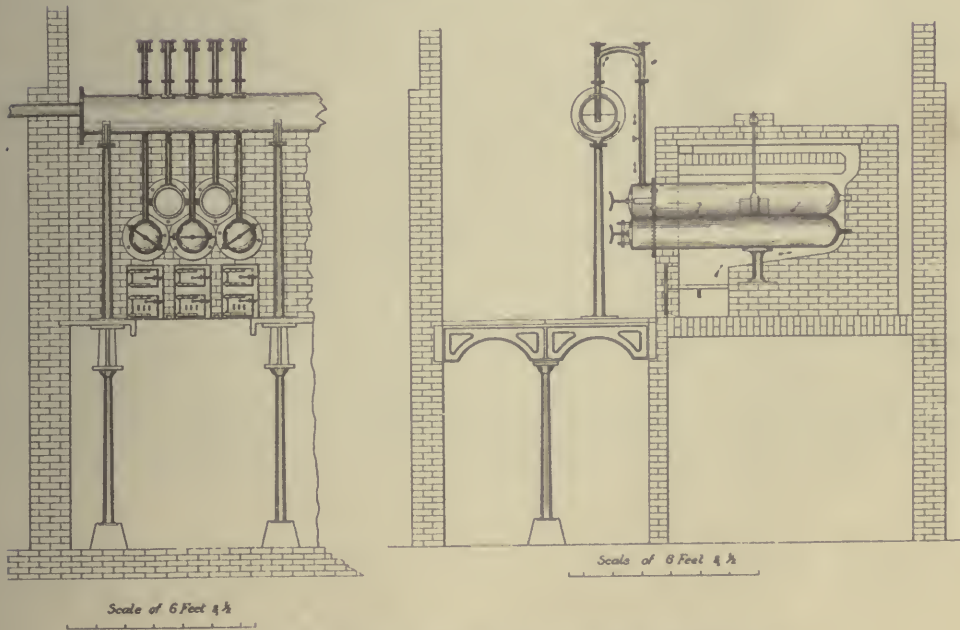
LIST OF OFFICES AND SHOWROOMS.

Horseferry Road, Westminster, S.W. (Chief Office).  
59/61, Kensington High Street, W.  
35, Harwood Terrace, Fulham, S.W.  
182/184, Edgware Road, W.  
106, High Road, Kilburn, N.W.  
16/18, High Street, Harlesden, N.W.  
20, The Promenade, Golders Green, N.W.  
5a, 7 and 9, Camden Road, N.W.  
70/74, Stoke Newington Road, N.  
129/133, Mare Street, N.E.  
146, Goswell Road, E.C.  
40/42, Imperial Market, Barking Road, E.  
Union Street, Stratford, E.  
3/5, Martin Street, Stratford, E.  
861, High Road, Leytonstone, E.  
13, Cleveland Parade, George Lane, Woodford, Essex.  
9, The Broadway, Snakes Lane, Woodford, Essex.  
64, Woodgrange Road, Forest Gate, E.  
Abbey Road, Barking, E.  
Ripple Road, Barking, E.  
Goodmayes Road, Goodmayes, Essex.  
54, Station Road, Chingford.  
High Road, Loughton.  
Finsbury Court, E.C. (Salesman's Office).

Illustrations referring to the Engineering Appendix.



No. 1. MURDOCK'S VERTICAL RETORT, 1805



No. 2. IRON RETORT SETTINGS AT WESTMINSTER, 1815.



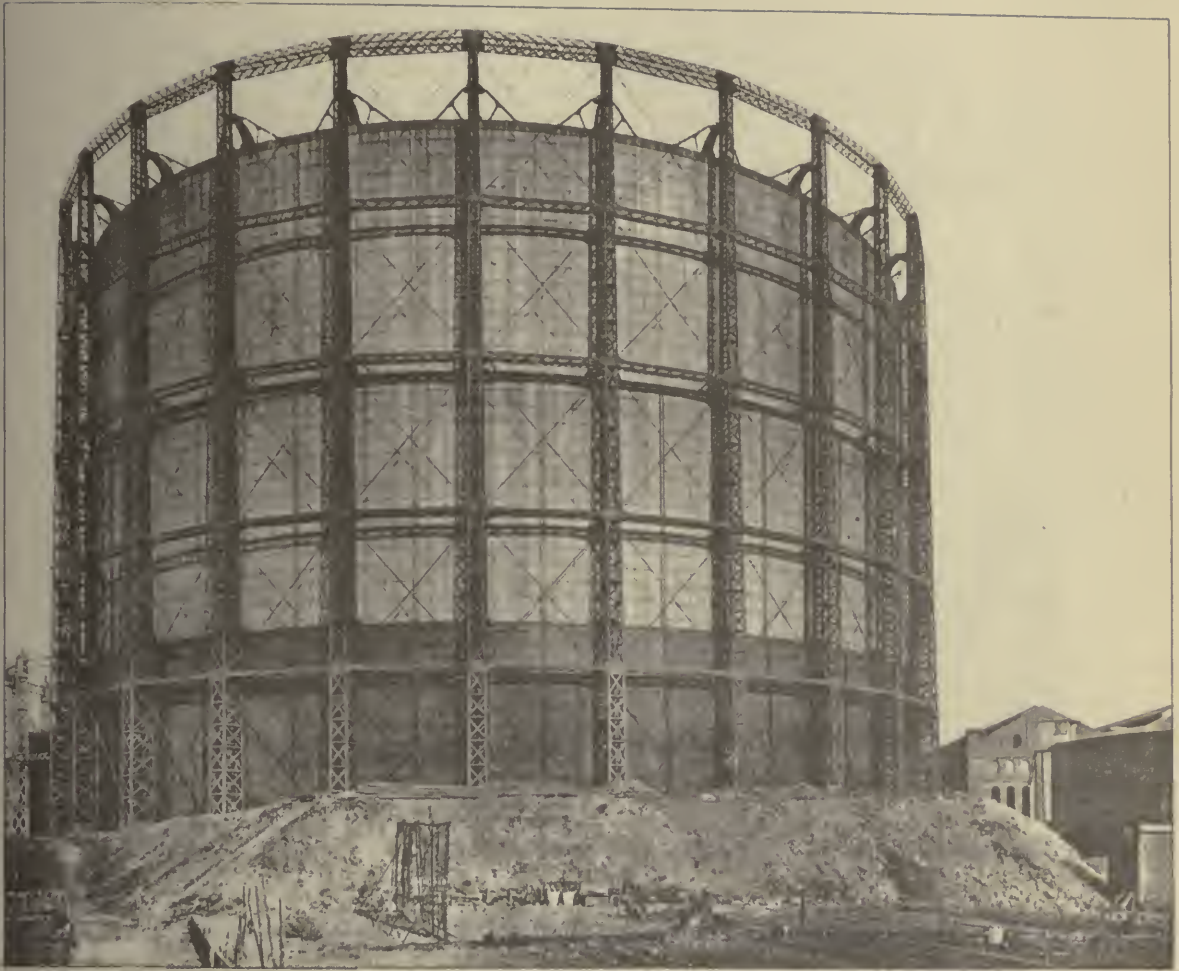
No. 3. A MODERN RETORT HOUSE.



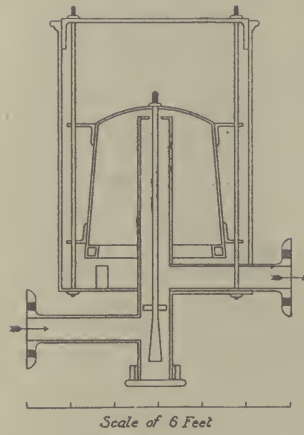
No. 4. CARBURETTED WATER GAS PLANT.



No. 5. CLEGG'S REVOLVING GASHOLDER, 1817.



No. 6. A MODERN GASHOLDER.



No. 7. CLEGG'S GOVERNOR.



COKE VAN AND COKE MOTOR LORRY.





NELL GWYNNE'S HOUSE, FULHAM.

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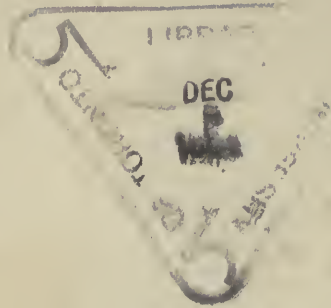
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