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# **James Watt**

Andrew Carnegie

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# JAMES WATT

By  
Andrew Carnegie  
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"Gospel of Wealth," "Triumphant Democracy,"  
"American Four-in-Hand in Britain,"  
"Round the World," Etc.  
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## PREFACE

When the publishers asked me to write the Life of Watt, I declined, stating that my thoughts were upon other matters. This settled the question, as I supposed, but in this I was mistaken. Why shouldn't I write the Life of the maker of the steam-engine, out of which I had made fortune? Besides, I knew little of the history of the Steam Engine and of Watt himself, and the surest way to obtain knowledge was to comply with the publisher's highly complimentary request. In short, the subject would not down, and finally, I was compelled to write again, telling them that the idea haunted me, and if they still desired me to undertake it, I should do so with my heart in the task.

I now know about the steam-engine, and have also had revealed to me one of the finest characters that ever graced the earth. For all this I am deeply grateful to the publishers.

I am indebted to friends, Messrs. Angus Sinclair and Edward R. Cooper, for editing my notes upon Scientific and Mechanical points.

The result is this volume. If the public, in reading, have one tithe of the pleasure I have had in writing it, I shall be amply rewarded.

The Author.

## CHAPTER I

### Childhood and Youth

James Watt, born in Greenock, January 19, 1736, had the advantage, so highly prized in Scotland, of being of good kith and kin. He had indeed come from a good nest. His great-grandfather, a stern Covenanter, was killed at Bridge of Dee, September 12, 1644, in one of the battles which Graham of Claverhouse fought against the Scotch. He was a farmer in Aberdeenshire, and upon his death the family was driven out of its homestead and forced to leave the district.

Watt's grandfather, Thomas Watt, was born in 1642, and found his way to Crawford's Dyke, then adjoining, and now part of, Greenock, where he founded a school of mathematics, and taught this branch, and also that of navigation, to the fishermen and seamen of the locality. That he succeeded in this field in so little and poor a community is no small tribute to his powers. He was a man of decided ability and great natural shrewdness, and very soon began to climb, as such men do. The landlord of the district appointed him his Baron Bailie, an office which then had important judicial functions. He rose to high position in the Pg. 4town, being Bailie and Elder, and was highly respected and honored. He subsequently purchased a home in Greenock and settled there, becoming one of its first citizens. Before his death he had established a considerable business in odds and ends, such as repairing and provisioning ships; repairing instruments of navigation, compasses, quadrants, etc., always receiving special attention at his hands.

The sturdy son of a sturdy Covenanter, he refused to take the test in favor of prelacy (1683), and was therefore proclaimed to be "a disorderly school-master officiating contrary to law." He continued to teach, however, and a few years later the Kirk Session of Greenock, notwithstanding his contumacy, found him "blameless in life and conversation," and appointed him an Elder, which required him to overlook not only religious observances, but the manners and morals of the people. One of the most important of these duties was to provide for the education of the young, in pursuance of that invaluable injunction of John Knox, "that no father, of what estate or

condition that ever he may be, use his children at his own fantasie, especially in their youthhood, *but all must be compelled to bring up their children in learning and virtue.*" Here we have, at its very birth, the doctrine of compulsory education for all the people, the secret of Scotland's progress. Great as was the service Knox rendered in the field ecclesiastical, probably Pg. 5 what he did for the cause of public education excels it. The man who proclaimed that he would never rest until there was a public school in every parish in Scotland must stand for all time as one of the foremost of her benefactors; probably, in the extent and quality of the influence he exerted upon the national character through universal compulsory education, the foremost of all.

The very year after Parliament passed the Act of 1696, which at last fulfilled Knox's aspirations, and during the Eldership of Watt's grandfather, Greenock made prompt provision for her parish school, in which we may be sure the old "teacher of mathematics" did not fail to take a prominent part.

Thomas Watt's son, the father of the great inventor, followed in his father's footsteps, after his father's death, as shipwright, contractor, provider, etc., becoming famous for his skill in the making of the most delicate instruments. He built shops at the back of his house, and such were the demands upon him that he was able to keep a number of men, sometimes as many as fourteen, constantly at work. Like his father, he became a man of position and influence in the community, and was universally esteemed. Prosperity attended him until after the birth of his famous son. The loss of a valuable ship, succeeded by other misfortunes, swept away most of the considerable sum which he had made, and it was resolved that James Pg. 6 would have to be taught a trade, instead of succeeding to the business, as had been the intention.

Fortunate it was for our subject, and especially so for the world, that he was thus favored by falling heir to the best heritage of all, as Mr. Morley calls it in his address to the Midland Institute—"the necessity at an early age to go forth into the world and work for the means needed for his own support." President Garfield's verdict was to the same effect, "The best heritage to which a man can be born is poverty." The writer's knowledge of the usual effect of the



heritage of milliondom upon the sons of millionaires leads him fully to concur with these high authorities, and to believe that it is neither to the rich nor to the noble that human society has to look for its preservation and improvement, but to those who, like Watt, have to labor that they may live, and thus make a proper return for what they receive, as working bees, not drones, in the social hive. Not from palace or castle, but from the cottage have come, or can come, the needed leaders of our race, under whose guidance it is to ascend.

We have a fine record in the three generations of the Watts, great-grandfather, grandfather and father, all able and successful men, whose careers were marked by steady progress, growing in usefulness to their fellows; men of unblemished character, kind and considerate, winning the confidence and affection of Pg. 7their neighbors, and leaving behind them records unstained.

So much for the male branch of the family tree, but this is only half. What of that of the grandmothers and mothers of the line—equally important? For what a Scotch boy born to labor is to become, and how, cannot be forecast until we know what his mother is, who is to him nurse, servant, governess, teacher and saint, all in one. We must look to the Watt women as carefully as to the men; and these fortunately we find all that can be desired. His mother was Agnes Muirhead, a descendant of the Muirheads of Lachop, who date away back before the reign of King David, 1122. Scott, in his "Minstrelsy of the Scottish Border," gives us the old ballad of "The Laird of Muirhead," who played a great part in these unsettled days.

The good judgment which characterised the Watts for three generations is nowhere more clearly shown than in the lady James Watt's father courted and finally succeeded in securing for his wife. She is described as a gentlewoman of reserved and quiet deportment, "esteemed by her neighbours for graces of person as well as of mind and heart, and not less distinguished for her sound sense and good manners than for her cheerful temper and excellent housewifery." Her likeness is thus drawn, and all that we have read elsewhere concerning her confirms the truth of the portrait. Williamson says that

the lady to whom he (Thomas Watt) was early united in marriage was Miss Agnes Muirhead, a gentlewoman of good understanding and superior endowments, whose excellent management in household affairs would seem to have contributed much to the order of her establishment, as well as to the every-day happiness of a cheerful home. She is described as having been a person above common in many respects, of a fine womanly presence, ladylike in appearance, affecting in domestic arrangements—according to our traditions—what, it would seem was considered for the time, rather a superior style of living. What such a style consisted in, the reader shall have the means of judging for himself. One of the author's informants on such points more than twenty years ago, a venerable lady, then in her eighty-fifth year, was wont to speak of the worthy Bailie's wife with much characteristic interest and animation. As illustrative of what has just been remarked of the internal economy of the family, the old lady related an occasion on which she had spent an evening, when a girl, at Mrs. Watt's house, and remembered expressing with much *naïveté* to her mother, on returning home, her childish surprise that "Mrs. Watt had *two* candles lighted on the table!" Among these and other reminiscences of her youth, one venerable informant described James Watt's mother, in her eloquent and expressive Doric, as, "a braw, braw, woman—none now to be seen like her."

There is another account from a neighbor, who also refers to Mrs. Watt as being somewhat of the grand lady, but always so kind, so sweet, so helpful to all her neighbors.

The Watt family for generations steadily improved and developed. A great step upward was made the day Agnes Muirhead was captured. We are liable to forget how little of the original strain of

an old family remains in after days. We glance over the record of the Cecils, for instance, to find that the present Marquis Pg. 9 has less than one four-thousandth part of the Cecil blood; a dozen marriages have each reduced it one-half, and the recent restoration of the family to its pristine greatness in the person of the late Prime Minister, and in his son, the brilliant young Parliamentarian, of whom great things are predicted already, is to be credited equally to the recent infusion into the Cecil family of the entirely new blood of two successive brides, daughters of commoners who made their own way in the world. One was the mother of the late statesman, the other his wife and the mother of his sons. So with the Watt family, of which we have records of three marriages. Our Watt, therefore, had but one-eighth of the original Watt strain; seven-eighths being that of the three ladies who married into the family. Upon the entrance of a gentlewoman of Agnes Muirhead's qualities hung important results, for she was a remarkable character with the indefinable air of distinction, was well educated, had a very wise head, a very kind heart and all the sensibility and enthusiasm of the Celt, easily touched to fine issues. She was a Scot of the Scots and a storehouse of border lore, as became a daughter of her house, Muirhead of Lachop.

Here, then, we have existing in the quiet village of Greenock in 1736, unknown of men, all the favorable conditions, the ideal soil, from which might be expected to appear such "variation of species" as contained that Pg. 10 rarest of elements, the divine spark we call genius. In due time the "variation" made its appearance, now known as Watt, the creator of the most potent instrument of mechanical force known to man.

The fond mother having lost several of her children born previously was intensely solicitous in her care of James, who was so delicate that regular attendance at school was impossible. The greater part of his school years he was confined most of the time to his room. This threw him during most of his early years into his mother's company and tender care. Happy chance! What teacher, what companionship, to compare with that of such a mother! She taught him to read most of what he then knew, and, we may be sure, fed him on the poetry and romance upon which she herself had fed, and for which he became noted in after life. He was rated as a

backward scholar at school, and his education was considered very much neglected.

Let it not be thought, however, that the lad was not being educated in some very important departments. The young mind was absorbing, though its acquisitions did not count in the school records. Much is revealed of his musings and inward development in the account of a visit which he paid to his grandmother Muirhead in Glasgow, when it was thought that a change would benefit the delicate boy. We read with pleasant surprise that he had to be sent for, at the request of the family, and taken home. He kept the household Pg. 11so stirred up with his stories, recitations and continual ebullitions, which so fairly entranced his Grannie and Grandpa and the cousins, that the whole household economy was disordered. They lost their sleep, for "Jamie" held them spellbound night after night with his wonderful performances. The shy and contemplative youngster who had tramped among the hills, reciting the stirring ballads of the border, had found an admiring tho astonished audience at last, and had let loose upon them.

To the circle at home he was naturally shy and reserved, but to his Grannie, Grandpa, and Cousins, free from parental restraint, he could freely deliver his soul. His mind was stored with the legends of his country, its romance and poetry, and, strong Covenanters as were the Watts for generations, tales of the Martyrs were not wanting. The heather was on fire within Jamie's breast. But where got you all that *perferidum Scotorum*, my wee mannie—that store of precious nutriment that is to become part of yourself and remain in the core of your being to the end, hallowing and elevating your life with ever-increasing power? Not at the grammar school we trow. No school but one can instil that, where rules the one best teacher you will ever know, genius though you be—the school kept at your mother's knee. Such mothers as Watt had are the appointed trainers of genius, and make men good and great, if the needed spark be there to enkindle: "Kings they make gods, and meaner subjects kings."

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We have another story of Watt's childhood that proclaims the coming man. Precocious children are said rarely to develop far in

later years, but Watt was pre-eminently a precocious child, and of this several proofs are related. A friend looking at the child of six said to his father, "You ought to send your boy to a public school, and not allow him to trifle away his time at home." "Look how he is occupied before you condemn him," said the father. He was trying to solve a problem in geometry. His mother had taught him drawing, and with this he was captivated. A few toys were given him, which were constantly in use. Often he took them to pieces, and out of the parts sometimes constructed new ones, a source of great delight. In this way he employed and amused himself in the many long days during which he was confined to the house by ill health.

It is at this stage the steam and kettle story takes its rise. Mrs. Campbell, Watt's cousin and constant companion, recounts, in her memoranda, written in 1798:

Sitting one evening with his aunt, Mrs. Muirhead, at the tea-table, she said: "James Watt, I never saw such an idle boy; take a book or employ yourself usefully; for the last hour you have not spoken one word, but taken off the lid of that kettle and put it on again, holding now a cup and now a silver spoon over the steam, watching how it rises from the spout, and catching and connecting the drops of hot water it falls into. Are you not ashamed of spending your time in this way?"

To what extent the precocious boy ruminated upon Pg. 13 the phenomenon must be left to conjecture. Enough that the story has a solid foundation upon which we can build. This more than justifies us in classing it with "Newton and the Apple," "Bruce and the Spider," "Tell and the Apple," "Galvani and the Frog," "Volta and the Damp Cloth," "Washington and His Little Hatchet," a string of gems, amongst the most precious of our legendary possessions. Let no rude iconoclast attempt to undermine one of them. Even if they never occurred, it matters little. They should have occurred, for they are too good to lose. We could part with many of the actual characters of the flesh in history without much loss; banish the imaginary host of the spirit and we were poor indeed. So with these inspiring

legends; let us accept them and add others gladly as they arise, inquiring not too curiously into their origin.

While Watt was still in boyhood, his wise father not only taught him writing and arithmetic, but also provided a set of small tools for him in the shop among the workmen—a wise and epoch-making gift, for young Watt soon revealed such wonderful manual dexterity, and could do such astonishing things, that the verdict of one of the workmen, "Jamie has a fortune at his finger-ends," became a common saying among them. The most complicated work seemed to come naturally to him. One model after another was produced to the wonder and delight of his older fellow-Pg. 14workmen. Jamie was the pride of the shop, and no doubt of his fond father, who saw with pardonable pride that his promising son inherited his own traits, and gave bright promise of excelling as a skilled handicraftsman.

The mechanical dexterity of the Watts, grandfather, father and son, is not to be belittled, for most of the mechanical inventions have come from those who have been cunning of hand and have worked as manual laborers, generally in charge of the machinery or devices which they have improved. When new processes have been invented, these also have usually suggested themselves to the able workmen as they experienced the crudeness of existing methods. Indeed, few important inventions have come from those who have not been thus employed. It is with inventors as with poets; few have been born to the purple or with silver spoons in their mouths, and we shall plainly see later on that had it not been for Watt's inherited and acquired manual dexterity, it is probable that the steam engine could never have been perfected, so often did failure of experiments arise solely because it was in that day impossible to find men capable of executing the plans of the inventor. His problem was to teach them by example how to obtain the exact work required when the tools of precision of our day were unknown and the men themselves were only workmen of the crudest kind. Many of the most Pg. 15delicate parts, even of working engines, passed through Watt's own hands, and for most of his experimental devices he had himself to make the models. Never was there an inventor who had such reason to thank fortune that in his youth he had learned to

work with his hands. It proved literally true, as his fellow-workmen in the shop predicted, that "Jamie's fortune was at his finger-ends."

As before stated, he proved a backward scholar for a time, at the grammar school. No one seems to have divined the latent powers smoldering within. Latin and Greek classics moved him not, for his mind was stored with more entrancing classics learned at his mother's knee: his heroes were of nobler mould than the Greek demigods, and the story of his own romantic land more fruitful than that of any other of the past. Busy working man has not time to draw his inspiration from more than one national literature. Nor has any man yet drawn fully from any but that of his native tongue. We can no more draw our mental sustenance from two languages than we can think in two. Man can have but one deep source from whence come healing waters, as he can have but one mother tongue. So it was with Watt. He had Scotland and that sufficed. When the boy absorbs, or rather is absorbed by, Wallace, The Bruce, and Sir John Grahame, is fired by the story of the Martyrs, has at heart page after page of the country's ballads, and also, Pg. 16 in more recent times, is at home with Burns' and Scott's prose and poetry, he has little room and less desire, and still less need, for inferior heroes. So the dead languages and their semi-supernatural, quarrelsome, self-seeking heroes passed in review without gaining admittance to the soul of Watt. But the spare that fired him came at last—Mathematics. "Happy is the man who has found his work," says Carlyle. Watt found his when yet a boy at school. Thereafter never a doubt existed as to the field of his labors. The choice of an occupation is a serious matter with most young men. There was never room for any question of choice with young Watt. The occupation had chosen him, as is the case with genius. "Talent does what it can, genius what it must." When the goddess lays her hand upon a mortal dedicated to her shrine, concentration is the inevitable result; there is no room for anything which does not contribute to her service, or rather all things are made contributory to it, and nothing that the devotee sees or reads, hears or feels, but some way or other is made to yield sustenance for the one great, overmastering task. "The gods send thread for a web begun," because the web absorbs everything that comes within reach. So it proved with Watt.

At fifteen, he had twice carefully read "The Elements of Philosophy" (Gravesend), and had made numerous chemical experiments, repeating them again Pg. 17 and again, until satisfied of their accuracy. A small electrical machine was one of his productions with which he startled his companions. Visits to his uncle Muirhead at Glasgow were frequent, and here he formed acquaintance with several educated young men, who appreciated his abilities and kindly nature; but the visits to the same kind uncle "on the bonnie, bonnie banks o' Loch Lomond," where the summer months were spent, gave the youth his happiest days. Indefatigable in habits of observation and research, and devoted to the lonely hills, he extended his knowledge by long excursions, adding to his botanical and mineral treasures. Freely entering the cottages of the people, he spent hours learning their traditions, superstitions, ballads, and all the Celtic lore. He loved nature in her wildest moods, and was a true child of the mist, brimful of poetry and romance, which he was ever ready to shower upon his friends. An omniverous reader, in after life he vindicated his practice of reading every book he found, alleging that he had "never yet read a book or conversed with a companion without gaining information, instruction or amusement." Scott has left on record that he never had met and conversed with a man who could not tell him something he did not know. Watt seems to have resembled Sir Walter, "who spoke to every man he met as if he were a brother"—as indeed he was—one of the many fine traits of that noble, wholesome character. Pg. 18 These two foremost Scots, each supreme in his sphere, seem to have had many social traits in common, and both that fine faculty of attracting others.

The only "sport" of the youth was angling, "the most fitting practice for quiet men and lovers of peace," the "Brothers of the Angle," according to Izaak Walton, "being mostly men of mild and gentle disposition." From the ruder athletic games of the school he was debarred, not being robust, and this was a constant source of morbid misery to him, entailing as it did separation from the other boys. The prosecution of his favorite geometry now occupied his thoughts and time, and astronomy also became a fascinating study. Long hours were often spent, lying on his back in a grove near his home, studying the stars by night and the clouds by day.



Watt met his first irreparable loss in 1753, when his mother suddenly died. The relations between them had been such as are only possible between mother and son. Often had the mother said to her intimates that she had been enabled to bear the loss of her daughter only by the love and care of her dutiful son. Home was home no longer for Jamie, and we are not surprised to find him leaving it soon after she who had been to him the light and leading of his life had passed out of it.

Watt now reached his seventeenth year. His father's affairs were greatly embarrassed. It was clearly seen that the two brothers, John and James, had Pg. 19to rely for their support upon their own unaided efforts. John, the elder, some time before this had taken to the sea and been shipwrecked, leaving only James at home. Of course, there was no question as to the career he would adopt. His fortune "lay at his fingers' ends," and accordingly he resolved at once to qualify himself for the trade of a mathematical instrument maker, the career which led him directly in the pathway of mathematics and mechanical science, and enabled him to gratify his unquenchable thirst for knowledge thereof.

Naturally Glasgow was decided upon as the proper place in which to begin, and Watt took up his abode there with his maternal relatives, the Muirheads, carrying his tools with him.

No mathematical instrument maker was to be found in Glasgow, but Watt entered the service of a kind of jack-of-all-trades, who called himself an "optician" and sold and mended spectacles, repaired fiddles, tuned spinets, made fishing-rods and tackle, etc. Watt, as a devoted brother of the angle, was an adept at dressing trout and salmon flies, and handy at so many things that he proved most useful to his employer, but there was nothing to be learned by the ambitious youth.

His most intimate schoolfellow was Andrew Anderson, whose elder brother, John Anderson, was the well-known Professor of natural philosophy, the first to Pg. 20open classes for the instruction of working-men in its principles. He bequeathed his property to found an institution for this purpose, which is now a college of the university. The Professor came to know young Watt through his brother, and Watt became a frequent visitor at his house. He was

given unrestricted access to the Professor's valuable library, in which he spent many of his evenings.

One of the chief advantages of the public school is the enduring friendships boys form there, first in importance through their beneficial influence upon character, and, second, as aids to success in after life. The writer has been impressed by this feature, for great is the number of instances he has known where the prized working-boy or man in position has been able, as additional force was required, to say the needed word of recommendation, which gave a start or a lift upward to a dearly-cherished schoolfellow. It seems a grave mistake for parents not to educate their sons in the region of home, or in later years in colleges and universities of their own land, so that early friendships may not be broken, but grow closer with the years. Watt at all events was fortunate in this respect. His schoolmate, Andrew Anderson, brought into his life the noted Professor, with all his knowledge, kindness and influence, and opened to him the kind of library he most needed.

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## CHAPTER II

### Glasgow to London—Return to Glasgow

Through Professor Muirhead, a kinsman of Watt's mother, he was introduced to many others of the faculty of the university, and, as usual, attracted their attention, especially that of Dr. Dick, Professor of natural philosophy, who strongly advised him to proceed to London, where he could receive better instruction than it was possible to obtain in Scotland at that time. The kind Professor, diviner of latent genius, went so far as to give him a personal introduction, which proved efficient. How true it is that the worthy, aspiring youth rarely goes unrecognised or unaided. Men with kind hearts, wise heads, and influence strong to aid, stand ready at every turn to take modest merit by the hand and give it the only aid needed, opportunity to speak, through results, for itself. So London was determined upon. Fortunately, a distant relative of the Watt family, a sea-captain, was about to set forth upon that then long and toilsome journey. They started from Glasgow June 7, 1755, on horseback, the journey taking twelve days.

The writer's parents often referred to the fact that when the leading linen manufacturer of Dunfermline Pg. 24 was about to take the journey to London—the only man in the town then who ever did—special prayers were always said in church for his safety.

The member of Parliament in Watt's day from the extreme north of Scotland would have consumed nearly twice twelve days to reach Westminster. To-day if the capital of the English-speaking race were in America, which Lord Roseberry says he is willing it should be, if thereby the union of our English-speaking race were secured, the members of the Great Council from Britain could reach Washington in seven days, the members from British Columbia and California, upon the Pacific, in five days, both land and sea routes soon to be much quickened.

Those sanguine prophets who predict the reunion of our race on both sides of the Atlantic can at least aver that in view of the union of Scotland and England, the element of time required to traverse distances to and from the capital is no obstacle, since the most dis-

tant points of the new empire, Britain in the east and British Columbia and California in the west, would be reached in less than one-third the time required to travel from the north of Scotland to London at the time of the union. Besides, the telegraph to-day binds the parts together, keeping all citizens informed, and stirring their hearts simultaneously thousands of miles apart—Glasgow to London, 1755, twelve days; 1905, eight hours. Thus under the genius Steam, tamed and Pg. 25harnessed by Watt, the world shrinks into a neighborhood, giving some countenance to the dreamers who may perchance be proclaiming a coming reality. We may continue, therefore, to indulge the hope of the coming "parliament of man, the federation of the world," or even the older and wider prophecy of Burns, that, "It's coming yet for a' that, when man to man the world o'er, shall brithers be for a' that."

There comes to mind that jewel we owe to Plato, which surely ranks as one of the most precious of all our treasures: "We should lure ourselves as with enchantments, for the hope is great and the reward is noble." So with this enchanting dream, better than most realities, even if it be all a dream. Let the dreamers therefore dream on. The world, minus enchanting dreams, would be commonplace indeed, and let us remember this dream is only dreamable because Watt's steam engine is a reality.

After his twelve days on horseback, Watt arrived in London, a stranger in a strange land, unknowing and unknown. But the fates had been kind for, burdened with neither wealth nor rank, this poor would-be skilled mechanic was to have a fair chance by beginning at the bottom among his fellows, the sternest yet finest of all schools to call forth and strengthen inherent qualities, and impel a poor young man to put forth his utmost effort when launched upon the sea of life, where Pg. 26he must either sink or swim, no bladders being in reserve for him.

Our young hero rose to the occasion and soon proved that, Cæsar-like, he could "stem the waves with heart of controversy." Thus the rude school of experience calls forth and strengthens the latent qualities of youth, implants others, and forms the indomitable man, fit to endure and overcome. Here, for the first time, alone in swarming London, not one relative, not one friend, not even an