

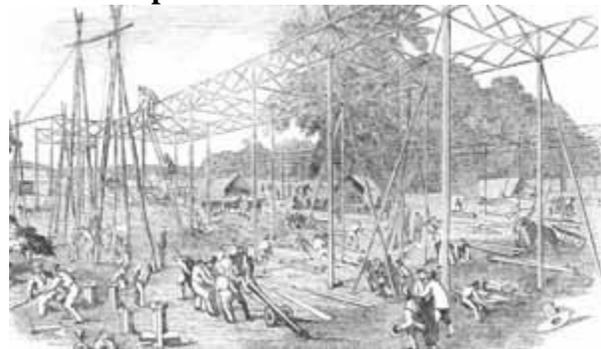
From the web site; <http://www.victorianstation.com/palace.html>

## The Great Exhibition at the Crystal Palace

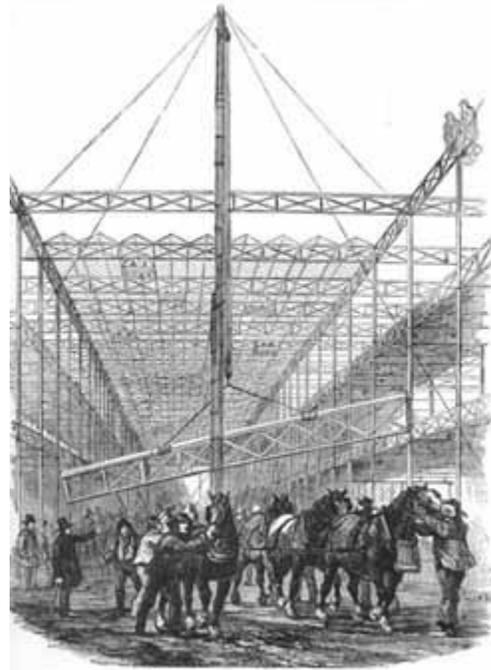


In 1851 Great Britain was arguably the leader of the industrial revolution and feeling very secure in that ideal. The Great Exhibition of 1851 in London was conceived to symbolize this industrial, military and economic superiority of Great Britain. Just representing the feats of Britain itself would have excluded many of the technological achievements pioneered

by the British in its many colonies and protectorates, so it was decided to make the exhibit truly international with invitations being extended to almost all of the colonized world. The British also felt that it was important to show their achievements right alongside those of "less civilized" countries. The prevailing attitude in England at the time was ripe for the somewhat arrogant parading of accomplishments. Many felt secure, economically and politically, and Queen Victoria was eager to reinforce the feeling of contentment with her reign. It was during the mid-1850s that the word "Victorian" began to be employed to express a new self-consciousness, both in relation to the nation and to the period through which it was passing.



The exhibition was also a triumph for Victoria's German husband, Albert, whom she had married in 1840. Despite outbursts of opposition to Albert by the press the family life of the Victorian court began to be considered increasingly as a model for the whole country. Albert had appreciated the achievements of Prime Minister Robert Peel's political and military advances and publicly advocated the advancement of industry and science. These facts began to sway opinion in his favor as respectable foundations of family life and industrial supremacy were becoming rapidly acquainted with the monarchy of Victoria and Albert. Conceived by prince Albert, the Great Exhibition was held in Hyde Park in London in the specially constructed Crystal Palace. The Crystal Palace was originally designed by Sir Joseph Paxton in only 10 days and was a huge iron goliath with over a million feet of glass. It was important that the building used to showcase these achievements be grandiose and innovative. Over 13,000 exhibits were displayed and viewed by over 6,200,000 visitors to the exhibition. The millions of visitors that journeyed to the Great Exhibition of 1851 marveled at the industrial revolution that was propelling Britain into the greatest power of the time. Among the 13,000 exhibits from all around the world were the Jacquard loom, an envelope machine, tools, kitchen appliances, steel-making displays and a reaping machine from the United States. The objects on display came from all parts of the world, including India and the countries with recent white settlements, such as Australia and New Zealand, that constituted the new empire. Many of the visitors who flocked to London came from European cities. The profits from the event allowed for the foundation of public works such as the Albert Hall, the Science Museum, the National History Museum and the Victoria and Albert Museum



Now from another website:

[http://web.sunybroome.edu/~ruggieri\\_p/sos/amsysofmanuf.htm](http://web.sunybroome.edu/~ruggieri_p/sos/amsysofmanuf.htm)

### **British Study of American Manufacturing Methods in the 1850's**

- 1851 – The Crystal Palace Exhibition in London – British first familiarized with American products and the methods used. Firearms from Robbins & Lawrence (in Windsor, VT) were displayed. Robbins and Lawrence was a leading firearms manufacturer who used "**ARMORY PRACTICE**".
- 1854 – Parliament established a committee to judge the political, economic, and technical feasibility of the British Board of Ordnance proposal to create a small arms factory modeled after the U.S. federal armories at Springfield and Harper's Ferry. The committee ended up approving the proposal. Not only was the new Enfield Armory modeled after the U.S. federal armories but it was equipped with American-made machinery.

Still another site: <http://sourcebook.fsc.edu/history/greeley.html>

The following is 16 pages long and written in prose that may be a bit beyond the general reader.

The Crystal Palace  
A Lecture by Horace Greeley

EACH age, each race, inscribes itself; with more or less distinctness, on History's dial. Nineveh, almost faded from our traditions of the world's infancy, revisits us in her freshly exhumed sculptures and in the vivid narrations of Layard. The Egypt of Sesostrius and the Pharaohs survives no less in her pyramids and obelisks than in the ever-enduring records of Moses and Manetho. Jerusalem, in her lonely humiliation, best typifies the Hebrew state and race. Ancient Rome lives for us in the Capitol and the Coliseum, as does her medieval and sacerdotal offspring and namesake in St. Peter's and the Vatican. Royal and feudal France, the France of Richelieu and Louis le Grand, still lingers in the boundless magnificence and prodigality, the showy sieges and battle-pieces of Versailles. The England of the last three centuries confronts us in the Bank—not a very stately nor graceful edifice, it must be allowed; but very substantial and well furnished—the fit heart's core of a trading, money-getting people. So we Americans of the Nineteenth Century will be found in due time to have inscribed ourselves most legibly, though all unconsciously, on the earth's unfading records—how, or in what, time alone can tell. Perhaps a railroad over the Rocky Mountains, a telegraph across the Atlantic, a towering observatory {4} has a new tropical plant confided to his charge, which, by a perfect knowledge of his art and an unbounded command of means, he induces to vegetate and flourish in that high latitude—of course, in an artificially fervid soil and under shielding glass. Here it grows and aspires with unimagined rapidity to an unprecedented height, threatening to shiver its frail covering in its upward career. Necessity, mother of invention, pricks on the unideal gardener to enlarge, and still enlarge, his glass shelter, which this aspiring rival of Jack's Bean-Stalk threatens to put his head and arms through in quest of altitude and sunshine: so he elevates and expands his crystal encasement, until, little by little, step by step, a stately glass house has been erected; and this becomes the model of the hitherto unsuggested Crystal Palace. The gardener had no premonition of this, no idea of anything beyond sheltering his delicate though gigantic plant, and saving its artificial Timbuctoo from destruction:

'He builded wiser than he knew.'

But when plans and designs for the immense edifice required to hold the contributions of all nations to the grand Exposition were advertised for, he was prepared to compete for the proffered reward; and his plan, dictated to him by Nature herself, was found the best of all, adopted, and, with some necessary modifications of detail, carried into effect. The result was the Crystal Palace, the most capacious, convenient, economical, healthful, and admirable structure ever devised for any kindred purpose. Earth was ransacked for alluring marvels; Science racked its brains for brilliant combinations; Art exhausted its subtle alchemy in quest of dazzling effects; Labor poured out its sweat like rain to fill the grand receptacle with whatever is beautiful and winning: yet the Crystal Palace remained to the end the crowning triumph of all.

Within the last century, London has expanded rapidly and immensely, but especially toward the West, or up the Thames. {5} Temple Bar, the western boundary of

the city proper, (or ancient London,) is now considerably East, I think, of the center of the Great Metropolis; while the present residences of nearly all the nobility and gentry are built on grounds which were open country since the days of the Plantagenets and Tudors. In the center of this magnificent West end, between St. James's Palace and Kensington Gardens, though much nearer the latter, stretches HYDE PARK, one of the most spacious and pleasant expanses of sward and shade and water that eye ever feasted on. Boston Common would be somewhat like it, if it were ten times as large and twenty times as well watered as at present. Hyde Park is the favorite resort of the Aristocracy for equestrian and carriage exercise, and thoroughly justifies their choice. On the southern verge of this noble expanse, some three miles west of the Bank, Exchange, and London Bridge, the Crystal Palace was erected. It was not an imposing edifice. No stately gateway, no frowning turrets, no graceful spire, no lofty tower, marked the capacious structure from whose roof the flags of all nations rose and floated in perfect amity. Its slender ribs of iron, covered and hidden for some thirty feet from the earth by boards, like any house of wood, were thenceforth visible through the glass which formed the upper siding and roof, like a spider's web on the grass of a dewy morning. Slender iron columns or pillars, rising at intervals unperceived from beneath the floor, helped to sustain the weight of the slight yet ponderous roof, through which, though covered with canvas to modify the heat of the few sunny days vouchsafed to an English summer, an abundance of light, not only under the murkiest London skies, but even during the prevalence of the great July eclipse, was at all times received. So immense was the volume of atmosphere enclosed, or so perfect the arrangements for ventilation, that no sense of exhaustion or of breathing vitiated air was at any time experienced; for the building was something more than a third of a {6} mile in length from east to west, some three hundred feet wide, and rather more than a hundred feet from floor to roof, with eight or ten large doors for entrance and exit hardly ever closed during the day. On a volume of atmosphere thus extended and constantly changing, the breathings of sixty thousand persons for hours could make no impression. In this vast bazaar, which a few months saw advance from its first conception to its perfect realization, and which yet was barely completed at the day appointed for opening the exhibition, the choice or characteristic products of all nations had already for some weeks been accumulating. Under the mere corner (though of itself covering more than an acre) devoted to machinery, mainly British, water-pipes and adaptations of steam-power had already been conducted, the steam itself being generated outside. An army of carpenters and other artisans had been some weeks at work on the fixtures and decorations of the several apartments, so that, when the eagerly expected opening day at length arrived, although the whole visible area had an unmistakable aspect of haste and rawness,—an odor born of green boards and fresh paint,—and although an infinity of carpenters' work still remained undone, especially in the galleries or upper story, yet the Exhibition was plainly there, and only needed time to perfect its huge proportions, and stand forth the acknowledged wonder of the world.

The first of May, 1851, was a happy day for London. Her skies had relaxed something of their habitual sullenness to usher in the pageant whereby the Sovereign of the Realm, surrounded by her chief councilors and grandees, was to inaugurate the first grand Exhibition of All Nations' Industry. The rain, which, had dripped or pattered almost or quite daily for weeks, held up the evening before, and promised not to return for this whole May-day—a promise which was only broken by a slight shower at noon,

too late to mar the interest or pleasure of the festival. At an early morning hour, a strong current of human {7} life set westward from the city proper toward Hyde Park, and long before the doors of the House of Glass were opened, they, were surrounded by eager groups, though no admission was purchasable save at the cost of a season ticket—over fifteen dollars. Even thus, some thirty thousand enjoyed and swelled the indoor pageant; while perhaps ten times as many gazed from the parks and streets at the meager procession out-doors which escorted the Queen from her palace of St. James to the airier, richer palace of the working millions, the hall of vastest prophecy. There arrived a robed and jeweled procession of Princes and Embassadors—of noble Ladies and noble Workers—the Duke of Wellington and Mr. Paxton—the Master of the Buckhounds, Groom of the Stole, Gentleman Usher of Sword and State, Gold Stick in Waiting, Silver Stick in Waiting, and other such antediluvian absurdities—attended Her Majesty, along with the Foreign-Commissioners, Architects of the edifice, her older children, and some other living verities, on her slow and measured progress from side to side and end to end of the mighty convocation. This strange mingling of the real with the shadowy, the apposite with the obsolete, gave additional piquancy and zest to the spectacle. Had the courtly symbols of an outworn, out-grown feudal age appeared by themselves, we might have taken them for some fanciful creation of a mind diseased by reading Froissart and Walter Scott, and watched to see them exhale like ghosts at cock-crowing; but here they are so mixed up and blended with undeniable entities; with the solid and practical Prince Albert; with our own portly and palpable Embassador; with that world-known Celestial who accompanies and illustrates the Chinese Junk, himself first of matter-of-fact conservatives — a walking, human Junk — that we cannot refuse to credit its total verity, in spite of the glaring anachronisms. Then there was a prosy though proper Address read by Prince Albert as head of the Royal Commission to his Royal consort as head of the kingdom, telling her how the Exhibition was first started, and how it had moved onward till now—rather superfluous, it must be confessed, since they had doubtless talked the matter all over between them a {8} dozen times when much more at their ease, and in a far more satisfactory manner; but Queens must endure and take part in some dreary absurdities as well as other people. This speech was through in time, and was very briefly and fittingly responded to. I trust the prayer which the Archbishop of Canterbury sent up in behalf of us all was as graciously received. There was some music, rather out of place and lost in the vastness of space to all but the few immediately under the transept, and some other performances; but all in perfect order, in due and punctual season, and without a betrayal of awkwardness or conscious incongruity. Between two and three o'clock, the pageant was at an end,—the Royal cortege departed, and the Exhibition formally opened. Let me now try to give some general notion of its character, by glancing at the more obvious details, so far as I, at this distance of time and space, may be able to recall them.

There are doors on all sides, one or more devoted exclusively to the reception of articles for exhibition; one for Jurors in attendance on the Fair; others for the Police, the Royal visitors, &c.; while the main entrances for paying visitors are upon the south side, into the transept. But we will enter one of the three or four doors at the east end, and find ourselves at once in the excessive space devoted to contributions from the United States, and which thence seems sparsely filled. Before us are large collections of Lake Superior Native Copper, as it was torn from the rock, in pieces from the size of a bean up to one

slab of more than a ton, though still but a wart beside some masses which have been wrenched from the earth's bosom, cut into manageable pieces of two to three tons, and thus dispatched to the smelting furnace and a market. New Jersey Zinc, from the ore to the powder, the paint, the solid metal, is creditably represented; and there are specimens of Adirondack Iron and Steel {9} from Northern New-York which attract and reward attention. Passing these and various cabinets or solitary specimens of the Minerals of Maryland and other States, we are confronted by abundant bales of Cotton, barrels of Wheat and of Flour, cakes of Rice, &c.; while various clusters of ears of our yellow and white Indian Corn remind the English of one valued staple which our climate abundantly vouchsafes and theirs habitually denies. The 'Bay State' Shawls of Lawrence, the Axes of Maine, the Flint Glass of Brooklyn, the Daguerreotypes of New-York and Philadelphia, (whose excellence was acknowledged from the first by nearly every critic) next salute us; and near them are the specimens of various Yankee Locks, and in their midst the invincible Hobbs, a small, young, shrewd, quiet-seeming Yankee, but evidently distinguished for penetration, who would have made fewer enemies in England had he proved less potent a master of his calling.

And now we are at the Grand Aisle, across which is the U.S. Commissioner's office, with that much ridiculed 'pasteboard eagle' displayed along its front, and certainly looking as if its appetite would overtax any ordinary powers of digestion. In front of the office are Yankee Stoves, Safes, Light Wagons, and Carriages, Plows and other agricultural implements, including the since famous 'Virginia Reaper,' which was for months a butt of British journalistic waggery, having been described by one Reporter as 'a cross between an Astley's chariot, a flying machine, and a treadmill.' They spoke of it far more respectfully after it had been set to work, with memorable results; and it must in fairness be confessed that beauty is not its best point, and that, while nothing is more effective in a grain-field, many things would be more comely in a drawing-room. But let us return to the main aisle, and, starting at its eastern end, proceed westward.

A model Railroad Bridge of wood and iron fills a very large space at the outset, and is not deemed by British critics a brilliant specimen of Yankee invention. (One of them, however, at length candidly confessed that its capacity of endurance and of resistance must be very great, or the weight of ridicule heaped upon it must inevitably have broken it down long before.) Upon it is a handsome show of India Rubber fabrics by Goodyear; while beyond it, toward the west, in a chosen locality in the center of the aisle, stands 'the Greek Slave' of Powers, one of the sweetest and most popular achievements of the modern chisel, here constantly surrounded by a swarm of admirers; yet I think it not the best of Powers's works—I am half inclined to say, not among his best. He has several stronger heads, possessing far more character, in his studio at Florence; and yet I am glad this statue was in the Exhibition, for it enabled the critics of the London press to say some really smart things about Greek and American slaves, and the Slave as a representative and masterpiece of American artistic achievement, which that heavy metropolis could not well have spared. Let us not grudge them a grin, even at our expense; for mirth promotes digestion, and the hit in this instance is certainly a fair one. 'The Dying Indian,' just beside the Slave: by a younger and less famous American artist, is a work of power and merit, though the delineation of agony and approaching death can hardly be rendered pleasing. Is it not remarkable that a chained and chattelized woman, and a wounded, dying Indian, should be the subjects chosen by American sculptors for

their two works whereby we shall be most widely known in connection with this Exhibition?—But we cross the imaginary line which here separates the United States from the nations of Continental Europe, and look westward.

How magnificent the prospect! Far above is the sober sky of canvas-covered glass, through which the abundant light falls gently and mellowly. Spacious and richly decorated galleries, some sixty feet apart, overhang all the ground floor but the grand aisle, and are themselves the depositories of many of the { 11 } richest and most tempting fabrics and lighter wares exhibited. The aisle itself, farther than the eye can reach, is studded with works of art; statues in marble, in bronze, in plaster, in zinc; here a gigantic Amazon on horseback, there a raging lion, a classic group, or a pair of magnificent bronze vases enriched with exquisite representations of scenes from the master-singers of antiquity. Busts, Casts, Medallions, and smaller Bronzes abound; with elegant Clocks, Chandeliers, Cabinets, &c.; for each nation whose department we pass has arranged its most enticing products in front, so that they shall be seen from the grand aisle, putting its homelier though in some cases intrinsically more valuable productions in the back-ground. Russia's superb tables and slabs of richest Malachite stand just far enough out of the aisle within her allotted space to draw thither the wandering gazer to view her imperial structures of gilded Porcelain, colored Glass and other barbaric marvels. Austria has brought hither and put in order a Suite of rooms sumptuously furnished and ornamented according to her highest ideal of taste and luxury. France displays in the foreground her admirable Bronzes, Porcelain, Musical Instruments, &c.; and so Northern Germany, Switzerland, Belgium, and other European states, each 'put its best foot foremost,' in a sense hardly metaphorical. Behind these dainty and rare fabrics are ranged others less difficult of achievement—costly Silks and Laces; then Woolens and Muslins; and behind these you often stumble on coils of Rope or Wire; bars of Steel or pigs of Iron; Saws, Files, and Hammers; Stoves, Grates and Furnaces; Bedsteads, Chairs and Lanterns—these, as you pass laterally from the dazzling glories of the center aisle, between the well-filled sub-compartments devoted to fabrics of taste and adornment, will greet you before you reach the outer walls. For the Crystal Palace has its homelier aspects, like any other, and it but follows the general usage in keeping them as much in the back-ground as possible.

But we pass on down the Grand Aisle, to the Transept or { 12 } cross, where both the height and width of the building are considerably increased, in order, it would seem, to save two stately and beautiful trees, (elms,) which here stand in apposition some two hundred feet apart. The Transept embraces and covers both, leaving each ample room to grow and flourish; while, half-way between them, in the exact center of the Palace, a spacious and copious Fountain, wholly of glass, throws its sparkling torrent high into the air, whence it descends from crystal cup to cup, each considerably wider than that next above it, until it reaches the lowest and largest, near the ground, thence gliding away unseen. There are few finer effects in the Exhibition than this of the Crystal Fountain, which utterly shames the Koh-i-Noor, or 'Mountain of Light,' said to be the largest diamond in the world, and computed worth several millions of dollars, which, obviously over-guarded against robbery, rests in its gilded cage beside the Fountain. No child, looking from one to the other, ever suspected, until told it, that the Diamond was deemed worth more than the Fountain. Here are displayed full-length portraits of Queen Victoria and her husband,—the latter once handsome, now gross-featured and rather heavy, but

still a man of fair appearance, good sense and varied information. The Queen, never beautiful, has sacrificed her youthful freshness to the cares of maternity and the exactions of late hours and luxurious living, so that at thirty-two she looks plain and old,—not in this portrait, but in her living self. But uncommon energy, activity, shrewdness, with an earnest desire to please her people and promote their welfare, still remain to her, and have rendered her the most popular British Sovereign of the Guelphic family.

The Transept is the heart of the Exhibition, to which all currents converge, from which all expeditions, whether of criticism or discovery, take their departure. Here abound Marble Statues, gigantic Brazen Gates and other works of Art; {13} while around it are located the fabrics of Turkey and of China, of Australia and of British America, which are as interesting and instructive in their rudeness and clumsiness as others in their grace and perfection. You could hardly realize without seeing them what wretched contrivances for Candlesticks, Culinary Utensils, Locks and Keys, &c. &c., are still slowly, toilsomely fabricated in Turkey, in Barbary, and in other half-civilized countries. A decent knowledge of the Useful Arts is yet confined to a few nations, and is imperfectly diffused even in these. And here, too, is sad Italy, not allowed to compete in her own name, but sending feeble and timid contributions as ‘Sardinia,’ ‘Tuscany,’ ‘Rome,’ &c., nothing being allowed to come from Naples. The Roman States, in the heart of ancient Civilization, with Three Millions of People yet, fill half a page of the Catalogue, or about one-seventeenth of the space required by the more distant United States; while the beautiful Statuary of the School of Milan, including the Veiled Vestal, one of the most original and admirable works in the Exhibition, is set down to the credit of Austria! There is a debtor as well as creditor side to that Austro-Italian account, and settlement cannot be refused for ever.

Great Britain and her Colonies engross the entire Western half of the Exhibition, and fill it creditably. In the Fine Arts, properly so called, she has probably less than a fourth of what is contributed; but in Iron and its multiform products she has far more than all the World beside. In Steam Engines and Force-Pumps, Looms and Anvils, Ores and Castings, Buttons, Steel Pens, &c., all the rest combined could not compare with her. I doubt if the world ever before saw so complete and instructive a collection of Ores and Minerals as are here brought together, or that Geology was ever studied under auspices more favorable than this collection would afford. Nearly every metal known to man may here be seen, first as ore, and then in every stage up to that of perfect adapta- {14} tion to our various human needs. So in the department of Machinery. I think no collection so varied and complete of Looms, Presses, Mills, Pumps, Engines, &c., &c., was ever before grouped under one roof.

The immense Manufacturing capacity and aptitude of Great Britain are here abundantly represented. From the unequalled Shawls of Cashmere to the fabrics woven of reeds or bark by Australian savages; from the Coal of Pictou to the Spices of Ceylon; almost every thing which mankind have agreed to value and consecrate as property, is collected in the western half of the Crystal Palace, under the folds of the meteor flag, and displayed as specimens of the products of Queen Victoria’s spacious Realm. Here Manchester unrolls her serviceable fabrics and Birmingham displays her cheap and varied wares; here Sheffield, Glasgow, Belfast, and other centers of a vast manufacturing activity, solicit your attention to whatever is most showy or most substantial among their multiform productions. Gilded Fire-places of silver-shining steel, or snowy, speckless

marble; vessels of Iron, of Clay, or of Tin; Robes and Couches, Cannon and Bibles, Grindstones and Pianos, by turns arrest the gaze in a bewildering medley, which yet is not quite confusion; for most of the articles are roughly classified, and the vast area is divided into an infinity of apartments, or 'courts,' closed at the sides, which are covered with cards of their proper wares, as is often the end farthest from the center aisle, and sometimes a good part of the front also. Behind each court is an open passage-way, walled in by displays usually of homely wares and fabrics, mainly of iron, or brass, and behind these again are other courts, more open and irregular than the former, devoted to Castings, Metals, Ores, and the ruder forms of mineral wealth, occasionally giving place to the Refreshment Saloons wherewith the Palace is abundantly provided—to Committee Rooms, Jury Rooms, and other incidents of the Exhibition. And, thus environed, we move on, westward, until the grand Machinery {15} Room absorbs henceforth the entire space to the north of us, the hum of its innumerable Wheels, Rotary Pumps, Looms, Spinning-Jennies, Flax-Dressers, Printing-Presses, &c., &c., at all times audible from the distant center of the Palace, in spite of well directed efforts to drown it. At last we reach the western doorway, half obstructed by gigantic Bells and other bulky Manufactures, beyond which is the naked Park, or would be but for the still huger blocks of Coal, Stone, &c., for which no place could be made within the building—and our journey is at an end.

But no—we have not yet mounted to the upper story, whither four broad and spacious stairways in different parts of the building invite us. Here is a new immensity of Silks and Scarfs, of Millinery and costly Furniture, including illustrations of the Spaniard's ideal of sumptuous magnificence: here Belgium has tried her hand at bronzes with indifferent, and at Castings with considerable success: Here the finest achievements in Paper-Hanging and Window-Shading adorn the walls for hundreds of feet, some of the spacious curtains scarcely inferior in effect to any but the very best paintings; while the thousand costly trifles born of Parisian art and elegance vie with London's less graceful but more massive creations in filling the vast amphitheatre with wealth beyond the wildest dreams of a Sindbad or Aladeen. Such pyramids of Jewelry and Plate were never before collected under one roof. Clusters of Pearls and Diamonds, each a generous fortune, are here lost in the ocean of magnificence; a single firm has One Million Dollars' worth within a moderate compass; while the displays of rivals in pandering to luxury and ostentation stretch on either hand as far as the vision can reach. The industry and practical genius of Britain are evinced in the Machinery and serviceable Fabrics below, but her unequalled riches and aristocratic pomp are more vividly depicted here.

But the eyes ache, the brain reels, with this never-ending {16} succession of the sumptuous and the gorgeous; one glimpse of sterile heath, bare sand, or beetling crag, would be a sensible relief. Wearily we turn away from this maze of sensual delights, of costly luxuries, and listlessly wander to that part of the gallery nearest the Transept, with its towering Elms, its Crystal Fountain, its gigantic Brazen Gates, its Statues, its Royal Portraits, and caged Diamond; but these we do not care to look upon again. MAN is nobler than the works of his hands; let us pause and observe. Hark! the clock strikes ten; the gates are opened; the crowds which had collected before them begin to move. No tickets are used; no change given; it is a 'shilling day,' and whoever approaches any of the gates which open to the general public must have his shilling in hand, so as to pay without stopping the procession as he passes in. In twenty minutes our scattered, straggling band of Jurors, Exhibitors, Policemen and servitors will have been swelled by

at least ten thousand gazers; within the hour fifteen thousand more have added themselves to the number; by one o'clock the visitors have increased to fifty thousand: every corner and nook swarm with them; even the alleys and other standing room in the gallery are in good part blocked with them; but the wave-like, endless procession which before and below us sweeps up and down the Central Aisle is the grand spectacle of all. From our elevated and central position almost the entire length of this magnificent promenade is visible, from the pasteboard eagle of America on the east to the massive bells and other heavy British products which mark the western door, though the view is somewhat broken by a few towering trophies of artistic skill, to which places have been assigned at intervals in the middle of the aisle, leaving a broad passage-way on either side. Far as the eye can reach, a sea of human heads is presented, denser toward the center just before us, but with scarcely an interruption any where. The individuals who make up this marching array are moving in opposite directions, [17] or turning off to the right or to the left, and so lost to our view in 'Austria,' 'Russia,' 'Switzerland,' or 'France;' but the river flows on unchecked, undiminished, though the particular drops we gazed on a minute ago have passed from our view for ever. Still, mainly from the south, a steady stream of new comers, fifty to a hundred per minute, is pouring in to join the eager throng, but scarcely suffice to swell it. The machinery-room, the galleries, the side-passages, the refreshment saloons, absorb as fast as the in-flowing current can supply; until, about three o'clock, the tide turns, and the departures thence exceed the arrivals. At length the hour of six strikes, and the edifice is quietly, noiselessly vacated and closed.

But this vast tide of life, which ebbs and flows beneath our gaze as we stand in the gallery, near as we may to the Crystal Fount, is not a mere aggregation of human beings. London, herself a mimic world, has sent hither not merely her thousands but her tens. Among that moving mass you may recognize her ablest and her wisest denizens—her De la Beche, her Murchison, her Brewster, and others honorably distinguished in the arduous paths of Science. Here, too, are her Cobden, her Sturge, her Russell, and others eminent in council and in legislative halls. Of the Peers who make her their winter residence, the names of Canning, Granville, Wharncliffe, Argyle, De Mauley and others are honorably connected with the Exhibition, to which they give their time as Jurors; and they are among its almost daily visitors, mainly distinguished by their quiet bearing and simple, unpretending manners. And here, too, may be often seen the age-enfeebled frame of her veteran Wellington, the victor in so many hard-fought fields and the final vanquisher of the greatest of modern warriors. Though his eye is dim and his step no longer firm, the conqueror of Hindostan, the Liberator of the Peninsula, the victor of Waterloo, still emphatically the 'Duke,' is among the most absorbed and constant visitors of {18} the great Exhibition, carefully scanning the more interesting objects in detail, and gazing by the hour on achievements so different from those of Assaye, Salamanca and the Chateau of Hougomont. Do those dull ears, though deafened by twenty years' familiarity with the roar of artillery, catch some prophetic premonition of the New Age dawning upon mankind, wherein Carnage and Devastation shall no more secure the world's proudest honors, while Invention and Production sink into unmarked graves? Sees that dim eye, rekindled for a moment by the neighborhood of death, the approach of that glorious era wherein Man the creator and beautifier shall be honored and fêted and Man the destroyer discrowned? His furrowed brow, his sunken eye, return no answer to our eager question, as he slowly, thoughtfully, plods on.

But not London, not England, alone: the Civilized World here strongly represented. America and Russia, France, and Austria, Belgium and Spain, have here their Commissioners, their Notables, their *savans*, earnestly studying the Palace and its contents, eager to carry away something which shall be valued and useful at home. A Yankee Manufacturer passes rapidly through the Machinery-room until his eye rests on a novel combination for weaving certain fabrics, when, after watching it intently for a few minutes, he claps his hands and exclaims in unconscious, irrepressible enthusiasm, "That will pay my expenses for the trip!" On every side sharp eyes are watching, busy brains are treasuring, practical fingers are testing and comparing. Here are shrewd men from the ends of the earth: can it be that they will go home no wiser than they came? Many are here officially, and under pay from their respective governments: some of them sent out of compliment to Her Majesty, who specially invited the cooperation of their masters; but there are skillfull artificers, and mechanics also, from Paris, from Brussels, {19} and from far Turin, sent here by subscription expressly that they may study, profit by and diffuse the Arts here exhibited in perfection. About the pleasantest fellow I met in London was a Turkish official, military by profession, born a Frenchman, but naturalized at Stamboul, who spoke good English and seemed to understand the world very fairly, though (I judge) rather less a Saint than a Philosopher. The noblest and truest man I encountered in Europe was a Belgian Manufacturer and Juror; and though there were doubtless many unworthy persons attracted to London by the novel spectacle, I doubt whether any General Council of the Christian Church has ever convened an assemblage on the whole superior, morally and intellectually, to that summoned to London by the great Exhibition.

So much of the Crystal Palace and its Contents. And now of its Lessons.

I rank first among these that of the practicability and ultimate certainty of Universal Peace. There have been several amateur Peace Congresses, after a fashion: but I esteem this the first satisfactory working model of a Peace Congress. The men of the Sword and their champions tell us that Nations will not submit their conflicting claims and jarring interests to the chances of Arbitration; but here they did it, and with the most satisfactory results. Individual heart-burnings there must ever be; cases of injustice, neglect of merit, and partiality, there probably were; but as a whole the award of Prizes at the Fair was discriminating and satisfactory. If the representatives of rival nations there assembled had set to fighting for the honor and credit of their several countries; hired all the bravoes and marketable ruffians they could find to help them; run in debt for more than they were worth; and finally burned up the Glass Palace with all its contents in the heat of the fray—who imagines that the result would have been more conclusive and satisfactory than it now is? Yet. the contrast between the set-{20}tlement of National differences by War and by Arbitration is favorable to the latter mode as in the parallel case of rival pretensions to superiority in Art and Industry.

But while I hold that Arbitration is the true mode of settling National differences, and War at all times a blunder and a crime on the part of those who wage it, refusing to arbitrate, I do not therefore hold that those who seek only justice should disarm and proclaim their unqualified adhesion to the doctrines of Non-Resistance, and thus invite the despot, the military adventurer, the pirate; to overrun and ravage at their will. I do not believe that peace and justice are in this way attainable, out by quite a different, an almost opposite course. Let the lovers of Freedom and Right repudiate all standing armies, all

military conquests, under any conceivable circumstances—all aggressive interference in the domestic concerns of other nations; but let each People be essentially prepared to resist tyranny at home and repel invasion from abroad, each with its own chosen weapons when others shall have proved ineffective. Let the just and pacific take up a position which says to the restless and rapacious, “Be quiet, and do not put us to the disagreeable necessity of quieting you, which you see we are perfectly able to do,”—then and thus we may hope for peace; but not while the ‘old man’ absolutely relies on driving off the ‘rude boys’ who are ‘stealing his apples,’ with ‘words and grass’ only.

Akin to this is my view of the question of regulated or unrestricted Trade between Nations, which worthily holds so prominent a place in the popular discussions of our time. That men should buy and sell precisely as their several interests (real or fancied) shall dictate, without interference therewith or tax thereon by Governments,—this is a very natural and popular demand, which clearly harmonizes with a prevailing tendency of our time, whereof the deification of the individual will and pleasure is the end. But, standing amidst this labyrinth of {21} British machinery, this wilderness of European fabrics, I cannot but ask,—How, with totally unregulated trade, is the all but resistless tendency of Manufactures and Commerce to Centralization to be resisted? How, for instance, shall we rationally hope for the rapid, extensive naturalization of new Arts, the establishment of new and difficult branches of Manufacture, requiring large capital, practiced skill and ample markets to ensure their success, in any quarter of the globe but Europe, while that continent remains the focus of the world’s commercial activity and thrift? Suppose, for example, an American should be able to produce the richest and most tasteful fabrics of the French or Flemish looms as cheaply as, or even more cheaply than, his European rivals,—what are his chances for success in the manufacture? Are there ships departing from our seaports daily to every inhabited portion of the earth, laden with assorted cargoes of ordered and anxiously expected American fabrics? Have we great mercantile houses engaged in buying up such American fabrics for exportation? Nay, do our own Countrywomen stand ready to buy his Bareges or Laces at the prices which they are daily and freely paying for just such goods from Europe? Suppose he could fabricate a hundred thousand pieces per annum at the lowest possible price for which they can be made in Europe, could he sell them as fast as produced? No, he could not; he does not. The producers in immediate proximity to, in intimate relations with, the ‘merchant princes’ of Europe, who are the life-long factors of the traders of India, of Australia, of Asia Minor, Africa and Russia, have an immense advantage over any rivals located on the Western Continent, or at any similar distance from the commercial centers of Western Europe. The rule that “To him who hath shall be given, while from him who hath not shall be taken away even that he hath,” is perpetually and powerfully operative to concentrate the Manufactures and Trade of the world upon London, Paris, and {22} their out-of-town workshops, which, for all commercial purposes, are a part of themselves. This Centralization, unchecked, tends to depopulate and barbarize the rest of the earth to build up a bloated and factitious prosperity in Western Europe—a prosperity whereof the Laboring Millions are instruments, not sharers—a prosperity whereof a few immense fortunes, amassed at the cost of the world’s impoverishment, are the sole enduring trophies. The system which in the name of Free Trade is calculated to secure a monopoly of Production and Commerce in all but the ruder Arts and Manufactures to Great Britain, France and Germany, tends to tax the food-grower and the artisan half the value of their

respective products for the cost of transporting them to and exchanging them with each other, and so keep them in perpetual vassalage and debt to the 'merchant princes,' instead of rendering them neighbors and direct exchangers, and thus saving the heavy cost of reaching each other across an ocean and a continent. These convictions are not new to me, but they were strengthened by weeks of earnest observation in the Crystal Palace. More and more was I there convinced that Price is not an infallible measure of Cost, and that a foreign fabric is not proved cheaper than a home-made one because it is purchased in preference, nor even because it is sold at a lower price. If the whole Earth is ever to be truly Civilized, it must be by the diffusion of the Useful Arts and their Machinery rather than of their finished products. If Universal Labor is ever to be constantly employed and fairly rewarded, it must be through a more direct and intimate relation of laborer with laborer; not through the system of complexity, aggregation and needless expense wherein the grain-grower of Illinois hires, through half a dozen intermediates, his Iron made in Wales; and sends his grain thither to pay for the work, instead of having it done at the ore-bed in his township; with the coal which underlies the whole County. I {23} know how strong is the current against this view of Labor's true interest; but the world will refuse to be ruled by names and plausibilities for ever.

But the Crystal Palace has other lessons for us than those of Political Economy—it has Social suggestions as well. Here are Hollow Brick, destined, I think, to supersede nearly all others, saving half the expense of solid brick for material and transportation, being far more quickly and cheaply burned; far more easily handled and laid; rendering houses entirely free from dampness, less susceptible to Summer's heat and Winter's cold, while proffering new facilities for warming, ventilation, &c. The invention and diffusion of this Brick alone seem to me worth to mankind the cost of the Exhibition. Here, too, is Claussen, with his Flax discoveries and processes, whereby the entire fiber of the plant is separated from the woody matter of the stalk and rendered as soft, fine, white and tractable as the choicest Sea-Island Cotton, which it greatly resembles; while, by a little change in the mode of preparing it, it is made closely to imitate Linen, Cotton or Woolen, and to blend freely in the same web with either. The worth of this discovery to mankind can hardly be overestimated. Here, too, is his Circular Loom, steadily weaving bags without a seam, and capable of infinite varieties of practical application. Here is McCormick, with his masterly Reaper, cutting as clean as Death's sythe, and almost as rapidly; so that the field of waving grain, which the eye could scarcely measure in the morning, has been transformed by it into a field of naked stubble before evening. Here is Ericsson, with his new Caloric Engine, threatening to reduce steam to its primary insignificance—as, indeed, hundreds have threatened before, but as yet none have quite accomplished. Let us hope that some of the present noble strivers will be more successful; for, indeed, steam, though it has done the world good service, is a most expensive ally; the great bulk and {24} weight of fuel and water it requires to have carried along with it have rendered it thus far entirely useless for locomotive purposes except on a liquid or metallic track; while the frequent stoppages it exacts, the nicety of management it demands, and the serious disasters its use involves, unite to proclaim that a blessed day in which mankind shall be able to dispense with it. Whether Ericsson, Page, or some other 'visionary,' shall achieve for us that victory, I dare not predict; but that its achievement is close at hand, I affirm with undoubting confidence.

A kindred improvement is about to be inaugurated in the more extended and

diversified employment of GAS. A hundred models of Gas Stoves, Gas Burners, Gas Cooking Ranges; &c., were exhibited at the Fair, each warranted, (as usual,) to save half the fuel and render treble the service of any other; yet I was not able to designate anyone of them as particularly meritorious, nor did the Jury on this department award a premium to any. All seems yet crude and infantile in this field of invention. Yet the study of the various models and contrivances for Gas-burning there presented, fixed me in the novel faith that Gas is ultimately to be not only the main agent of illumination but the chief fuel also of all cities and villages; that the time is at hand when the head of a family, the solitary lodger, requiring either heat or light, will simply touch a bell in his own room and be supplied with the indicated quantity of Gas, whether for culinary purposes, for warmth, for light, or all together; and that thus the cost, the trouble, the dust, of making fires in all parts of a building, carrying fuel thither and removing ashes there-from, will be obviated; and a single fire, constantly maintained, subserve admirably the purpose of them all, saving the labor and cost of five hundred wasteful kindlings and clearings, beside affording heat at the moment it is wanted, and stopping its consumption the instant the want is satisfied.

This is but one among a thousand noiseless agencies constantly preaching the advantages and economies of COMBINATION, and indicating the certainty that through Coöperation lies the way whereby Labor is to emerge from bondage, anxiety and need into liberty and assured competence. This truth, long apparent to the eye of Reason, threatens to be made palpable even to stolidity and stagnation by the sharp spur of Necessity. Rude, rugged Labor must organize itself for its appointed task of production, or it will soon have nothing to do. It must concentrate its energies for the creation of commodious and economical homes, or it will have no home but the Union Work-house. It must save and combine its earnings, for the purchase and command of Machinery; or Machinery, owned by and working for Capital alone, will reduce it to insignificance, want and despair.

On every side the onward march of Invention is constant; rapid, inexorable. The human Reaper of thirty years ago, finds to-day a machine cutting grain twenty times as fast as ever he could; he gets three days' work as its waiter where he formerly had three weeks' steady harvesting: the work is as well done as of old, and far cheaper; but his share of the product is sadly diminished. The Planing Machine does the work of two hundred men admirably, and pays moderate wages to three or four; the Sewing Machine, of moderate cost, performs easily and cheaply the labors of forty seamstresses; but all the seamstresses in the world probably do not own the first machine. And so muscular force, or mere Labor, becomes daily more and more a drug in the market, shivers at the approach of winter, cringes lower and lower at the glance of a machine-lord or landlord, and vainly paces street after street, with weary limbs and sinking heart, in quest of 'something to do.'

The only effectual remedy for this deplorable state and still more deplorable tendency is found, not in Destruction but in Construction,—not in Anarchy and war on the rights of Property, but in Order and the creation of more property by and for the Poor—not in envy and hatred of the Rich, but in general study and imitation of the forecast and frugality by which they were made rich, which are as potent this hour as they ever were, and which, wise Coöperation will render effective for the Poor of to-day. In this country, where so much land is still unappropriated and the legal right of Association

is absolute and universal the Laboring Classes are masters of their own destiny, and that of their brethren throughout the world. A thousand young men, inured to labor and as yet unburdened with families, can save at least one hundred dollars each in the space of two years if they will; and by wisely and legally combining this in a capital of \$100,000, investing it judiciously in Land, Machinery and Buildings, under the direction of their ablest and most responsible members, they may be morally certain henceforth of constant employment for each, under circumstances which will ensure them the utmost efficiency and the full reward of their labor. To Woman, whose work is still more depressed and still more meagerly rewarded, the means of securing emancipation and just recompense are substantially the same. The workers, in every department of industry, may secure and own the Machinery best calculated to give efficiency, to their labor, if they will but unitedly, persistently try. Through the scientific Association of Labor and Capital, three-fourths of them may within five years accomplish this, while by heedlessness and isolated competition they are sure to miss it, and see their condition grow gradually worse and worse. Labor working against Machinery is inevitably doomed, as the present condition of the hand-loom weavers all over the globe sufficiently attests; Labor working for Machinery, in which it has no interest, can obtain in the average but a scanty, precarious and diminishing subsistence; while to Labor working with Machinery, which it owns and directs, there are ample recompense, steady employment, and the prospect of gradual improvement. Such is one of the great truths confirmed by the lessons of the Crystal Palace. {27}

Another truth forcibly taught there is that of the steadiness of the march of Invention and the infinite capacity of the laws and forces of Nature to minister more and more readily and amply to the sustenance and comfort of Man. We are obviously as yet on the bare threshold of chemical discovery and mechanical contrivance for the benefit of Man. The inventor of the steam engine still lived within the memory of many of us; yet even he never dreamed of the stupendous improvements already made on his invention, and the infinite adaptations to human wants of which it is fully proved susceptible. A first class North River or Sound Steam-boat, much more an Atlantic Steam-ship, would have astounded even him. But, though the capacities of Steam are not half exhausted, we grow dissatisfied with its performance and impatient of its conditions; we demand its power without its weight, its bulk, its cost, its explosive tendencies, or rather those of the elements from which it is evolved—and Electricity, Air, Gunpowder, and other potencies, are analyzed and interrogated in quest of the most advantageous substitute—a search which will ultimately achieve success. The only question is one of time. So in every department of mechanics and manufactures: The victory of to-day opens the path to grander and more beneficent victories to-morrow. There never was a single mind capable of conceiving and working out the idea of the Power Printing Press of to-day, nor that of the best Carpet-Looms and Paper-Mills in use; each has been produced by gradual, step-by-step improvement; the goal of one inventor serving as the starting-point of his successor; and often an invention which failed to subserve its intended purpose has been found eminently useful in a very different sphere and connection; or, after having been cast aside as worthless, has supplied the necessary hint to another inventor, who has been guided by it to a new achievement of signal beneficence. No real penetration into the arcana of Nature's forces was ever fruitless or unsuggestive. The unpractical side {28} of a newly discovered scientific truth indicates the position and nature of the practical side

as well. To my mind nothing is clearer than this—the immense strides and vast scope of invention and discovery during the last age, render morally certain the achievement of far more and greater triumphs during the like period just before us. The Railway and its train are by no means the utmost possibilities of over-land locomotion; the Telegraph is not the last word of electricity; the Steamship is not the acme of Ocean navigation. These ennobling triumphs herald others which shall swiftly succeed them; and so in all the departments of applied science. And among the agencies which aided and accelerated the march of Invention, which impelled the car of Industrial Progress, I doubt not that our children, looking back on that progress from heights whereof we can but vaguely dream, will honorably distinguish the World's Exhibition of 1851.

Nor can we hesitate to class among the lasting benefits of this Exhibition the wider and deeper appreciation of Labor as a chief source of human enjoyment and a ground of respect and honor for its votaries. I know how little sincerity or depth there is in the usual Fourth-of-July declamation in behalf of the dignity of Labor, the nobleness of Labor, and the like, by men who never did a *bona fide* day's work with their hands unless absolutely driven to it, and who would be ashamed of being caught wheeling a barrow or wielding a spade, unless obviously for exercise or pastime; yet, since 'Hypocrisy is the homage which Vice pays to Virtue,' even this empty glorification of Labor has some value as a demonstration, if not of what the fortunate think, at least of what they think they ought to think. But the tribute paid to Labor in the Great Exhibition was far deeper and higher than this. Here were tens of thousands gathered daily to study and admire the chosen products of the loom, the forge, the shop, the studio, nine-tenths of them from no other impulse than that afforded by the pleasure and instruction found therein. Can all {29} this sink into the ground, and be forgotten? Shall not we, for instance, who presume ourselves better appreciators of labor than the gilded aristocracies and squalid peasantries of Europe, think more of Industrial capacity since we feel that our country was saved from disgrace at this grand tournament of Industry by the genius of Hobbs, of Steers, of Dick, of McCormick? And shall not the Dukes, the Lords, the Generals, the Honorables, who met from day to day to inspect, scrutinize, compare and judge the rival products of England, France, Germany and America, in order to award the palm of excellence to the worthiest in each department—who severally felt a thrill of pleasure when a countryman bore off the palm and a pang of disappointment and chagrin when none such was found entitled to commendation,—shall they not henceforth hold in juster esteem the sphere of Creative Art wherein such trophies were lost or won? I cannot doubt the beneficent influence of this Exhibition, both in inspiring workers with a clearer consciousness of the quiet dignity of their own sphere, and in diffusing, deepening, a corresponding appreciation in the minds of others. If so, who shall say that the Great Exhibition was held in vain?

Yet one more lesson: The 'World's Fair' shall teach us the cheering truth that there is rightfully no such thing as 'Over-Production,' or a glut in the Labor market. There may be mis-directed, wasted, useless or worse than useless Industry, like that devoted to the fabrication of implements of Gaming or Intoxicating Beverages; but of the Labor and Skill devoted to the production of whatever is needful, is tributary to Man's physical sustenance, intellectual and moral culture, or material comfort, there are not and cannot be too much. If all were to insist on being employed and subsisted in the fabrication of Hats or of Chintzes, of Pianos or Wall-paper, there would of course be a glut in that

particular department, but a corresponding deficiency in others. Not until every family shall be provided with, a commodious and comfortable habitation, and that {30} habitation amply supplied with Food, and Fuel not only, but with Clothing, Furniture, Books, Maps, Charts, Globes, Musical Instruments and every other auxiliary to Moral and Intellectual growth as well as to Physical comfort, can we rationally talk of excessive Production. There is no such thing as general Over-Production, and can be none. Immense as the collection of useful products which the Crystal Palace enfolds, it is yet but a drop in the bucket when compared with the far vaster aggregate required to satisfy the legitimate wants even of Europe alone, though that is by far the best supplied of the four quarters of the globe. If each dwelling in wealthy and profusely manufacturing England alone were to be fitly and adequately furnished from the existing stores, the undertaking would very soon dismantle not merely the Crystal Palace but nearly all the shops and warehouses in the Kingdom. There is at no time a lack of employment because no more needed work remains undone, but only because the machinery of Production has not yet been so adjusted and perfected as to bring the Work and the Workers into their rightful and fruitful relation. Up and down the streets of every great city wander thousands after thousands, seeking work from day to day, and seeking it in vain, when they themselves would reciprocally afford a demand for each other's labor, a market for each other's products, if they could be placed where they truly belong. Several know how to spin Cotton, Flax or Wool; others to weave them all into fabrics; and still others to fashion them into the garments whereof the unemployed nearly all stand in need; while other thousands of this hungry multitude know how to grow the grain, and dig or cut the fuel, and make the bread, which are essential to them all. Then why roam this haggard legion from day to day, from week to week, from month to month, idle, anxious, famished, tattered, miserable and despairing? Do you answer that they lack Industrial training, and thence productive efficiency? Then, I tell you, the greater shame to us, practical workers or in some sense capitalists, who, realizing their defect and how it crushes them to the earth—realizing, at least, that they must live somehow, and that, so long as they may remain idle their sustenance must come out of our earnings or our hoards—still look vacantly, stupidly on, and see them flounder {31} ever in this tantalizing and ultimately devouring, whirlpool, without stretching forth a hand to rescue and save them. As individuals, the few can do little or nothing; but as the State the whole might do much—every thing—for these poor, perishing strugglers. As I look out upon their ill-directed, incoherent, ineffective efforts to find work and bread, they picture themselves on my mind's eye as disjointed fragments and wrecks of Humanity—mere heads, or trunks, or limbs—(oftener 'hands')—torn apart by some inscrutable Providence, and anxiously, dumbly awaiting the creative word, the electric flash, which can alone recombine and restore them to their proper integrity and practical efficiency. That word no individual has power to speak; but Society, the State, the COMMONWEALTH, may readily pronounce it. Let the State but decree—'There shall be work for everyone who will do it; but no subsistence in pauper idleness for any save the incapable of working'—and all will be transformed. Take the orphan from the cellar, the beggar from the street, the petty filcher from the crowded wharves, and place them all where they must earn their bread, and in earning it acquire the capacity to labor efficiently for themselves—this is a primary dictate of Public Economy no less than of enlightened Philanthropy. Palaces vaster and more commodious than Paxton ever

dreamed of might be built and furnished by the labor which now wears itself out in vain attempts to find employment—by the application of faculties now undeveloped or perverted to evil ends. Only let Society recognise and accept its duty to find work for all who can find none for themselves, and the realm of Misery and Despair will be three-fourths conquered at a blow by Industry, Thrift and Content.

—But it is time the World's Fair were closed, or at least this meager account of it. The year 1852 has sterner work in hand, in presence of which this wondrous bazaar would seem out of place and incongruous. Haul down, then, those myriad banners, now streaming so peacefully from its roof in the common breeze and flapping each other so lovingly: they shall full soon be confronted in the red field where the destinies of Mankind must be decided, the liberties of Nations lost and won. Roll out these lumbering cannon, sleeping here side by side so quietly, uncharged, unmounted, the play-things of idle boys {32} and the gazing-stock of country clowns, who wonder what they mean; their iron throats shall tell a fearful tale amid the steadfast ranks and charging columns of the Battle Summer before us. Gray veterans from many lands, leaning on your rusty swords, and stirring each other's recollections of Badajoz, Austerlitz, Leipsic and Quatre-Bras—shake hands once more and part, for the skies are red with the gathering wrath of nations, and airborne whispers that KOSSUTH is once more free, are troubling the sleep of tyrants. Ho! Royal butcher of Naples! you would not let your subjects visit or enjoy the exhibition of 1801; rest assured that they will bear apart, and you with them, in the grander, vaster exhibition of 1852. False juggler of the Elysée Bourbon! beware the *ides* of May, and learn, while not too late, that Republican France has other uses for her armed sons than that of holding sacerdotal despots on their detested thrones. Kingly perjurer of Prussia! you have sworn and broken the last oath to observe and maintain a liberal constitution to which your abused and betrayed people will ever hearken from your lips. Prepare for a reckoning in which perfidy shall no more avail you Grim Autocrat of the icy North; the coming summer has work in store for your relentless legions, not alone this time on the Danube, but on the Rhine, the Oder, the Vistula, as well.—Tear down, then, this fragile structure of glass and lath! too slight to breast the rugged shocks of the whirlwind year before us. Ere we meet again as workers to test the fineness of our rival fabrics, the strength of our metals, the draft of our plows, we must vindicate by the mailed hail our right as men to speak, and think, and be. Before us lowers the last decisive struggle of the Millions of Europe for Justice, Opportunity and Freedom; let not its iron hail appall, its crimson torrents revolt us; for the Bow of Promise gleams through its lurid cloud, and the dove of Peace shall soon be seen hovering over the assuaging waters, fit harbinger of a new and more auspicious era for Freedom and enduring Concord—for Industry and Man!

[\*] This reproduction is from the original (borrowed from Harvard's Widner Library): *The Crystal Palace and Its Lessons: A Lecture by Horace Greeley* (1852).

## **Mentions of the Crystal Palace:**

**This web site:**

**[http://www.willamette.edu/~fthomps/MgmtCon/Mass\\_Production.html](http://www.willamette.edu/~fthomps/MgmtCon/Mass_Production.html)**

**Mass production** is the name given to the method of producing goods in large quantities at low cost per unit. But mass production, although allowing lower prices, does not have to mean low-quality production. Instead, mass-produced goods are standardized by means of precision-manufactured, interchangeable parts. The mass production process itself is characterized by mechanization to achieve high volume, elaborate organization of materials flow through various stages of manufacturing, careful supervision of quality standards, and minute division of labour. To make it worthwhile, mass production requires mass consumption. Until relatively recent times the only large-scale demand for standardized, uniform products came from military organizations. The major experiments that eventually led to mass production were first performed under the aegis of the military.

**Machine tools and interchangeable parts** The material basis for mass production was laid by the development of the machine-tool industry--that is, the making of machines to make machines. Though some basic devices such as the woodworking lathe had existed for centuries, their translation into industrial machine tools capable of cutting and shaping hard metals to precise tolerances was brought about by a series of 19th-century innovators, first in Britain and later in the United States. With precision equipment, large numbers of identical parts could be produced at low cost and with a small work force.

The system of manufacture involving production of many identical parts and their assembly into finished products came to be called the American System, because it achieved its fullest maturity in the United States. Although Eli Whitney has been given credit for this development, his ideas had appeared earlier in Sweden, France, and Britain and were being practiced in arms factories in the United States. During the years 1802-08, for example, the French émigré engineer Marc Brunel, while working for the British Admiralty in the Portsmouth Dockyard, devised a process for producing wooden pulley blocks by sequential machine operations. Ten men, in place of 110 needed previously, were able to make 160,000 pulley blocks per year. British manufacturers, however, ignored Brunel's ideas, and **it was not until London's Crystal Palace exhibition of 1851 that British engineers, viewing exhibits of machines used in the United States to produce interchangeable parts, began to apply the system.** By the third quarter of the 19th century, the American System was employed in making small arms, clocks, textile machinery, sewing machines, and a host of other industrial products.

**The assembly line.** Though prototypes of the assembly line can be traced to antiquity, the true ancestor of this industrial technique was the 19th-century meat-packing industry in Cincinnati, Ohio, and in Chicago, where overhead trolleys were employed to convey carcasses from worker to worker. When these trolleys were connected with chains and

power was used to move the carcasses past the workers at a steady pace, they formed a true assembly line (or in effect a "disassembly" line in the case of meat cutters). Stationary workers concentrated on one task, performing it at a pace dictated by the machine, minimizing unnecessary movement, and dramatically increasing productivity.

Drawing upon observations of the meat-packing industry, the American automobile manufacturer Henry Ford designed an assembly line that began operation in 1913. The result was a remarkable reduction of manufacturing time for magneto flywheels from 20 minutes to five minutes. This success stimulated Ford to apply the technique to chassis assembly. Under the old system, by which parts were carried to a stationary assembly point, 12 1/2 man-hours were required for each chassis. Using a rope to pull the chassis past stockpiles of components, Ford cut labour time to six man-hours. With improvements--a chain drive to power assembly-line movement, stationary locations for the workmen, and work stations designed for convenience and comfort--assembly time fell to 93 man-minutes by the end of April 1914. Ford's methods drastically reduced the price of a private automobile, bringing it within the reach of the common man. (see also Index: automotive industry ) Ford's spectacular feats forced both his competitors and his parts suppliers to initiate his technique, and the assembly line spread through a large part of U.S. industry, bringing dramatic gains in productivity and causing skilled workers to be replaced with low-cost unskilled labour. Because the pace of the assembly line was dictated by machines, the temptation arose to accelerate the machines, forcing the workers to keep up. Such speedups became a serious point of contention between labour and management, while the dull, repetitive nature of many assembly-line jobs bored employees, reducing their output.

## The King's Last Argument [UNFINISHED]

The Crystal Palace, an industrial cathedral in glass, sprawling over 19 acres of Hyde Park, and made with over 4,000 tons of iron and almost a million square feet of glass, was to be the showpiece of the nation. In 1851 Britain was top dog in the world; its steam engines, its navies, and its colonies had put it there. It controlled Australia, New Zealand, Canada, India, and parts of the Mediterranean, the Middle East, the Far East, Africa, China, South America, the Caribbean, and numerous Pacific islands. The violent 'year of revolutions,' 1848, was over, as were the flaring riots, and Europe was once again stable, although Continental jails were still crowded with radicals, liberals, democrats, and other rabble. Queen Victoria's smug reign had so far been one long stream of triumphs, and a self-satisfied Britain had invited 77 nations, colonies, and principalities to show off their wares alongside its own, all to be displayed at the Great Exhibition in the Crystal Palace during the summer of 1851. On May 3rd, *The Illustrated London News* ran a full-page sketch of the opening ceremonies presided over by the young queen and, at her side, the Duke of Wellington, who turned 82 that day. All the men bore swords. That was to change by the end of the century, partly because of the exhibition. As 6.2 million visitors gawped at the wares of over 14,000 exhibitors that summer, most made fun of the plainness and paucity of the scant United States exhibit, while a thoughtful few were struck by the quality of American locks, watches, and harvesters, and principally by their guns. On June 9th, *The Times* sniffed that "The most popular and famous invention of American industry, is a pistol which will kill eight times as quick as the weapon formerly in use. It has been reported upon by committees, and sanctioned by Congress, and so keen is the national appreciation of this great discovery, that the Republican Government of Washington does not hesitate to pay about three times as much for cavalry pistols as England pays for infantry muskets." Britain, the world's undisputed industrial leader, didn't know that it was about to be out-produced by a poor, raggle-taggle, ex-colonial nation. By the end of the century, the United States would leap onto the world stage with a method of production that would ultimately be as consequential as the steam engine itself---a method that would eventually create a unprecedentedly huge middle class. It was a method that for a time would come to be called 'the American system of manufacture,' a method based on a new American idea---interchangeable parts, a method that today we call mass production.

The idea was neither new nor American. It came from France in 1785. Although Gutenberg around 1450 created interchangeable parts---the lead type for his printing press---those parts didn't work together to do mechanical work. Honoré Blanc, a French gunsmith, did that. At the time of the French Revolution, and all over the world, machines were handmade---usually badly. Precision and quality control were unknown and no two parts could work together. Firearms, for example, were more works of art than mere guns---crude and barely serviceable for the poor, richly adorned but just as crude for the rich. French gunsmiths had been trying, unsuccessfully, to change that since 1720 because every military in

the world wanted guns they could repair on the battlefield. Le Blanc was a French gunsmith who interested Thomas Jefferson, then Ambassador to France, in an idea he'd had to make gun parts interchangeable, and thus easily repairable. He put on a demonstration in 1785, to which he invited Jefferson as well as dozens of high-ranking military men and diplomats, to showcase his method by assembling the locking mechanism of a gun from bins of interchangeable parts. His work was part of a political struggle in France between the new technocrats and the old guard in the military following the French Revolution. To reduce weight, the new method of making guns also dispensed with gun ornamentation, particularly the common device of adding to cannons the motto *Ultima Ratio Regis*--Latin for 'the king's last argument.'

Britain in 1851 was relatively stable, but was still far from today's Britain. As citizens of superpowers are wont to do, Victorian Britons believed that they ruled the world because they were morally superior. Hilaire Belloc, however, was to later suggest another reason---the king's last argument: 'Whatever happens we have got/ The Maxim gun and they have not.' In 1851, a potato famine in 1845-49 had just killed one million Irish out of a population of 8.2 million, and more than half a million more emigrated on the new steam ships, many to England, many more to North America. Many had died while ships carrying food left a starving Ireland bound for England; the bitterness would last until modern times. Britain had teetered on the brink of revolution in 1832 over political reform, then carefully edged away from the chasm, eventually increasing the franchise to include Catholics and a slightly less unbalanced portion of the population by shifting a little power from the landed gentry to the newly rising propertied classes. But the ballot was still not secret, so patronage, collusion, and corruption were as easy as ever. From 1832 on, the industrial revolution had begun to have major political consequences, but still in 1851 only three percent of a nation of 24 million could vote. Jews wouldn't be able to vote until 1860, most taxpayers not until 1867, avowed atheists not until 1888, all adult males not until 1918, and all adult females not until 1928. People were publically hanged until 1868. Trade unions were illegal until 1871. Children were being sold, brutalized, and put to work up narrow chimneys, down dank coal mines, in the factories, in the fields. Children under 10 were barred from mining only in 1841; children under eight were barred from working the fields only in 1868; children under 10 were barred from factory work only in 1874; and child chimney sweeps were barred only in 1875. Members of parliament were still unsalaried, so only the rich could legislate. Country squires still had nearly all the power. Parliament didn't so much run the country as supervise it. In 1851 the working classes, not yet part of the middle class, were still being ground into powder. France, too, was under pressure to change, and in 1848 experienced yet another revolution. Both Britain and France had preceded the United States in mass production, but both failed to follow through on their lead. Although mass production eventually took hold in both countries, then everywhere in the industrial world, neither country ever regained the lead lost to the United States in the early 1800s. Ironically, the

Crystal Palace that housed all the exhibits in 1851 was itself the first building made of mass-produced, prefabricated, interchangeable parts.