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THE INDUSTRIAL REVOLUTION



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THE INDUSTRIAL REVOLUTION

BY

CHARLES BEARD

WITH A PREFACE

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1901



PREFATORY NOTE

MY friend Mr. Beard asks me to put a few words of preface to his little book. I do not know that it needs any such introduction, and I remember what Mandeville has wisely and wittily said about prefaces, but I cannot refuse to do as he wishes, for I think that what he has written will be useful to the working people for whom he has written, and I am grateful to him for giving me the opportunity of saying, and desiring me to say here some things to them I have wished to say for some time.

The classes that labour with their hands for weekly wages have now entrusted to them much of the power possessed by the Government of this country. The future of this country, and the parts of the world dependent on it must be largely settled by the use, wise or foolish, good or evil, they will be making of this power. Their own future depends on it. If they refuse to think, if they choose to listen to fools' advice, if they do not take advantage of the opportunities they have for making themselves better, morally, physically, and intellectually, the world will pass them by speedily and inevitably. Goodwill is no excuse in face of facts; only good deeds will count.

Knowledge and the will to use it, and the courage and perseverance required to use it rightly, these are the necessities of progress and of well-being of any kind. Ignorance that may be felt (but that may by honest effort be destroyed) is the cause of many more of our troubles than we like to admit. Science, not Creed, is the Deliverer, if we will only take the trouble to follow it. There will be plenty of mistakes on the way, but if a man means to learn by his former mistakes, he nearly always has the chance, and the advance, though slow, will be continuous.

Democracy is no heaven-born institution. There is

no right divine about it. Darwin has dismissed the fatal poisonous absurdities of Rousseau to the limbo of lost rubbish. If democracy cannot do its work, it will, and must, go as other political methods and expedients have gone. If this country is not healthier, stronger, wiser, happier, and better off in the highest sense under a democracy than it was under an oligarchy, democracy will have failed, and some other plan of government will be tried, whether people like it or not. Democracy is on its trial. If it is worked by wise men and honest men, it may do well; if it is worked by ignorant, prejudiced, gullible, and selfish persons, it will not do well. The greatest enemy of the democracy is the lie-maker, the flatterer, and the person who tries to persuade the voter that dishonesty is not always the worst policy, and that a bit of boodle for himself cannot hurt him or anyone else. A democracy, of all governments, is the least able to afford to listen to lies, or to grow corrupt, or to remain self-indulgent or ignorant. Its stability depends upon the persons it trusts; if it trusts the wrong persons, it falls sooner or later—generally sooner.

These are commonplaces, but they are not sufficiently attended to. Democracy is a good or bad thing as they are remembered and attended to or not. It is worse and more unpleasant and more dangerous to be ruled by many fools than by one fool or a few fools. The tyranny of an ignorant and cowardly mob is a worse tyranny than the tyranny of an ignorant and cowardly clique or individual. Rulers are not wise by reason of their number or their poverty, or their reception of a weekly wage instead of a monthly salary or yearly income.

Again, workers are not respectable or to be considered because they work more with their hands or feet than with their brains, but because the work they do is good. If it is not good work they do, they are

as unprofitable as any other wasters. A plumber is not a useful or admirable creature because he plumbs (if he plumbs ignorantly or dishonestly he is often either a manslayer or a murderer), but because he plumbs well, and saves the community from danger and damp, disease, and fire and water. Makers of useless machine-made ornaments are, however "horny-handed," really "anti-social persons," baneful to the community as far as their bad work goes; more baneful, possibly, than the consumers of these bad articles, quite as baneful as the *entrepreneurs* who employ them. We "practical English" spend millions on machine-made ornaments, and so-called art which is not art. Every furniture-maker's shop is crowded with badly-made, badly-ornamented stuff which ought never to have been made, and would never be sold if people only took the trouble to try and understand the difference between real art and sham art; if they only knew so much as that a machine can only copy, it cannot make or create a beautiful thing at all. The hand of man, worked by the brain of man, is needed for that. A Windsor chair is an honest piece of work, acceptable; the pieces of the wretched "drawing-room suite" the women are so proud to put in their front parlours are vile to look at, and degrading to live with. The wax flowers you see in the front windows of "respectable artisans'" houses, and the detestable "painted vases" they set on their chimney-pieces, "mantels" they call them, are horrible to look at, and pure waste to make. They do not please the eye; they merely puff up a silly and anti-social conceit. They are symbols of snobbery. The dreadful waste on sham art and bad ornament is bad and anti-progressive. People who cheat themselves into liking, or pretending to like, bad art are blind to good art, blind to natural beauty, and cannot understand what true art is. This is a degrading state to be in for any person or set of persons.

We must not be deceived by words. We talk of "doing well" when we only mean "getting rich," which is a very different thing in many cases. The only good institutions are those that do good work; the only good work done is that which produces good results, whether they be direct, as the ploughman's, or navy's, or sailor's; or indirect, as the policeman, or the school-master, or the teacher of good art, or the writer of books that are worth reading. A man is no better or wiser than others by reason of his position or lack of position, but by reason of his stronger body, wiser head, better skill, greater endurance, keener courage. Knowledge teaches a community to breed better children, to bring them up better, to employ them better, to encourage them to behave better, and work better, and play better, and in their turn breed children who shall have better chances than themselves—not necessarily better chances to grow rich or to become idle, but better chances to become honourable, wise, strong-bodied and strong-brained able men and women. No system of government, no set of formulas, can save a state unless the people who work the system or formulas are wise, and honest, and healthy. A nation with too large a proportion of stunted, unhealthy, besotted, irritable, excitable, ignorant, vain, self-indulgent persons cannot endure in the world-struggle. It must and ought to be swept away, and the sooner the better. What we call Nature does not indulge in sentimental pity; she puts her failures out of their pain as quickly as she can. She does not keep idiot asylums.

In the competition for trade that is upon us, nay, in the very "struggle for life," we can only hold our own by greater physical and intellectual power. We must put ourselves in training; we must throw off the "anti-social" habits that hinder our efficiency; we must beware of the quack mixtures of the demagogue and the superstition-monger, and

accept only what satisfies trained reason. We must put off Sentimentality, which means the wholesome feeling for humanity gone rancid and turbid and unwholesome, and is an expensive and dangerous folly. We must take deliberate and calm judgments, and we must look ahead.

The record of progress in this little book is largely the record of the success of men who with honest material objects worked in many ways wisely and prosperously, and made England the richest place on earth; but this is not all, it is the record also of a great sacrifice, a sacrifice of health and happiness and vitality—a needless sacrifice offered up to Mammon. The English people, never by any plague, or famine, or war, suffered such a deadly blow at its vitality as by the establishment of the factory system without the proper safeguards. Napoleon's wars crippled France (though not as badly as his legislation), but the factory system threatened to sap the very existence of our people, because those who could have helped it (both employers and employed) at that time were too greedy, too ignorant, and too callous to understand the full evil they were doing, and the governing classes above them too foolish to see that the remedy must be swiftly applied.

Ignorance and the blindness caused by greed are deadly enemies that we can only meet by knowledge and by honesty. And it must be remembered, though it is often forgotten, that the acquisition of knowledge does not mean book-learning, which is only a very little part of it. It is no good reading a book without understanding it, and no good understanding it unless one profits by it, and makes the principle or the piece of wisdom or fact a part of our mental store, ready for use when the proper times comes. A man may be book-learned and very ignorant.

Mr. Beard's book should make his readers think; that is what he wants them to do. The good teacher does not

teach things, he tries to make his pupils teach themselves by honest thinking. No one really knows a thing that he has not mastered for himself. Here in this little volume is matter for thought, for further inquiry, for bringing a man into touch with big and important branches of knowledge. Such primers are useful; they help one through the hard beginnings of the subjects; they show one how to go on and master the thing by one's self. They give one admitted results, and show one the consequences suspected or ascertained. They work the mind.

There is a time, perhaps, when ignorance may be tolerated, but this is emphatically not the time. We have to set our house in order, as everyone knows who has a grain of sense left, but it cannot be done unless we choose the right men to do our political and economic work, trust them wisely, back them wisely, and resolve not only that the nation, but every town, every village, every workshop, and every house be made healthier, be better managed, and the causes that check progress and security be done away with. We cannot afford to sit down and rub our bellies and think how fat we are. Disease and crime can be tackled, and would be if we were in earnest. It requires probably less effort to keep ourselves and our children healthy and out of the dock than to save money and leave it to fools, or buy an annuity, and it is a great deal more necessary to the nation. It is not a sin to break some old Hebrew *tabu* that has no utility left in it, but it is a sin to be diseased when you can be healthy, to be ignorant when you can, at a little trouble, learn the truth of a matter, to be dishonest when you can, at the cost of a little effort, speak and act truly. Adulteration, again, is criminal and vile in all its aspects and results, and honest men will have nothing to do with it. It is one of the worst symptoms in the body social when adulterations and shams are tolerated. Adulteration

is simply a low and vile form of larceny practised treacherously by persons who pretend to be respectable (like the bakers and brewers who poison their customers by the careless use of adulterants) upon persons who are often unable to detect or avoid the deceit and injury.

The reading of good books without thinking things out is a mere debauching amusement, and reading for pastime is not a respectable thing, when it is pushed to extremes, at all, any more than over-eating or over-drinking. The "habit of reading" is no better than the "habit of snuffing," unless the reading which the habitué does is good reading—reading that gives noble pleasure or that helps directly to progress, mental or physical, or trains one to practical ends. Waste of time is not only folly, but it is anti-progressive and means degeneration, just as waste of money over bad or foolish things, or waste of work over ugly shams or false ornaments or dishonest productions of any kind.

One of the most useful things a teacher can do is to help beginners to the right books. There is no use, but much weary, useless toil, in the reading of the wrong books. Every scholar knows the fearful count of hours spent in looking through foolish books in the hope of finding something pertinent. All books about books, and the miserable compilations made at second-hand by second-rate men, should be avoided. Read Adam Smith himself; it will take a little time. Don't be persuaded to use an "analysis" or "epitome" of Adam Smith instead, it is only waste of time; it will not do instead of Adam Smith himself. And if you come to fancy it will, you are in the wrong groove. Never be afraid of big books by big men. One can remember and assimilate them far better and easier than any analysis.

This little book seems to me to have in its plain pages and its straightforward substance a good deal of food for thought, a good deal that is worth remem-

bering, a good deal that is of the nature of guidance and warning. For instance, we learn from it how the civilised world has been changed, and our duties, morals, habits, habitations, and connections all altered by the discoveries of a few dozen able men. The world is "full of a number of things," as R. L. Stevenson says, and we have only learnt to make use of a few of these. There seem almost endless possibilities open, but they are only open to those who mean to take advantage of them, who mean to make themselves and do make themselves able to see the things that the ignorant and the lazy miss and always will miss. Our trade rivals have learnt all they knew till a few years ago from us, we can surely afford to take a lesson from our own ancestors ; but we must be prepared to strip off prejudice and renounce hollow formulæ. Even if such a sacred institution as a trades-union stands in the way of real progress, it must change or go.

Good work, not sham work ; good art, not bad nor even mediocre art ; good food, not the bad bread (one of the worst disgraces of this country) and the bad beer, but good bread and good beer ; plain, good clothes, not " fashionably cut " shoddy ; good news, not party lies and foolish flattery and idle or malicious gossip ; real information (which need not be cheap, and cannot be easy, for knowledge is not an easy thing to get, but a hard thing both to win and hold), not chopped-up rubbish and dirty garbage ; as much fresh air, and clean water, and out-of-door exercise as we can do with. These are things within our grasp, and we have not got them yet, though we have thousands of things we do not want, or really enjoy at all, but which we are fooled, or fool ourselves, into paying for through the nose. The end of work is to produce useful things, beautiful things, necessary things ; but the end of life is not merely work, nor what people look for in exchange for work—riches. Riches without health or security, or the

knowledge of how to use them, are merely a danger and a daily reproach to an individual. They are also a danger and a daily reproach when unused, ill-used, or wasted to a nation. Health and wisdom are not incompatible with wealth, but worn-out vitality and blind ignorance quite certainly are. Only the strong man armed and healthy of brain can keep his house.

Healthy people look to the future, sick people are content to linger through the day, or ready to sink into oblivion; the mark of a healthy nation is that it looks forward, prepares for the future, learns from the past, gets rid of its parasites, shakes off its social diseases, and walks resolutely in the service of her whom Defoe celebrated as that "Most Serene, Most Invincible, Most Illustrious Princess, REASON," and whom, long before him, Solomon, and the son of Sirach, lauded as the Chief of Things, the very emanation and breath of their God Himself.

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The Industrial Revolution

CHAPTER I

ENGLAND IN 1760—AGRICULTURE, MANUFACTURES, POLITICS

Sec. 1.—Definition. Owing to the unity of all history, we are compelled to define arbitrarily and set limits when any special field is undertaken. Industrial History is the story of man's labour with tools and mechanical and power appliances for the satisfaction of his wants. By the Industrial Revolution we mean that great transformation which has been brought about during the past one hundred and fifty years, by discoveries and inventions which have altered fundamentally all the methods of production and distribution of the means of life, and consequently revolutionised all the economic functions of society. Man, who through the long centuries had toiled with his hands, aided by crude implements, to wrest a pitiful subsistence from Nature, suddenly discovered that the blind forces against which he had been struggling could be chained to do his work. Through the countless ages, humanity had been the helpless prey of the vulture elements—consumed by fire, drowned by flood, struck down by

lightning, frozen in the winter storms, eliminated by pestilence and famine. Man's first action was then defensive. He sharpened a bit of wood, polished a flint, kindled a flame—Industrial History was begun. The millions of years which separate the eighteenth century from primeval dawn did not produce, however, as many mechanical and scientific triumphs as have been brought forth in the last century and a half.

Sec. 2.—Mechanical and Social Phases. The Industrial Revolution has two phases: one material, the other social; one concerning the making of things, the other concerning the making of men. A man's work and the conditions under which it is performed are tremendous factors in determining his character. Though the Industrial Revolution opened the way for the production of the means of life without the consumption of all human energy, man, startled and stunned by the sudden changes in the methods of working and living, was unable to organise his life so that all might share in the benefits of the new inventions. The Industrial Revolution, with its factory system, and its increased facilities for intercourse, wrought wonderful changes in the social organism. It brought with it long hours, overwork, over-crowding, and other evils. It called into existence suddenly the factory towns, with their want of corporate life, their vile sanitary conditions, and filthy hovels. Men were forced rapidly into new relations, in which the old formulæ, maxims, and moralisings became useless and void. The old economic order and basis of life were swept away, and in the confusion—"the wreck of matter and crush of worlds"—it seemed as if man had become utterly powerless to adjust himself to the new conditions, to conquer and control them as he had

the forces of Nature. For a while after this industrial convulsion, and the demolition of the old order, man seemed paralysed. Economists, moral teachers, and social leaders groped in darkness amid confusion. Man had become a machine—a producer of things, a commodity to be bought and sold. His character, his powers of love and joy and admiration, his desire for freedom from misery, pain, and wretchedness, were made secondary to the production of marketable commodities. However, the bitter wrongs which called forth the scathing denunciations of Carlyle, Kingsley, and Ruskin were the result not only of the new mechanical developments, but also of the want of a re-organisation of society upon the basis of the new achievements. This process of reconstruction is now going on, and corporate society is the hope of the future. From the standpoint of achievement of human brain and hand, the mechanical revolution possesses a lasting and constantly increasing fascination ; but being inseparably interwoven with the life and labour of the people, it has an interest as deep and abiding as the problems of human health, happiness, character, and power.

Sec. 3.—England in 1760. To realise the magnitude of the change wrought in industry, politics, and social organisation, we must turn to England of 1760, and examine the old order. What a strange panorama unrolls before our eyes! We see not the England of to-day, but a quiet, rural England yet unawakened by the roar of traffic and industry. At the middle of the eighteenth century man produced the necessaries of life—food, clothing, and the like—by the labour of his hands, almost unaided by machinery. The flail, the

primitive plough, the spinning wheel, the hand loom, and a few other rude appliances assisted the manual worker in his tasks, while the horse and water furnished the power used to turn the wheels of some small factories. The commodities so produced were transported by slow and tedious methods to the markets. Man seemed to be a helpless pigmy, confined and overawed in his activities by the tremendous forces of an apparently uncontrollable natural world. The great manufacturing cities had not yet sprung up; there was no "Black Country," with its forest of chimney stacks, pouring forth clouds of sulphurous smoke to darken the sunlight; there were no volcanic blast furnaces to make the night hideous; no trains shrieking and thundering across plain and under mountain; there were no vast armies of workers even, collected in great factories, stifled by heat and dust, and deafened by the dull, monotonous roar of machinery.

Sec. 4.—Extent of Agriculture. In 1760, one-third of the workers of England were agricultural labourers, and a large number of those engaged in regular manufacturing industries continued to work in the fields during certain portions of the year. It is estimated that 3,600,000, out of a population of 8,500,000, lived in the country, and that their income was £66,000,000, out of a total national income of £119,500,000. While these figures are not exact, they show that agriculturalists had more than their proportionate share of the income. This was probably due to the fact that machinery was not yet employed in manufacturing to any great extent, and a large number of workers was required to turn out a comparatively small product. We have no very reliable information as to the amount of land which was

actually in cultivation at this time. Gregory King estimated it at about 22,000,000 acres, or about three-fifths of the total area of the country, while, according to the reckoning of a land-agent in 1729, one-half of the country was waste. Though these estimates may be far from accurate, there is sufficient evidence to warrant a conclusion that there were at the close of the eighteenth century throughout England vast stretches of waste and unimproved land which are now fertile and productive fields. A large portion of Essex was covered by Hainault and Epping Forest. Wide tracts of the weald of Surrey lay unused and desolate. The bogs and fens of Cambridgeshire and Huntingdonshire were yet untapped, while barren expanses of land, considered inevitably sterile, were lying unused. "Robin Hood would have found his forest of Sherwood still covering the greater part of Nottinghamshire. Derbyshire was a black region of ling, and from the northern point of the county to the extremity of Northumberland—a distance of 150 miles—the traveller would, like Jeanie Deans, encounter nothing but wastes. In 1734, the forest of Knaresborough 'was so thick with wood that he was thought a cunning fellow that could readily find these Spaws' of Harrowgate. The road from Beverley to Hull was marked out by willows, which showed above the swamp; at dusk the bells rang from Barton-upon-Humber to guide the traveller; from Sleaford to Brigg, the land lighthouse of Dunstan pillar directed wayfarers across a solitary waste."

Sec. 5.—State of Agriculture and the System of Cultivation.

It is difficult to make any safe generalisations about the state of agriculture in all England, for conditions varied in different parts. In some places we hear of land

“cultivated in the most husbandlike manner, richly manured, well-peopled, and yielding a hundred times the produce that it did in its former state.” On account of the lack of general diffusion of knowledge, improvements in fertilising and cultivation used in some portions were unknown in others. In the South Country the cultivation seems to have been uniformly good, while throughout the North there were great tracts of land exhausted by continued crops and ignorant tillers. However, for more than fifty years before the Industrial Revolution there were extensive improvements in the methods of agriculture, brought about, for the most part, by the landed gentry who had acquired a knowledge of experimental farming, and whose capital enabled them to put it to practical test. Root-crops and artificial grasses were adopted to utilise fallow land and poor pastures. The introduction of rotation of crops did away with exhaustion of the soil. “Writers of this time note that country gentlemen talked about land and its properties, the benefit of certain courses, the advantage of turnip fallows, and the economics of agricultural machinery, about breeds of cattle, sheep, and pigs, with the same interest which their fathers and grandfathers used to exhibit on the subjects of the stable and kennel only.”

More than one-half of the land in use was cultivated on the primitive system of common field tillage. Though the Peasants' Revolt and other economic forces had broken up the old manorial system, the village organisation as the centre of open field farms still existed over a large portion of the country. The land attached to the village was composed of arable, meadow, and pasture. Though the average holding

consisted of about eighteen acres of arable, two of meadow, and common pasture rights, in reality the holdings varied greatly in size and character of tenure. The farmers were tenants by freehold, copyhold, leasehold, at will, or from year to year. The arable land was laid off into three fields, and each field was subdivided by balks into strips about three yards wide, containing an acre or a half-acre. Each farmer held at least one strip in each field. One of the arable fields was left fallow every year; while, in the other two, wheat and barley, oats, beans, pease were grown. The acre and half-acre holdings of each individual were scattered throughout the three fields. The meadow land was also laid off in strips, for which the villagers drew lots. When the hay had been taken off, the meadow land was thrown open to the village herd. The waste land about the village was also common pasture.

The evils of this system were numerous; but the most grievous may be summed up as follows:—(1) Rotation or change of crops was almost impossible, as such action could only be taken with the assent of the entire community; (2) an immense amount of land was wasted by the balks and footpaths; (3) common pasturage of the arable land made it impossible to grow winter crops; (4) a vast deal of time was consumed by labourers “in travelling to many dispersed pieces of land from one end of the parish to the other”; (5) quarrelling and litigation over the little strips were continuous; (6) the common herding of cattle and sheep made it impossible to prevent disease and to improve the breed. On the whole, the old communal system of agriculture, however picturesque and Arcadian

it may appear to some people at this distant day, made radical improvement impossible, and from the standpoint of scientific production was wasteful and laborious. The enclosure of commons, which did more than anything else to break up the old open field system, had been going on since early in the Middle Ages; but the practice increased rapidly in the eighteenth century. Between 1710 and 1760, 334,974 acres were enclosed, and between 1760 and 1843 the enclosure amounted almost to 7,000,000 acres.

Whatever injustice the enclosure may have wrought, it is evident that intensive agriculture and the production of the greatest amount of stuff with the least expenditure and waste of energy were absolutely impossible under the old system. The intensive agriculture added greatly to the output; but it certainly did work hardship to the poor, who were cleared off the land to make room for the vast field system and sheep and cattle raising. A few individuals were made rich, prices were probably lowered; but the poor at large suffered in several ways.

Sec. 6.—Life in the Agricultural Village. The condition of the agricultural labourers was, comparatively speaking, good. Wages ranged from 8s. to 10s. per week, while the cost of board was 5s. or 6s. Rents were low, food-stuffs and clothing abundant, and the regular wages could be supplemented with earnings from spinning, weaving, and lace-making. Communities were isolated through lack of facilities for communication, life was simple, and education certainly not wide-spread; for we are told by a contemporary that "not one farmer in five thousand reads at all." Indeed, there was little necessity for communication with the world at large. The villages

were almost entirely self-sufficing, because they produced and prepared their own food, clothing, shelter, and implements. "Each village had its mill, generally the property of the lord of the manor; almost every house had its oven and brewing cauldron. Women spun wool into coarse cloth; men tanned their own leather. Wealth existed only in its simplest forms, and natural divisions of employment were not made, because only the rudest implements of production were used. The rough tools required for the cultivation of the soil, and the rude household utensils needed for the comfort of daily life, were made at home."

Sec. 7.—Agricultural Implements. These were by no means of an improved type, although about this time several labour-saving tools and machines were invented. Eden, writing about 1797, states that the plough used in many parts of England differed but little in description from the old Roman plough, and that agricultural machinery of all others had received the least improvement. Wheat flailing was being superseded by the thresher; hand and horse-drills were used to sow and plant seeds. The sickle still held sway in the harvest fields, and feed and root cutting were done by hand machines. Wooden ploughs were still generally used, waggons were narrow-wheeled and small, and, on the whole, the implements were primitive and wretched.

Sec. 8.—Manufactures in 1760. The woollen trade, which was regarded as "the basis of our wealth," was the most important, and composed more than one-fourth of the entire export. The industry was not concentrated in any one part of the country, but was distributed among centres, large and small, throughout England. The cotton industry, which was as yet quite unimportant,

centred in Lancashire. The manufactured goods at Manchester and Bolton consisted largely of cotton stuffs. We are told that the number of spinners employed in and out of Manchester was immense, and that they reckoned 30,000 souls in that town, and 50,000 "manufacturers" employed out of it. A large portion of the cotton output, as to-day, went to America. However, the value of the cotton export amounted to only about one-twentieth of that of the woollen export. Next in importance to the woollen industry was the iron trade which, according to Hobson's estimate, employed, in all its branches, about 200,000 persons. The chief centre of production was in Sussex, where ten furnaces yielded an annual output of 1400 tons. Five miles from Newcastle-on-Tyne were iron works which ranked among the largest in Europe, and Rotherham was also famous for its iron foundries. At the middle of the eighteenth century, the industry was not as great as it had been at the close of the seventeenth century, owing to the fact that smelting by wood had led to such waste that the whole trade was discouraged by legislation. In 1695 the output was nearly 180,000 tons, but in 1740 it had fallen to 17,350 tons. To show the comparative insignificance of the iron industry, it is only necessary to point out that the export alone in 1881 was 8,320,315 tons of iron and steel. Staffordshire was the home of the potteries which employed about 10,000 persons. Hardware and cutlery were manufactured chiefly at Sheffield and Birmingham which had become, even by this time, large industrial centres. About 30,000 persons were employed in brass and copper industry in 1720, and silk, hosiery, linen, glass, and other minor industries were increasing in importance.

Sec. 9.—Mechanical Inventions before 1760. In the most important industry—woollen manufacture—very primitive machinery was used. Spinning and weaving were, of course, done by hand, though a few improvements had been made in textile machinery. In 1730, Wyatt had invented roller spinning; but it did not come into immediate use. In 1738, Kay of Bury made an important contrivance known as the fly-shuttle which enabled one man to do the work of two. At the beginning of the eighteenth century, calico printing had been so well developed that “all the mean people—the maid servants and indifferently poor persons” could clothe themselves in calico or printed linen. Water-power was used by many of the larger mills, such as those at Sheffield and Newcastle-on-Tyne. Some labour-saving machinery propelled by water used in the iron shops is described by Young as follows:—“As to the machinery accelerating several operations in the manufacture, copper rollers for squeezing bars into hoop, and the scissors for cutting bars of iron, the turning cranes for moving anchors into and out of the fire, the beating hammer lifted by the cogs of a wheel—these are machines of manifest utility, simple in their construction, and all moved by water.” The age of invention was yet to come, and, comparatively speaking, work had to be done almost without the aid of power-driven, mechanical devices.

Sec. 10.—The Organisation of Industry. There were few factories and vast accumulations of capital in industry in England before the coming of machinery. Even those engaged in other than agricultural pursuits very often lived in cottages in the country, and held small strips of land for cultivation. The metal workers of

West Bromwich and the cutlers of Sheffield were not yet divorced from the soil, and the various industries throughout England were more or less combined with agriculture. Manufacturing was carried on for the most part under what is called the domestic system. Industry was not concentrated in the hands of great "captains," but was distributed among innumerable cottagers and small masters who had close relationship with their workers. It is easy, however, to underestimate the developments which had already been made in the direction of the factory system before the age of mechanical inventions. It is erroneous to suppose that the factory system is entirely the result of machine and steam-power industry, because there are other conditions which lead to specialisation and large industrial organisation. These conditions have been aptly classified by Hobson under three heads: (1) Physical Aptitudes of Soil. For instance, since wood was used by smelting, iron works very naturally were built near forests. Industries requiring water-power sprang up along the hill streams of the North, and so on. (2) Facility of Market. It was natural that around the large towns which afforded markets certain specialised industries should arise. (3) Nature of Commodity. Where transportation was slow and inadequate, there was naturally little specialisation in heavy or perishable goods.

Defoe, in his tour through Great Britain (1724-26), draws a graphic picture of industrial life near Halifax, Yorkshire, at that time. "The land was divided into small enclosures from two acres to six or seven acres each, seldom more, every three or four pieces having a house belonging to them; hardly a

house standing out of speaking distance from another. We could see at every house a tenter, and on almost every tenter a piece of cloth, or kersie, or shalloon. At every considerable house there was a manufactory. Every clothier keeps one horse, at least, to carry his manufactures to market, and everyone generally keeps a cow or two or more for his family. By this means the small pieces of enclosed land about each house are occupied, for they scarce sow corn enough to feed their poultry. The houses are full of lusty fellows, some at their dye-vat, some at their looms, others dressing the cloths'; the women and children carding or spinning; all being employed, from the youngest to the eldest." However, by 1760 things had changed considerably, and while the domestic system was awaiting the final blow from the great inventions, the capitalistic system was beginning to take form.

Sec. 11.—Capitalism. Up to the eighteenth century, the land-owning class had been the dominating element in English political and social life; but from that time onward their power began to wane. Alongside of the landed aristocracy arose a powerful mercantile class whose wealth gave them influence and, finally, position in society. After the mercantile capitalists, who derived most of their wealth from foreign trade, came the capitalists who amassed great fortunes from home manufacturing industries. This latter class, which increased rapidly in numbers and wealth after the advent of the great inventions, had been gradually rising as masters of other workmen, until, in 1760, we hear of a few mills employing large numbers of labourers. The dependence of workmen on employers was in the process of development. The simplest form of

industry was the "domestic factory." In this industrial organisation, if it deserves the name, the raw materials, the tools, and the power were owned by the head of the household. These little units made up a portion of the industrial structure of the nation. Originally the communities of labourers worked to satisfy their own needs; but as the functions of society grew more complex, division of labour began. If the domestic weaver could obtain materials to keep him busy at more profitable work than agriculture, he began naturally to concentrate his energies upon textiles, and bought his food stuffs. Thus the progress of industrial society has been marked by division of labour and separation of industry. At first the workman owned his own tools, and bought raw materials for his own use. However, the domestic worker could not escape from the necessity of the market. He was continually confronted with the difficulty of securing a continuous and adequate supply of materials. To obviate this difficulty, the middle man or manufacturer came in as a "factor" in the primitive industry. James says: "First the manufacturer had to travel on horseback to purchase his raw material among the farmers, or at the great fairs held in those old towns that had formerly been the exclusive markets, or, as they were called, 'staples' of wool. The wool, safely received, was handed over to the sorters, who rigorously applied their gauge of required length of staple, and mercilessly chopped off by shears or hatchet what did not reach the standard as wool fit for the clothing trade. The long wool thus passed into the hand of the combers, and, having been brought back to them in the combed state, was again carefully packed and strapped on the back

of the sturdy horse, to be taken into the country to be spun. Here at each village he had his agents, who received the wool, distributed it amongst the peasantry, and received it back as yarn. The machine employed was still the old one-thread wheel, and in summer weather on many a village green might be seen the housewives plying their busy trade, and furnishing to the poet the vision of contentment spinning at the cottage door. Returning in safety with his yarn, the manufacturer had now to seek out his weavers, who ultimately delivered to him his camblets or russels, or tammies or calimancoes (such were the leading names of the fibres) ready for sale to the merchant or delivery to the dyer." "In Lancashire," says Toynbee, "we can trace step by step the growth of the capitalist employer. At first we see, as in Yorkshire, the weaver furnishing himself with warp and weft, which he worked up in his own house and brought himself to market. By degrees he found it difficult to get yarn from the spinners, so the merchants at Manchester gave him out linen warp and raw cotton, and the weaver became dependent on them. Finally, the merchant would get together thirty or forty looms in a town. This was the nearest approach to the capitalist system before the great mechanical inventions." Thus the ownership of the raw materials passed to the manufacturer, even before the factory system supplanted domestic industry. However, we must not lose sight of the fact that the substitution of power-driven machinery for hand labour was necessary to complete the destruction of home industry. As late as 1775, Adam Smith considered that large aggregations of capital in Joint Stock Concerns could only be successfully worked in the

trades of banking, insurance, making and maintaining a navigable cut or canal, and bringing a water supply for a great city.

Sec. 12.—The Condition of the Workers in 1760 was, generally speaking, quite good. There is a great difficulty in the way of making satisfactory comparisons, for a large number of new trades employing thousands have sprung up since that time. So much depends upon the standard of life, which is by no means fixed or easily determined, that any generalisations about the condition of the workers, even if drawn from elaborate statistics, are almost meaningless. We may agree with Toynbee that the status of the artisan has distinctly improved since Adam Smith's time. However, the great manufacturing cities had not yet risen, and the workers were not crowded in dingy, ill-drained, poorly-lighted tenements. Work was steadier, and there was less fluctuation in prices, because trade was "for the most part conducted on a small, steady basis, with known, regular customs." Food stuffs were reasonable in price, and the wages received secured to the workers the necessaries for a plain life. Life was simpler, and the struggle for existence not so keen as at the present time. There were not the hurry, rush, and uproar which machinery and increased competition bring. The cheap and simple tools required in the "manufacturing establishments" of those days could be secured without any great outlay of capital, so that labour was relatively more important than capital. This secured the freedom of the workers from the routine of the capitalist factory system and its attendant disadvantages, and allowed them to be, to a certain extent, their own masters. Though the workers had little chance of becoming rich

by thrift, industry, and especially by profits from the labour of others, they had still less chance of ending their days in the poorhouse.

Sec. 13.—The System of Transportation. In these days of rapid transit it is difficult to imagine the times when the products of mill, mine, and farm were laboriously and slowly dragged to markets in waggons, canal boats, or on horseback. A large portion of the traffic was carried on in 1760 at the markets and great annual fairs. Buyers and sellers, with droves of pack-horses, went over the country buying raw material and selling manufactured stuffs. The roads were far from the best, adding to the difficulties of transportation. Arthur Young, in one of his travels, mentions one hundred and twenty-three roads, fifty-three of which were good, twenty-seven vile, and forty-one indifferent. He frequently gives us bits of description as expressive as the following:—"To Wigan. I know not, in the whole range of language, terms sufficiently expressive to describe this infernal road. To look over the map, and perceive that it is a principal one, not only to some towns but even to whole counties, one would naturally conclude it to be at least decent; but let me most seriously caution all travellers who may accidentally purpose to travel this terrible country to avoid it as they would the devil; for a thousand to one but they break their necks or limbs by overthrows or breakings down. They will here meet with ruts which I actually measured four feet deep, and floating with mud from a wet summer; what, therefore, must it be after a winter?" There were, however, many excellent turnpikes which permitted of comparatively easy and rapid transportation. The problem of transportation received considerable attention toward the close of the

century. "The canal system was being rapidly developed throughout the country. In 1777 the Grand Trunk canal, ninety-six miles in length, connecting the Trent and Mersey, was finished; Hull and Liverpool were connected by one canal, while another connected them both with Bristol; and in 1792 the Grand Junction canal, ninety miles in length, made a water-way from London through Oxford to the chief midland towns. Some years afterwards the roads were greatly improved under Telford and Macadam." Though the rivers and canals afforded less expensive means of shipping, the effect of the cost on trade and industry can scarcely be estimated. The primitive system of transportation, combined with restrictions on apprentices and the Act of Settlement and general ignorance of opportunities open in various parts of the country, prevented that mobility of labour and capital which characterises modern industry.

Sec. 14.—Politics and Government. The study of history reveals that human progress has not been continuous and regular, but intermittent and spasmodic, often depending upon apparently accidental causes. It is difficult to get a cross-section view of society at any given stage. As Fustel de Coulanges has said of feudalism: "It is a body infinitely vast, with many organs, changing aspects, and complex life." Society, in progress, is like a stream of many different-coloured liquids, blending and mixing, stagnant, crystallising, and crystallised in places; dissolving, rushing, widening, deepening in others. It is easy to give statistics and classify the laws of certain periods, but so complex and labyrinthine are the problems of political and social *development* that the most careful and tentative descriptive phrase must be merely provisional. If we

describe the social and political system of any period, it must be with the realisation of the fact that the system of that time contained both the germs of growth and expansion ; decay and contraction. However, the simpler the life, the easier is accurate description. This being true, social and political forms of the eighteenth century are more readily described than those of our own time. In 1760 the economic, political, religious, and social organisation in England was essentially mediæval, presenting the two chief and all-pervading characteristics—rigidity of structure and immutability of function. We may accept Monsieur Seignobos' definition of these terms: "By the structure of society we mean the rules and the customs which distribute occupations and enjoyments among its members ; and by the functions of society we mean the habitual actions by which each man enters into relations with the others." Rigidity of structure is illustrated by the last chapter of the Constitution of Clarendon (1164): "Sons of rustics ought not to be ordained without the consent of the lords on whose land they are known to have been born." This one clause fairly exemplifies the character of the mediæval social structure. Men were compelled to accept the conditions to which they were born, freedom of contract being as yet almost unknown. The whole social fabric was keyed together by the king, upon whose personality depended law, order, international relations, social and industrial changes. The various classes, from the king to the serf, took their places in society under arbitrary and hereditary contracts. The villein was bound to the soil ; the lord of the soil to his overlord or directly to the king. However, at no time can we say that this order was absolute. Irresponsible kings,

anarchy, foreign influence, the growth of towns and cities, and the rise of an artisan class, had been shaking the stability of the rigid fabric. Peasants' revolts, famines, and the rise of a free labouring class had the same tendency, and the commercial development, which began in the Tudor age, also contributed to the destruction of the feudal organism. But by 1760 there had been no upheavals violent and far-reaching enough to affect the general character of the social hierarchy. Agriculture yet retained the form of the village community; nominally, at least, prices and wages were regulated by law and trades were controlled by the town guilds; international commerce was carried on by privileged and chartered companies and restricted by legislative enactments. On the eve of the Industrial Revolution, though the king had been rendered nominally subservient to Parliament, the Government was in reality in the hands of a landed aristocracy more or less subject to royal dictates, while the mass of the people, "bowed by the weight of centuries," were obedient to the heritage of laws, traditions, and customs which the ages had given them.

Sec. 15. — International Commerce. Though Italy, Portugal, Spain, Holland, and England were successively enriched by Eastern trade during the several centuries preceding the Industrial Revolution, yet in 1760 the export of the various nations represented a very small proportion of the total produce. Just as the communities were isolated and largely self-sufficing, so nations were more independent and self-sustaining. The idea of any nation becoming the workshop of the world had not entered the human mind. As late as the beginning of the eighteenth century, England's exports amounted

to less than one-sixth the value of the home trade, while the imports amounted to only one-twelfth of the home consumption.

Sec. 16.—Conclusion. We have now gone over the main outlines of English industrial conditions at the eve of the Great Revolution. We have noted the prevalence of the primitive agricultural system, the use of crude mechanical contrivances, the comparative simplicity of the industrial structure, and the mediæval character of politics and government. This chapter is at best only suggestive of the rich field for investigation open to the student. However, all the principal features have been emphasised, and the student who has thoroughly grasped their significance has laid the foundation for an intelligent understanding of subsequent developments.

CHAPTER II

THE MECHANICAL REVOLUTION, AND ITS ECONOMIC EFFECTS

Sec. 1.—Review. The last chapter was devoted to the industrial and social conditions which existed in England on the eve of the Industrial Revolution. Viewed from a political as well as an economic standpoint, agriculture was of supreme importance. It furnished a large portion of the national income, and the great land-owners occupied official positions which yielded them an immense administrative and political power. The factory system had not yet taken possession of industry and supplanted domestic manufacture. According to Defoe, many of the manufactures were organised by the guilds for home consumption, and only those whose raw material was the produce of home agriculture showed any considerable export. There was little specialisation in industry; foreign trade was comparatively small; nations and communities were largely self-sustaining; the workers were less dependent upon capital; trade was steadier because production was carried on for the purpose of supplying a small and well-known demand; and the tools required in most industries were so simple and so easily secured, and the power utilised in their operation so largely human, that there was little need for vast aggregations of capital. Though the amount of

machinery which had been invented up to that time must not be under-estimated, it is apparent that man was limited and cramped in his activities on account of his ignorance of the tremendous forces of the natural world. In fact, England of the first part of the eighteenth century was virtually a mediæval England, quiet, primeval, and undisturbed by the roar of trade and commerce. Suddenly, almost like a thunderbolt from a clear sky, were ushered in the storm and stress of the Industrial Revolution. The mechanical inventions of the centuries were eclipsed in less than one hundred years.

Sec. 2.—The Mechanics of the Revolution. So vast is the field which we are about to investigate, so complex are the forces, and so multitudinous are the details, that we are compelled to set our limitations somewhat arbitrarily, and to establish divisions even where they do not exist in reality. It is apparently advisable to begin with the tangible developments: (1) those which found expression in mechanical inventions, and (2) those which can be stated in figures. We can then proceed to the more intangible and subtle changes, known as social, which touch upon every phase of human life. Following this plan, we shall first devote our attention to the mechanical phase of the subject. It is impossible, even if it were desirable, to give here an extended account of the mechanical inventions and improvements which have been made during the last one hundred and fifty years. The story of mechanical development, from the wooden canoe of primitive man to the modern 16,000 tons trans-Atlantic steamship, from the distaff to the marvellous spinning jenny, with its myriads of swiftly-flying fingers, possesses a fascination in itself; but it

is the effect of this development upon the labour and life of the people which gives it a deep and abiding interest to the student of social questions. The central fact of the mechanical revolution, which is marked by the chaining of the forces of Nature to do man's drudgery, is the tremendous increase in the productive capacity of man. This has been brought about by (1) the invention of machinery capable of performing the varied and intricately complex processes required in manufacture and industry of all kinds; (2) the extensive application of extra-human power to the operation of machinery, and (3) division of labour and centralisation of industry.

Sec. 3.—The Textile Industry. The revolution in the methods of production is perhaps best illustrated by the Textile Trade. This is one of the most important of all human industries, because it supplies one of the commodities necessary for the satisfaction of man's simple organic need for warmth. The history of spinning and weaving reaches far back beyond written record, to the time when primitive man discarded the skins of wild animals and substituted woven cloth. Early in the history of England wool was an article of export, and in 1100 we read of a wealthy clothier of Reading "whose wains, filled with cloth, crowded the highways between that town and London." For centuries the raw material was worked up by hand, with the aid of a few rough-hewn tools. Wooden combs, about 5 by 6 inches, fitted with fine teeth and manipulated by hand, were used for carding and preparing the raw materials, while the distaff and the spindle were the only appliances used to facilitate spinning. The old hand spinner held a bunch of carded wool under one arm, and with his fingers drew out and twisted a few inches of yarn, and attached it to

the end of the wooden spindle which was allowed to swing down and revolve, thus twisting the wool fibre. The one-thread spinning wheel, a wonderful contrivance which superseded the distaff, is thought to have been generally used in England by the beginning of the sixteenth century. However, as late as 1757 an English poet writes :

“And many yet adhere
To the ancient distaff at the bosom fixed,
Casting the whirling spindle as they walk ;
At home, or in the sheep fold, or the mart,
Alike the work proceeds.”

The methods of weaving were quite as crude as those of spinning, for the old treadle loom was still in use, and the shuttle was only a flat stick notched at the ends, around which the weft was wound. Before 1760 a few minor inventions had been made which considerably increased the productive capacity of the operatives. In 1738, Kay of Bury invented the fly-shuttle which enabled one weaver to do the work of two. In 1748, Lewis Paul, of Birmingham, took out a patent for a rotary carding machine ; but it was not until several improvements were subsequently made that it became of practical utility. Kay's invention, however, proved useful at once, and, increasing two-fold the productive capacity of a weaver, multiplied rapidly the demand for cotton yarn which had hitherto been supplied by the hand wheels of the workers. The hand spinners could not keep up with the requirements, but the difficulty was soon met by John Hargreaves, an ingenious Blackburn weaver, who contrived a spinning machine which multiplied eight-fold the productive power of one

spinner, and could be operated by a child. Some hand workers, hearing of the new machine, and fearing that they would lose their employment, promptly forced their way into Hargreaves' house and smashed the "new-fangled contrivance." This did not deter the inventors, however. Before Kay had devised the fly-shuttle, Paul and Wyatt, working probably in conjunction, had developed, but with little practical outcome, the idea of spinning by rollers revolving at different speeds. In 1768, Arkwright embodied this design in his "water frame." Whatever advantage Arkwright may have taken of the previous inventions, it is certain that he made one important advance. Previous to his invention, linen thread was used by the weavers for warp because the yarn was not strong enough. Arkwright remedied this difficulty by the device of his jenny, which enabled him to spin thread hard and firm enough to serve for warp. Being a shrewd business man as well as an inventor, Arkwright made a huge fortune from his machines. In 1779, Crompton effected a happy combination of the jenny and the water frame, but he never derived any financial benefit from his "mule," as it was called. As soon as it was discovered that he was doing a higher grade spinning than his neighbours in Bolton, he was besieged for the secret, and to avoid violence he told his plans on promise of a subscription which, when collected, only amounted to £67 6s. 6d. Though his invention enabled others to build up great fortunes, Crompton died discouraged and in poverty. It is not necessary to enter into an elaborate description of ring spinning and the other numerous improvements which have brought the industry to its present state of perfection.

The wonderful development in spinning has been equalled by that in weaving. The initial steps in the construction of the power loom were taken by Dr. Cartwright, a Kentish clergyman, "who knew nothing about the textile trade, and had never interested himself in machine construction until he invented the power loom." Cartwright's own account of the causes which led him to take an interest in invention, and the plans he followed in working out his loom, throw light upon the way men thought and laboured in the early days of the Industrial Revolution, and is consequently worth giving here in full:—

"Happening to be at Matlock in the summer of 1784, I fell in company with some gentlemen of Manchester, when the conversation turned on Arkwright's spinning machinery. One of the company observed that as soon as Arkwright's patent expired, so many mills would be erected and so much cotton spun that hands never could be found to weave it. To this observation, I replied that Arkwright must then set his wits to work to invent a weaving mill. This brought on a conversation on the subject, in which the Manchester gentlemen unanimously agreed that the thing was impracticable; and, in defence of their opinion, they adduced arguments which I certainly was incompetent to answer, or even to comprehend, being totally ignorant of the subject, having never at that time seen a person weave. I controverted, however, the impracticability of the thing by remarking that there had lately been exhibited in London an automaton figure which played at chess. 'Now you will not assert, gentlemen,' said I, 'that it is more difficult to construct a machine that shall weave than one which shall make all the variety of moves required in that complicated game.' Some little time afterwards, a particular circumstance recalling this conversation to my mind, it struck me that as in plain weaving, according to the conception I then had of the business, there could only be three movements, which were to follow each other in succession, there would be little difficulty in producing and repeating them. Full of these ideas, I immediately employed a carpenter and smith to carry them into effect. As soon as the machine was finished I got a weaver to put in the warp, which was of such materials as sailcloth is usually made of. To my great delight, a piece of cloth, such as it was, was the produce.

As I had never before turned my thoughts to anything mechanical either in theory or practice, nor had ever seen a loom at work or knew anything of its construction, you will readily suppose that my first loom was a most rude piece of machinery. The warp was placed perpendicularly, the reed fell with the weight of at least half-a-hundred weight, and the springs which threw the shuttle were strong enough to have thrown a Congreve rocket. In short, it required the strength of two powerful men to work the machine at a slow rate, and only for a short time. Conceiving, in my great simplicity, that I had accomplished all that was required, I then secured what I thought a most valuable patent, 4th of April, 1785. This being done, I then condescended to see how other people wove; and you will guess my astonishment when I compared their easy modes of operation with mine. Availing myself, however, of what I then saw, I made a loom in its general principles nearly as they are now made. But it was not until the year 1787 that I completed my invention, when I took out my last weaving patent, 1st August of that year."

Notwithstanding the invention of the power loom, hand-weaving held on with wonderful tenacity for more than a quarter of a century, but was finally forced from the competitive arena. There were only 2,400 power looms in operation in 1813, while in 1833 the number had increased to more than 100,000. Other machines for carrying out the minor processes of spinning and weaving have been from time to time invented, and added to the loom and jenny, until to-day twenty-five men with modern improved machinery can produce more manufactured goods than all the textile workers of Lancashire could in the eighteenth century. Bell's invention of cylinder printing in 1783 enabled a man and a boy to turn out as much as two hundred men and boys, while the application of oxymuriatic acid to bleaching shortened that process from several months to a few days. The problem of supplying the enormous demand for raw materials now confronted the cotton growers of America. The capacity of the jenny had

multiplied many fold, but it still took an old coloured woman a whole day to thoroughly clean one pound of raw green seed cotton, while the best of hand-workers on ordinary cotton could only prepare five or six pounds a day. Eli Whitney, a young Yankee who was then studying law in the South, recognised the difficulties with which the planters had to deal, and, at the solicitation of some friends, set to work to construct a mechanical cotton cleaner. Previous to his graduation at Yale College, he had been employed in making nails by hand, and had become so skilled in handicraft that he was enabled to complete his "saw gin" within less than a year. As soon as it was put into practical working order, one man by its aid could clean upwards of a thousand pounds of cotton a day, and the producers, by the use of this machine, could supply the demands of the spinners. From the field to the shop counters, cotton now passes through a series of mechanical processes in which the labour of man is reduced to the minimum.

Sec. 4.—The Steam-Engine. Power was wanted to turn the new machines. While Hargreaves, Crompton, Arkwright, and others were busy contriving the new textile machinery, various inventors were wrestling with the problem of energy. Consequently, the wonderful revelation of the exhaustless labour-power of the steam-engine came about the same time as the textile inventions. Though it is impossible here to give anything like an adequate account of the steam-engine in history and the mechanical principles involved, a few words will not be out of place. The expansive power of steam was known to the ancients, for more than a hundred years B.C. there was in the museum at Alexandria a model of a steam-engine working on the reaction principle.

Though the theological and metaphysical bickerings which occupied the attention of the learned for so many long centuries overshadowed the wisdom of the ancients, "here and there in the pages of history we find a hint that the knowledge of the force of steam was not lost." The steam-engine began to take practical form in 1698 when Thomas Savery patented his engine for pumping water from mines. This invention was subsequently improved, and new principles adopted by Newcomen, Beighton, and Smeaton ; but by reason of the enormous consumption of coal required by the crude apparatus, it could not be economically used in the factories.

Sec. 5.—James Watt. It is largely to James Watt that we owe the practical and comparatively economical steam-engine which revolutionised power in modern industry. This great inventive genius was born at Greenock in 1736. The failure of his father, who was a small merchant, threw James at an early age upon his own resources, and, having a turn for mechanics, he went to London, where he was apprenticed to one Morgan to learn philosophical instrument-making. He remained there only one year, and then returned to Scotland where he sought out his friends in Glasgow University, and secured a position as repairer of astronomical instruments. He afterwards tried to establish a shop of his own, but was prevented by the refusal of the city guilds to recognise him on account of his short apprenticeship. The University then took him up, and gave him a position as mathematical instrument-maker for the institution. It was while he occupied this position that he entered into a discussion with some of his friends in the University over the possibilities of improving the old, cumbersome steam-engine, which was then used at

the mines. One Sunday afternoon in 1765, while walking in Glasgow Green, the idea of the nature of the improvement flashed across his mind. Hindered in his work by a lack of funds, he finally entered into partnership with Matthew Boulton, of Birmingham, who had bought the interest of his former partner, Mr. Roebuck. In 1768 he settled in Birmingham, and for many years worked without ceasing on improvements on the steam-engine, which he patented from time to time. In 1819 he passed quietly away, and was buried in the parish churchyard at Handsworth. His life and work are an inspiration to all who believe that man, by attention, observation, and experiment, can solve the problems which everywhere confront him. By 1786 steam power was coming into use, but it was not until 1795 that it was applied to cotton manufacturing. Since that time it has been used to turn the countless wheels of the factories, and, though in modern times it has found many sharp competitors, the tireless iron horse bids fair to hold its own for many years.

Sec. 6.—The Iron Trade. The importance of iron in the development of industry and the extension of the powers of man can scarcely be over-estimated. Its qualities of durability, malleability, and strength, and the manifold uses to which it can be adapted, make iron an indispensable factor in the evolution of mechanical production. Though it had been used by man for ages, there had been comparatively little advancement in iron working, for the methods of preparation were extremely crude at the beginning of the eighteenth century. However, the demand for iron, which sprang up when machines began to supersede the implements of handicraft, and the steam-engine came into general use, led to the concentration

of attention on improvements in the methods of iron working. In early times the industry was located chiefly in the South of England, but by the middle of the eighteenth century Coalbrookdale became an important centre. The difficulty of procuring fuel prevented any extensive development, because wood was considered necessary to the smelting processes. About 1750 the process of smelting by coal became effective, and at once led to a rapid advancement of the industry. The primitive method of supplying the blast by huge bellows worked in pairs by hand, water, or horse power, was superseded in 1760 by Smeaton's cylinder blowing apparatus which, notwithstanding the irregularity of the blast it furnished, soon came into general use. The advantage of a steady and continued blast was secured in 1790, when the steam-engine was adopted as the motive power. Between 1766 and 1784 great advance was made in the methods of working malleable iron, and of changing cast into wrought iron; grooved rolling supplanted hammering in 1783; this improvement was followed by the invention of the puddling forge. In 1828, James Neilson, an employé of the Glasgow Gas Works, discovered the advantage to be gained by substituting hot for cold air in the blast. Though treated as presumptuous by the practical iron manufacturers, he soon demonstrated the efficacy of his process by saving nearly three tons of coal per ton of cast iron. The steam hammer was invented in 1842; in 1865 the Bessemer-Mushet process made it possible to transform into steel molten metal direct from the furnace. The Siemens fuel-saving regenerative furnace and gas producer, the use of machinery in the place of hand labour in puddling and handling heavy castings, the

utilisation of electricity in drawing iron from the crushed ore, and innumerable other minor improvements have come in rapid succession, adding greatly to the development of the iron industry, and revolutionising the methods of preparing the material necessary for the progress of mechanical invention. Enormous quantities of steel for harnessing the limitless drawing forces of Nature can now be made with comparative ease.

Sec. 7.—Shoemaking, Tailoring, and Farming. In olden times the shoemaker bought his leather, cut out and shaped by hand the various parts of the shoe, sewed, and nailed them together with the aid of a few simple tools. Early in this century inventors turned their attention to this important industry, and by mechanical appliances completely revolutionised it. "Simple machine processes for fastening soles and heels to inner soles began to be adopted in 1809; and from that time onward successive inventions have converted the pure handicraft into one of the most mechanical industries in the world. In the United States, in 1881, no less than 50,000,000 pairs of boots and shoes were sewn by the Blake-Mackay machines. A visitor to a shoe factory to-day will see the following machines: for cutting leather, for pressing rollers for sole leather, for stamping out sole and heel pieces, for blocking and crimping, for moulding uppers or vamps, for vamp folding, for eyeletting, lasting, trimming, paring, sandpapering and burnishing, for stamping, peg cutting, and nail rasping." In a well-equipped clothing factory one will see at work machines for cutting out, sewing together, working and cutting buttonholes, sewing on buttons, and pressing. The sickle, scythe, cradle, and hand rake have gone from the harvest fields, while the

flail is a relic of an almost forgotten time. The steam plough, the mowing machine, the self-binder, hay tedder, and numerous other machines now do the work of the farm labourer. The modern threshing machine feeds itself, cuts its own bands, measures the grain, sacks it automatically, and stacks the straw with but little aid from the tender. Steel and steam have invaded every industry. So marvellous have been the mechanical inventions, so universal has been the introduction of machinery, so sweeping has been man's conquest over the forces of Nature, that not only have the methods of production been revolutionised, *but the possibilities of increased output are practically unlimited.*

Sec. 8.—The Revolution in Distribution. Along with the wonderful revolution in the methods of production have gone equally wonderful developments in the methods of distribution. A concentrated industry, like cotton spinning in Lancashire, would be impossible if it could not command a world market. With the extension of commerce and industry there came a demand for improved methods of transportation. Canals, stage-coaches, pack-horses, waggons, and sailing vessels could not do the work, and the slow methods precluded the transportation of perishable commodities. For a number of years attempts had been made to apply steam to locomotion. As early as 1769, a French army officer had built and operated a steam carriage, and fifteen years later one was constructed by Murdock, Watt's assistant. However, these locomotives were intended for use on the ordinary highways. In order to facilitate transportation upon the miserable roads, manufacturers had adopted the plan of laying down parallel lines of timber or flat stones for the wheels of waggons to run

over. Later, regular iron tracks were constructed and wheels especially fitted. In 1801, a charter was granted for a railway between Wandsworth and Croydon for the use of horses. The developments in the steam-engine made by Watt, and the use of iron rails to aid in overcoming the difficulties of dragging heavy loads over almost impassable roads, made the possibilities of steam locomotion plain to the inventors of the time. The honour of first applying steam to the hauling of loads upon a railway belongs, not, as is often supposed, to Stephenson, but to Richard Trevithick who, in 1804, built a locomotive, and set it to work on the Welsh Pen-y-darran road. In 1808, he built a railway in London, but this venture proved unfortunate for him, as his locomotive, after some weeks of successful operation, was accidentally thrown from the track, and the impoverished inventor was without funds to continue his experiments.

Sec. 9.—George Stephenson. Building upon the work of Watt, Trevithick, and other inventors, George Stephenson reaped the reward of practical success. He was born in 1781. His father, who was a fireman of a colliery engine near Newcastle, had no means to spend on the education of his son, who at an early age showed a decided bent for mechanical construction. Young Stephenson began his life as a cowherd, and passing on through other grades of employment, finally became engine-man at the colliery. He was stimulated by a desire to know more about the steam-engine, with which Watt and Boulton were astonishing the world, and since he could not read, he began to attend night-school at the age of eighteen. With the assistance of one of the principal owners of the colliery, he was

enabled to construct a "travelling engine" for the tramway between the colliery and the shipping port nine miles distant. His contrivance was set to work in 1814, and was quite successful. He then set about improving his invention, and in 1822 impressed the projectors of the Stockton and Darlington railway with his scheme of substituting the iron horse for one of flesh and blood. As a result, in 1825 was completed the first railway over which both passengers and goods were carried. Thus the modern railway system was inaugurated. A scholarly and not unfriendly critic of Stephenson's invention, writing at that time for the *Quarterly Review*, said: "What can be more palpably absurd and ridiculous than the prospect held out of locomotives travelling twice as fast as stage-coaches?" In spite of the sneers of the wise heads and their prophecies of failure, companies were organised and the age of rapid transportation opened.

Sec. 10. — The Steamship. The problem of steam navigation had been by no means neglected. Near the close of the seventeenth century, Papin set forth a proposition to use his piston-engine to drive paddle wheels for the propulsion of vessels, and in 1707 steam was actually applied to propel a small model boat on the Fulda, in Cassel. During the eighteenth century, a number of inventors in England and America turned their attention to the development of the idea. In 1736, Jonathan Hull took out an English patent for the application of steam to ship propulsion. Henry and Fitch, in the United States, demonstrated the practicability of steam navigation, but Robert Fulton reaped the honours of the century of struggle on the part of other inventors. In the spring of 1807 the *Clermont* was

launched, and in the autumn the new "water monster" made its successful trial trip to Albany. Trans-Atlantic steam navigation began in 1819 with the voyage of the American steamer *Savannah* from Savannah, Georgia, to St. Petersburg *via* Great Britain and North European ports. The trip from Savannah to Liverpool was made in twenty-five days, without any serious difficulty. Now goods and passenger steamers ply between all the principal ports of the trading world. Such have been the results of conquering and utilising the powers of Nature, which through the centuries had only been waiting for man to wake to consciousness, and devote himself to science and invention. More than 400,000 miles of steel lines bind nations and continents together; the ends of the earth are but a few days' journey apart. Great ocean liners cross the Atlantic in less than six days. It is a pleasant trip of but ten days from Liverpool to San Francisco. Electricity has been harnessed to flash our messages over land and under sea, and to turn our nights into day. Through all these achievements we see the subtle and cunning brain of man unravelling the secret powers of Nature, and transforming them into servants of his will.

Sec. 11.—The Inner History of Invention. The preceding pages, which have dealt with the slow unfolding of mechanical inventions, take the halos from the heads of many heroes. They show us that not a single one of the great inventions was struck off at one blow from the brain of a genius. It explodes the "great man theory" in the history of mechanical inventions. It cannot be denied that there have been a great number of inventors endowed with remarkable skill; but this skill has found play in studying the collective wisdom of the ages

bearing upon their work, and in profiting by the attempts, mistakes, failures, and successes of those who have wrestled with similar problems. Not one of the great inventions mentioned in the preceding pages can be attributed in its entirety to a single inventor. As Hodge pointed out in his evidence before a Commission in 1857: "The present spinning machinery which we use is supposed to be a compound of about eight hundred inventions. The present carding machinery is a compound of about sixty patents." If we turn to the inner history of mechanical invention, the secret of the great progress is easily learned. As has been shown, there were workers in every field of mechanics, each stimulating and aiding the others, and handing some new facts on to successors. Paul, Wyatt, Kay, Hargreaves, Arkwright, Crompton, Cartwright, and others dealt with the textile problem; Papin, Savery, Newcomen, Beighton, Watt, and perhaps a host of others, whose names will never appear on the pages of history, added to the perfecting of the steam-engine. The same story applies to every great invention. Whatever may be our theories about the great man, we are forced to admit with Spencer that "he is powerless in the absence of the material and mental accumulations which his society inherits from the past, and that he is powerless in the absence of the co-existing population, character, intelligence, and social arrangements. Given a Shakespeare, and what dramas could he have written without the multitudinous traditions of civilised life—without the various experiences, which, descending to him from the past, gave wealth to his thought, and without the language which a hundred generations had developed and enriched by use?

Suppose a Watt, with all his inventive power, living in a tribe ignorant of iron, or in a tribe that could get only as much iron as a fire blown by hand-bellows will smelt; or suppose him born among ourselves before lathes existed; what chance would there have been of the steam-engine?" Enlarging upon the eloquent words of Ruskin, "Infinite is the help that man can yield to man," we may add that infinite is the help that society can give to man, and that man can give to society.

Sec. 12.—The Economics of the Revolution. The second phase of the Industrial Revolution, which is to be described by figures, does not derive its interest, so far as this work is concerned, from the number of tons of stuff produced, but from the relative increase in the productive capacity of man. Herein lies the problem; for, as Thurston says: "Human progress depends upon the ability of mankind to do more work, and to accomplish greater tasks, to supply the necessaries of life with less expenditure of time and strength, thus to secure leisure for thought, invention, and intellectual development of every kind." To show the expansion of trade and development of industry which produce the alteration in the structure of society described hereafter, it is necessary to give a few statistics. When machinery was introduced into the textile industry, the output of manufactured goods increased by leaps and bounds. In 1764, the cotton imported into England amounted to 3,870,392 lbs.; in 1841, it had risen to 489,900,000 lbs. In 1792, the amount of cotton imported into Lancashire alone from the United States was 138,000 lbs., and in 1800 it was 18,000,000 lbs. The calico sold in the Blackburn market during the year 1805 amounted to one million pieces. Seventy-nine years later the expor-

tation of piece goods was nearly four and one-half billion yards, and this was exclusive of that produced for home consumption. In the ten years from 1790 to 1800, the woollen import rose from 2,582,000 to 8,609,000 lbs. In 1788, the iron output was 61,300 tons; in 1839, it was 1,347,790 tons. One hundred years after Crompton invented his spinning mule there were in Lancashire 2,655 cotton mills running a total of 37,515,772 spindles and 463,118 power looms. In the twenty-two years from 1793 to 1815, the exports, according to official valuation, rose from £17,000,000 annually to £58,000,000. These figures give an inkling of the industrial transformation which succeeded the great inventions. Now, let us turn to the real increase in productive capacity of the individual. In other words, let us see whether productive capacity has grown more rapidly than the population, for this is the vital question—the one which throws clearest light on the condition of the workers at the present time, and upon the possibilities of increasing the amount of necessaries and comforts. Unfortunately, elaborate compilations of statistics are only of recent date, and we are compelled to base most of our comparison upon the developments between the early portion of this century and the present time. Hargreaves' first jenny worked only eight spindles; the number was gradually increased to 120; and by the beginning of this century, to 200.

The jenny has now more than a thousand spindles, each revolving at the rate of 10,000 revolutions per minute. A man and two piecers can work two thousand spindles. Fifty years ago the most improved power loom made only about 100 picks or throws of the shuttle per minute; to-day the highest grade loom runs at the rate

of about 400 picks a minute, and along with the increase in the productive capacity of the machines has gone a decrease in the amount of human labour required in the operation. This is shown by the following table :—

INCREASE IN MAN'S PRODUCTIVE CAPACITY.

	Lbs. yarn produced.	Spindles.	Hands.	Production per Spindle.	per Hand.
1819-21 -	106,500,000	7,000,000	110,000	15.2	968
1844-46 -	523,300,000	19,500,000	190,000	26.8	2,754
1859-61 -	910,000,000	30,400,000	248,000	30.0	3,671
1886-87 -	1,415,000,000	43,000,000	245,000	32.9	5,900

In other words, the number employed in spinning had fallen 3,000 in the years between 1859 and 1887, while the output of their labour had increased 505,000,000 lbs. The other productive industries show about a corresponding development. It may be asked what has become of the millions of workers which this machinery supplanted. Some have gone into other channels, for during the past century many entirely new industries have sprung up, such as those connected with the manufacture of bicycles, automobiles, and electrical appliances, and other things more or less serviceable, while many people are doing nothing, as the following table will show :—

OCCUPATIONS OF THE PEOPLE OF ENGLAND IN 1891.

Professional - - - - -	926,132
Domestic - - - - -	1,900,328
Commercial - - - - -	1,399,735
Agricultural and Fishing - - - - -	1,336,945
Unoccupied and Non-productive - - - - -	9,154,373
Industrial - - - - -	7,336,344

Sec. 13.—Substitution for Hand Power. The progress of industry is based upon the application of power to matter. It is necessary to grasp the fact that all power is the same; it matters not whether it be muscular activity of man or beast, or the lightning's flash released in the swiftly flying motor. The question in which we are vitally interested is this: Has the power of the world increased more rapidly than the population? Since 1831 the population of the civilised world has not quite doubled, while since 1840 the power of steam alone has risen from 1,647,000 horse-power to more than 55,580,000 horse-power. Mulhall says: "In little more than half a century the working power of nations has trebled in Europe and multiplied eight-fold in the United States. Taking the nations of Christendom in the aggregate, the average energy per inhabitant has more than doubled since 1840; that is to say, five men can now do as much as eleven men could fifty years ago." According to the report of the United States Commissioner of Labour, there was in the United States, in 1886, machinery equivalent to 3,500,000 horse-power. If this power had been supplied by the muscle of men, it would have required 21,000,000 to produce the output, whereas, under the machine system, only 4,000,000 men were employed. "To do the work accomplished in 1886 in the United States by power machinery, and on the railroads, would have required men representing a population of 172,500,000. The actual population in the United States in 1886 was something under 60,000,000, or little more than one-third." The extent to which the tireless power of Nature can be substituted for manual labour depends upon the ability of man to build and adjust his machinery. Here is the material key to man's spiritual progress.

The ploughing of a furrow, the sowing of the seed, the reaping of grain, the transportation of grain from one market to another, the weaving of a fabric, and the making of a coat all represent in the final analysis the application of so much power to matter. The past achievements of inventors have shown us that there are no limits to the ways in which the exhaustless forces of Nature can be applied to do man's work. If we turn to the past, we see man struggling to maintain life by the sheer strength of his muscle; but if we look along the centuries of the future, we see the struggle for existence taking only a small portion of man's energy, leaving all the remainder of his illimitable powers of heart and brain free for the extension, enlargement, and enriching of life. Instead of man wrestling with his brother to wrench from him wealth which is already created, we see all men united and organised to wrest from the boundless and exhaustless stores of Nature the means of life. "The daily bread being certain, the tyranny of pecuniary gain will be broken; and life will begin to be used in living, and not in the struggle for the chance to live." This is not merely a Utopian dream, but is a vision having its foundations on the immovable, established rock of human achievements in science and mechanics.

Sec. 14.—Agriculture. Notwithstanding the fact that man is a land animal, deriving his food stuffs largely from the soil, comparatively little attention has been paid to increasing the output of agricultural produce, though it is true that a great deal of improved machinery has been introduced to save labour. Though manufacturing, commerce, and wealth in England have increased rapidly, agriculture has actually been on the decline. The productive area of the United Kingdom has

increased 3,000,000 acres since 1846, but the area under crops has fallen from 21,900,000 to 20,500,000 acres. This has come about because England has devoted her attention to manufacture, and not because the soil has been exhausted or its productiveness has reached its limits. In Europe, the population has increased 44 per cent. since 1840, while the output of food stuffs, grain and meat, has increased 57 per cent.; and yet Nordau tells us that "if the soil of Europe were tilled and managed like that of China, it would support one thousand millions of human beings instead of its three hundred and sixteen millions, who are so poorly fed that they are emigrating annually by the hundreds of thousands to other parts of the world." The reaction against the factory craze has already set in, but, as Gibbins points out, high rents stand in the way not only of intensive farming, but also of increasing the number of acres under crops. We may do well to remember these pungent words from the "Conventional Lies of Civilisation": "The European factory operative is even now the slave of the negro on the Congo. He stills his hunger with vile whisky, spends his life in the factories, and dies of tuberculosis, so that some barbarian may lead a more comfortable existence than has heretofore been the case. This feverish labour, which is not applied to the production of food but to industrial over-production, will finally produce a nation of hungry money-bags. The world may then behold the spectacle of a country where a piano of the very latest make stands in every cottage, the people rustling in bran-new clothing, but with disease in their bones, no blood in their veins, and consumption in their lungs."

CHAPTER III

THE BREAKING UP OF THE OLD ORDER

Sec. 1.—The Factory System. We have examined the conditions which existed in England at the middle of the eighteenth century, and made a brief survey of the mechanical inventions which revolutionised the methods of production and distribution. We may now turn to the changes brought about in the industrial organisation and in economic theories by the sudden alteration of the economic basis of life. In the old order described in the first chapter the workshops were the homes of the people. Weaving and spinning were not done by workers under capitalistic masters, but by members of the family of the workman or a few employés. The workers for the most part owned their own machinery, and handled the raw materials and the manufactured products for themselves. Even where several men worked under one master, there was no complete separation as we see in modern life. "The manufacturer employed a group of journeymen and a few apprentices, the number of the latter being apportioned by law to the number of the former. In this way the proportion of workers in each trade was balanced according to the relative growth of each; and as there were no sudden displacements of labour by the introduction of machinery, as years went on the old habits and methods of life

were preserved, while the relation between employer and employed, commencing under an indentured apprenticeship, usually for seven years, and continuing under a system of journeymanship, became a kind of family relation. As a rule, with personal knowledge there was personal respect, though not without those occasional disagreements which opposing interests will sometimes beget, however carefully they may be regulated." But the hand workers could not compete with the new and tireless machines. Home and small industries gave place to the Factory System, under which the output was enormously increased, not only by reason of the machines, but also because of the division of labour and the consequent augmentation of the skill of the labourer. Instead of the hand worker turning out a finished product, came the organised army of workers, each filling a particular niche by performing one of the processes in the production of a commodity. To quote Hobson: "The typical unit of production is no longer a single family, or a small group of persons working with a few cheap, simple tools upon small quantities of material, but a compact and closely organised mass of labour, composed of hundreds or thousands of individuals co-operating with large quantities of expensive and intricate machinery through which passes a continuous and mighty volume of raw material on its way to the consuming public." At the beginning of the Industrial Revolution the men who owned the new machines had the advantage, and they made full use of it, for they were unhindered by factory legislation and unrestricted by public opinion. This collecting of vast armies of labourers under the dominion of one capitalist broke off the old relations of master

and man, and society gradually divided into two classes, the employers and the employed, bound together only by the "cash nexus." The ever-widening markets increased the demand for vast capital, and its relative importance consequently outgrew that of labour. Capital was necessary to buy machinery, erect factories, and initiate industries. Against the factory system, with its requirements and advantages, the hand workers could not compete, and they were compelled to give up their home industries and enter the ranks of the employed or unemployed as opportunity offered. "The new machinery soon threw out of employment a number of those who worked by hand; it enabled women and children to do the work of grown men; it made all classes of workers dependent upon capitalist employers; it introduced an era of hitherto unheard-of competition." The factory system saved labour, but the labourer did not profit much by the saving. However, the new order has apparently come to stay, notwithstanding the rhapsodies of some of our reforming poets, who sing of the picturesque days of the hand wheel and loom. The ills which have stung the poets to the quick have come, not from the use of machinery, but from its abuse.

Sec. 2.—The Rise of Capitalism. The new order was also marked by the rise of capitalism, which brought with it the destruction of the old mediæval policy of trade restriction and regulation, and ushered in an age of unrestrained individualism in industry. It would be well to define here what is meant by capital. Without considering the fine metaphysical distinctions drawn by the classic political economists in their attempted definitions of capital, we may accept for our use the conclusion of Hobson that the actual concrete forms

of capital are the raw materials of production, including the finished stage of shop goods, and the plant and implements used in the several processes of industry, including the monetary implements of exchange. By the rise of capitalism, then, we mean the gradual concentration in the hands of individuals or corporations of money, plant, implements, raw and finished materials necessary to the production of commodities.

Before the Industrial Revolution the communities were more self-sufficing, and competition among the home workers was very limited. Vast fortunes accumulated from manufacturing industries were unknown, and there was little demand for capital before the rise of the factory system. In the old domestic system little machinery was required, but the factory system altered the situation. Capital became relatively more important than labour. Machinery, vast quantities of raw materials, and funds to meet large running expenses were necessary to meet the demands of competition in the new industrial system. Before the Industrial Revolution wealth had been accumulated by gains from agriculture, commerce, and from the crude industries then in existence. By amassing some wealth in the old industries and by taking advantage of the new machines, men were enabled to lay the foundations of immense fortunes, and thus to acquire almost unlimited power over the lives of others. The hand worker without capital could not compete with organised mechanical industry, and consequently he was forced to become entirely dependent upon his employer who, taking advantage of the lawlessness of the time, pushed wages toward the lowest point of subsistence. Says Gibbins: "It is a sad but significant fact that, although the total wealth of the nation vastly increased at the

end of the last century and the beginning of this, little of that wealth came into the hands of the labourers, but went mainly into the hands of the great landlords and the new capitalist manufacturers, or was spent in the enormous expenses of foreign war." In addition to the tremendous power which possession of wealth gave to the employers, by legal methods, they were enabled to turn the institutions of government into instruments of oppression. As the government was almost entirely in the hands of the wealthy classes, they took advantage of the position of the workers so that the greatest possible gains could be obtained from their labour.

After the rise of capitalism came the subsequent development, which is still going on with increasing rapidity, known as the combination and organisation of capital. After the first flush of manufacturing prosperity under the new order had passed off, the great capitalists found themselves in competition with one another for the markets.

Sec. 3.—The Development of Capitalism. The fierce competition among capitalists has resulted in combination of capital and the consequent organisation of industry, which is, on the whole, the supreme industrial lesson of this hour. This development of capitalistic combination has come from two causes chiefly: (1) The demands for vast capital in the construction of railway systems and other industries on a large scale; (2) the necessity for mutual protection against the waste and strain of the warfare of fierce competition. In the early days of capitalism, though the capitalist was no longer a master among men, he was still an individual, tangible, approachable, and reproachable. To-day the owner and worker of capital are often not the same. As Mr.

Clarke aptly says: "Capital is becoming cosmopolitan and impersonal." As is well known, a large portion of the world's industry is carried on by great corporations, popularly known as "trusts." Just as the old hand worker was compelled to give way to the organised industrial armies equipped with the best mechanical appliances, so the small and then the larger capitalists were forced to capitulate to immense corporations with unlimited capacity for securing the largest and best fitted plants, and for controlling the markets. The latest development in the realm of combination is the "monopoly" or "trust," whereby a corporation of capitalists, by crowding out or including in their ranks all competitors, organise an entire industry to avoid waste and to secure the highest and best prices in the market.

In the United States three monopolist kings, Morse, Flint, and Rockefeller, control nearly \$3,000,000,000 capital. Flint controls everything made of india-rubber, from bicycle tyres to oceanic cables; he not only controls the rubber of the baby's bottle, but also the milk inside, for the milk supply of Greater New York and most of the territory of four other states is under his power. Morse is the ice king, while Rockefeller controls many things, from coal oil to kippered herring, with side lines in paper, whisky, tobacco, and railroad stocks. Within recent times there has been a decided movement in England toward capitalistic combination. Mr. MacCrosty, in an excellent article in the *Co-operative Wholesale Annual* for 1900, gives a partial summary of the English developments: "The English Sewing Cotton Co., J. and P. Coats & Co., the Fine Cotton Spinners' and Doublers' Association, the Bradford

Dyers' Association, the Yorkshire Indigo Dyers, the Unions of the Bradford slubbing and warp dyers, the textile machinery makers, the textile leather workers, the linen thread makers, the calico printers, the linoleum manufacturers, the india-rubber manufacturers, the oil and feeding stuff makers, the washing and wringing machine makers; the associated firms of W. Cory & Sons and Reckett, Cockerell & Co., which dominate the London coal trade; the Armstrong, Whitworth, Vickers-Maxim and J. Brown & Clydesdale Co. amalgamations; the Aberdeen Comb Co.; the Wall Paper Trust—this is from a complete list of consolidations, each of which is supreme in its own department of industry. Every prospectus is a protest against 'unhealthy and excessive competition'—a revulsion of feeling which reads strangely by the side of the rhapsodies of Smith and Ricardo. This is no accidental development, but the natural outcome of competition cutting at its own throat. To quote from the *Textile Mercury* (April 22, 1899): 'Steadily, although at a rate far less rapid than in the States, amalgamation of kindred concerns is going on within our own borders, and there is nothing to prevent, but so far much to encourage, further unification of industrial interests.'

Incidentally, another confident prediction of the economists has been falsified, for Free Trade is proving no barrier to private monopoly; protection accelerates but does not cause the evolution. Finally, these combinations are threatening to extinguish even international competition. The Standard Oil Trust of America controls the European market; international conferences or "shipping rings" fix English freight rates; J. and P. Coats & Co., and the English Sewing

Cotton Co., are not only closely connected, but they practically form one amalgamation with the American Sewing Thread Co.; the Fine Cotton Spinners' and Doublers' Association has acquired a factory at Lille, and the consolidated linen thread makers have factories in Scotland, Ireland, America, and Hamburg. It has taken us but little more than a hundred years to advance from the cottage industry to the trust, and the dawn of another century sees capital no longer competitive, but preparing to enter into new international unions. Free competition is truly dead. In America there is not a single important industry in which competition has anything like free play. Flour, sugar, starch, sewer pipe, copper, lamps, pottery, iron, steel, glass, candy, preserved fruits, lime, rubber, screws, coffins, hardware, pins, salt, silk, wire, type, chewing gum, and printing machinery petroleum, are a few among the many commodities controlled by combinations of capitalists, and they are in business for money. To use the phrase of one of them: "There is no damned sentiment about business." The trust is, however, teaching the people some lessons in economy.

In a highly organised industry under the control of a business-like corporation, every method is adopted to do away with unproductive activities of all sorts, such as advertising beyond a certain point; to avoid the risks of the small capitalist who produces for future and uncertain markets; and to escape the wear and strain which is inevitable in the unstable and precarious business of the private producer. By substituting a knowledge of the markets and probable demands of a vast area for chance plunges in the field of speculation, the "trusts," by their splendid organisation, avoid the

wastes and dangers of the competitive system. Many strange and sometimes fantastic prophecies are now being made about the future of industrial organisation illustrated by the development of the trusts; but as the trend of human progress is marked by the substitution of intelligence for precedent, and organisation for chaos and anarchy, there seems to be but little doubt that the trusts are merely pointing the way to higher forms of industrial methods in which the people, instead of a few capitalists, will reap the benefits. *Thus we see that the free competitive regime which obtained at the beginning of this century wore itself out, and another order based on entirely different principles has been developed.*

Sec. 5.—Politics and Economics at the Beginning of the Century. Less tangible, but no less important, was the diffusion of new political theories concerning the nature of economic and social organisation. *On the eve of the Industrial Revolution, England in its social, industrial, and political organisation was still mediæval.* The old view which regarded the whole system of social inequality as the divine order from the foundation of the world still held sway. The whole English political system was in the hands of the king and the great landed and commercial classes. Democracy in the modern sense had not yet appeared upon the political arena, for not over one person in five hundred had a vote. In the first place, the county boroughs were nearly all under the control of the county aristocracy; (2) the boroughs which returned members were largely the property of peers or under their dominion; (3) bribery was openly employed by the wealthy governing classes to obtain their ends. According to Taswell-Langmead: "It was stated by the

Lord Advocate in 1831 that at an election then within living memory for the county of Bute, which had not more than twenty-one electors, of whom but one was resident—that resident, together with the Sheriff and the returning officer, constituted the meeting, and having taken the chair, moved and seconded his own nomination, put the question to the vote, and elected himself.” The mass of the people lived, performed their work, and died in the position to which they thought the Lord had called them, without questioning the causes which gave them their position.

THE ECONOMIC THEORIES

were cast in the same mould. The world did move, but the legislators, administrators, and industrial leaders had not learned the fact in 1760. The ancient doctrine of paternalism and State regulation was still recognised as expedient and desirable, and “though nominally free to move, both farmers and labourers were practically fettered to the manor by their ignorance and their poverty.” The ancient theory of State made for a fixed order of society, and held it to be the duty of the Government to care for the temporal, spiritual, and eternal welfare of the individual, especially in so far as these interests did not conflict with those of the privileged. Under the old economic doctrine, wages were regulated, and the quality and often quantity of wares determined by the powers that were. Especially as the regulation of wages and the guaranteeing of good quality of wares suited the temporal interests of the “upper classes,” the system hung on from age to age, until it was finally broken by the sudden and vast

movements of the Industrial Revolution. In the old days life was simple, and human relationship, social and industrial, far from complex. Regulation was not the difficult task that it may appear to have been. But when the new order came, bringing its complex and intricate relationships, the old regulations hampered trade and industry on every hand. These restrictions have been classified by Toynbee as follows:—

I.—INTERNAL RESTRICTIONS ON TRADE.

1. The apprentice system requiring an apprenticeship of seven years from all who followed any trade which was in existence at the time the law was passed in Elizabeth's reign.

2. In general, corporations would not admit a workman if he was not a freeman, a position to be attained by serving the required apprenticeship. Corporations also supervised and regulated prices and qualities.

3. The regulation of wages was largely in the hands of the Justices of the Peace.

II.—EXTERNAL RESTRICTIONS.

1. Commerce was in the hands of chartered companies such as the East India and Turkish Companies.

2. Encouragement was given to the importation of raw materials and the necessaries of life, but the purchase of foreign manufactures was restricted.

3. Navigation Acts aimed to secure to English seamen the control of the world's carrying trade. "No

goods of growth or manufacture in Asia, Africa, or America were to be imported into England, Ireland, or plantations, except in ships belonging to English subjects, and manned by a crew three-fourths of whom were English subjects; while no goods of any country were to be imported except in English ships or ships belonging to the countries from which the goods came."

Thus we see at the beginning of the Industrial Revolution every branch of trade, commerce, and industry was hampered and restricted by complicated regulations, while the majority of the people were held in political bondage, and national policies were determined in the light of mediæval doctrines. The wonderful expansion of trade and commerce which came with the great inventions broke the narrow bonds of the old mediæval order; the aristocratic and divine right foundations crumbled from beneath the institutions of State and the industrial structure; and society resolved into the chaos of unrestrained individualism in every activity. The old laws could not control the immense trade which had suddenly sprung up, and the time for the new restriction had not yet come. The employment of land, capital, and labour in any way to make the largest returns for the "captains of industry" was recognised as legitimate, and upheld by the learned writers on political economy. Individual liberty was the battle-cry, and it is not to be wondered at when we understand the folly of the old restrictive doctrines which held on until the eve of the Revolution, and when we remember that the new principles of State control were not yet developed. The State was to be a passive policeman, according to the new theories of the sphere of legislative action, while workers and employers were to

be allowed full freedom in selling and buying. Freedom from social and aristocratic dogmas, freedom from restriction, marked the coming of the new industrial order. "Few of the laws and customs—little, indeed, of the social organisation could stand this test. England was covered with rotten survivals from bygone circumstances; the whole administration was an instrument for class domination and parasite nurture; the progress of the Industrial Revolution was rapidly making obsolete all laws, customs, proverbs, maxims, and nursery tales; and the sudden increase of population was baffling all expectations and disconcerting all arrangements. At last it came to be carelessly accepted as the teaching both of philosophy and of experience that every man must fight for himself, and 'the devil take the hindmost' became the accepted social creed of what was still believed to be a Christian nation. Utilitarianism became the Protestantism of Sociology, and 'how to make for self and family the best of both worlds' was assumed to be the duty, as it certainly was the aim, of every practical Englishman."

Sec. 6.—Condition of the Workers under the New Order. Capitalism, unrestrained by Acts of Parliament, and unhindered by public opinion, entered upon an era of full freedom of contract and unrestricted competition, and the results which followed upon the mad rush for wealth supply materials for the pessimist and cynic who make human nature a synonym for all that is mean and selfish. Labour became a commodity to be bought and sold on the market. Conditions of life became secondary to the production of wealth. In this discussion of these conditions we shall first take up a brief consideration of

LIFE IN THE FACTORIES.

As we have seen, the old domestic system of manufacturing had perished, and "contentment spinning at the cottage door" had become the dream of the poet. Instead came the factory system, with its organised armies of workers. Great factory buildings were rushed up by men ignorant of the elementary principles of sanitation. One who visits the Lancashire district to-day will see still standing many of the old factories with their low ceilings, small windows, and absence of sanitary arrangements. So wild was the rush for wealth that nothing was thought of save space enough to work the machines, and light enough to enable the operator to tend them. In these dingy buildings, choked with dust and worn with over-work, the English freeman enjoyed to the utmost the blessed privilege of freedom of contract. Radcliffe tells us that "Old barns, cart-houses, and out-buildings of all descriptions were repaired; windows broken through the old blank walls, and all were fitted up for loom-shops; new weavers' cottages arose in every direction." Bodily and mental comfort, health, security from dangerous machines, and moral decency were hardly taken into consideration by the "captains of industry who were laying the foundations of England's greatness." The new "labour-saving machines" did not save the labourer who worked them, and proved disastrous to those thrown out of employment to wait "until the fluidity of labour had adjusted the equilibrium." The horrors of the industrial conditions "under unrestrained capitalism outrival those of black slavery in America. If the English worker died

of starvation or was injured by accident in the mills, it mattered not to the employer, for he was not legally liable, and the worker's place could be supplied from among the thousands ready to work for even a bare subsistence. On the other hand, the body of the black slave was valuable to his master. Starvation or injury which diminished his power as a worker rendered him of less value to his owner, who was thus financially interested, at least, in some degree in the tolerable condition of his property. Contemporary reports, resolutions, personal accounts, and the Blue Books are so terrible that the reader to-day can scarcely believe that such ghastly stories of inhuman and infernal treatment can have a shadow of truth. For more than fifty years the reign of terror held sway in the peaceful walks of industry—a reign of terror that rivals that of the French Revolution, because it was so long, so coolly accepted, and even defended by political economists and servants of the Man of Galilee.

As early as 1795, Dr. Aikin noted that the invention of machinery to shorten labour had not only extended the trade, but had also called into the mills hands from all parts, and particularly children for the cotton factories. Mill owners arranged with the overseers of the poor, and, after inspection of the paupers, selected the best, and had them shipped to the factories to wear their lives out as slaves to machinery. There were even regular traders in human flesh who acted as brokers in paupers for the mills. As soon as the children were in the hands of the mill proprietors, "they were simply at the mercy of their owners, nominally as apprentices, but in reality as mere slaves, who got no wages, and whom it was not worth while even to feed or clothe properly,

because they were so cheap, and their places could be so easily supplied." These little slaves worked day and night in relays, so that the beds in which they slept never cooled, one batch following another in turn for its share of rest in the filthy rag piles. In the Parliamentary reports we read of children being knocked down and beaten as many as ten times a day; of boys working in heated glass factories, and being rewarded for negligence or failure to please the brutal overseer by severe beatings with irons. Children less than five years of age were found at work in coal mines, while in the pin factories, lads five years old were worked at full capacity for twelve hours a day. The story of adult labour is no less horrifying than that of child labour. Men and women were often worked just as long as the utmost limits of physical endurance would permit. Sanitary arrangements were generally of the most indecent sort, and diseases and malformations were prevalent. The Parliamentary report of 1833 classifies the sources of unhealthiness among the workers as follows:—Confinement; heated, close atmosphere; admission of foreign matter into the lungs; constant upright position; wet feet and person in wet spinnings; hurried eatings; sudden transitions of temperature; accidents from machinery; syphilitic taint; want of cleanliness; gas lights in closed rooms in winter; personal labour the only means of support; attention obliged to be as unremitting as the motion of the steam-engine. "We hear of children and young people in factories overworked and beaten as if they were slaves; of diseases and distortions only found in the manufacturing districts; of filthy, wretched homes where people huddle together like beasts; we hear of girls and

women working underground in the dark recesses of the coal-mines, dragging loads of coal in cars in places where no horses could go, and harnessed and crawling along the subterranean pathways like beasts of burden. Everywhere we find cruelty and oppression, and in many cases the workmen were but slaves, bound to fulfil their master's commands under fear of dismissal and starvation." A Manchester writer said, in 1842: "I never behold a poor factory child, but I instinctively picture to myself the misery which this cursed system (factory) entails upon the human family. I was once in the habit of visiting the hand-loom weavers, about ten or twelve years ago, and I invariably found them a happy and contented people; their cottages were comfortable homes; they had hours of relaxation, and gardens for profit and amusement, but now factories are at work in those districts in which they resided, and poverty, wretchedness, and discontent are the inmates of every dwelling."

These bits gathered from various sources give glimpses of the condition of the workers inside the mills before legislation and enlightened public opinion laid any restrictions upon the new factory system.

Sec. 7.—The Population and the New Towns. There were great changes brought about in the condition of the workers when they were placed under the factory system. At the same time, *the whole social life of the nation was altered* by the increase and shifting of the population and the rise of the factory towns. The increase in population in England and Wales, from 1770 to 1800, has been estimated at 1,959,590, or 27 $\frac{1}{16}$ per cent., and from 1800 to 1830 at 5,024,207, or 56 $\frac{3}{8}$ per cent.; but as Hobson has pointed out, eighteenth century

figures are not very trustworthy. The shifting of population from the South to the North, which had been going on for some time, was given an enormous impetus by the industrial developments which came in the North with the new machinery. The social life of the people was suddenly altered by the rise of the great manufacturing towns.

As long as man performed his tasks, almost unaided by mechanical appliances, there was no need of vast industrial armies, and before the application of steam to locomotion, the communities of hand workers were isolated and largely self-sufficing. Their knowledge was limited for the most part to the matters that concerned their particular trade and the immediate neighbourhood. Their homes were scattered through the country, and manufacture and agriculture were combined. But with machinery came the age of specialisation and organisation. The looms and wheels of the hand workers became useless, and the labourers flocked to the owners of the new power machines for employment. The capitalist soon learned the economy and advantages of large mills, production on a vast scale, and the centralisation of all processes, related to any particular industry, in one place. Around the immense factories sprang up thousands of cheap dwellings to be rented to the English freemen. Necessity being largely the "mother of invention," sanitary science had made scarcely any advance by the beginning of this century, and consequently the industrial towns were built up without decent sanitary provisions. Those who built the dens, miscalled "cottages," did not have to live in them; and the problem which confronted the contractors was: How to throw together just enough brick and mortar and slates

in form of a house that would not be too uncomfortable and indecent for a human habitation. The artistic, sanitary, social, and moral requirements for even a tolerable existence were not even heeded. The making of money seems to have been generally the aim of life; while the making of healthy, noble, happy human beings was forgotten, or left to the care of spiritual personages who were often willing to allow this world to be turned into hell in order that the inhabitants might inherit paradise to come. The worker in the new factory system was not a citizen, but a marketable producer of commodities. The cities were not intended to be delightful places wherein to dwell, but centres for factories and pens for the shelter of the workers. The development of the civic spirit was yet to come, and indeed, it is still to come in many of the towns of England. For the most part municipal organisations bent their energies to selfish, materialistic business ends; but all the while the manufacturing centres were increasing in importance and the problems which they presented increasing in complexity. Thus we may say that another great mark of the Industrial Revolution is the

PREDOMINANCE OF THE CITY OVER THE COUNTRY

when considered in terms of human life. The following figures reveal a wonderful transformation when we remember that in 1760 the population was almost one-half rural:—

		1861	1871	1881	1891
Urban population	-	62.3	64.8	66.6	71.7
Rural population	-	37.7	35.2	33.4	28.3

That this movement cityward is largely the result of the mechanical revolution is shown by the comparative increase of town population in countries where the machine industries are the most highly developed. The evils of overcrowding in towns at the beginning of this century were aggravated from the want of railways and trams, which provide rapid transportation to and from work, and allow the population to be more widely scattered.

The effects of large aggregations of people upon the life and character of the individuals are far-reaching and complex. In spite of the improved sanitary arrangements and the increased medical skill in our times, life in the towns is shorter than in the country, and is more beset with disease and infirmities while it lasts. According to Dr. Ogle: "The combined effect of this constantly higher mortality of the towns, and of the constant immigration into them of the pick of the rural population, must clearly be a gradual deterioration of the whole, inasmuch as the more energetic and vigorous members of the community are consumed more rapidly than the rest of the population. The system is one which leads to the survival of the unfittest." Many reformers are mistaken in laying all of the ills of modern city life to mechanical industry, for it is shown to be ill-founded by the prevalence of sweating, and worst conditions of life and work in the hand-labour trades. When we turn back to the records which tell us of the sad annals of toil, we wonder what a patient creature the worker has been in all times, and, instead of condemning his occasional outbursts, we are surprised at his moderation.

Sec. 8.—Progress and Poverty. In 1789, when the In-

ustrial Revolution was getting a fair start in England, the French Revolution broke out. The fall of the Bastille, whose sombre walls stood for all that was tyrannical in the old order, was a signal of the passing of the ancient regime. The revolt of the people against their oppressors at first met with considerable favour on the part of prominent statesmen as well as the people in England, but the disorder and murderous excesses frightened the law and order party. The belligerent attitude of the Republic and the evident determination upon extensive conquest led to war with all Europe. In 1793, England was drawn into the vortex for many reasons. The doctrines proclaimed by the revolutionary party in France were dangerous to the privileged classes in England, and English commercial supremacy was to be maintained at any cost. From that year onward until the crushing defeat of Napoleon at Waterloo in 1815, England was engaged in playing a costly part in the continental struggle. Though not the scene of actual conflict, England's share in the war cost £831,446,449. During this period the wealth of the nation was piling up with astonishing rapidity, but the poverty of the people was intensifying. In 1760, the poor rate was £1,250,000, or 3s. 7d. per head; and in 1818 it had risen to £7,870,000, or 13s. 3d. per head of population. Evidently the people did not derive much benefit from the new inventions. As Gibbins says: "The profits all went into the hands of the capitalist manufacturers, while taxation fell with special severity upon the poor, since taxes were placed upon every necessity and convenience of daily life. Even as late as 1841 there were 1,200 articles in the Customs tariff. The price of wheat, moreover, rose to famine height;

from 49s. 3d. per quarter in 1793 to 69s. in 1799, to 113s. in 1800, and 106s. in 1810. At the same time, wages were falling rapidly, and thus the chief burdens of war fell on those least able to pay for them ; but the poverty of the poor was the wealth of the landowners, who kept on raising rents continually, and grew rich upon the starvation of the people ; for they persuaded Parliament to prohibit corn except at famine prices, and shifted the burden of taxation, as was not unnatural, upon other shoulders." During these sad years in the history of English toil, the political economists were busy with "over-population," enlightened self-interest, and the relation of wages to capital ; but the people were, fortunately, beginning to think a little for themselves. It soon became evident to the nation at large that unrestrained individualism in industry had failed to give health, happiness, or decent conditions of livelihood. The age of revolt was not far off.

CHAPTER IV

REVOLT AGAINST LAISSEZ FAIRE AND BEGINNING OF ORGANISATION

Sec. 1. — Hindrances and Aggravations. The new machinery had been humming and pounding for a long time before the social conditions which it brought aroused men to the fact that a new world had been created, and before any serious attempt was made to ameliorate the conditions of the workers. In addition to the natural inactivity of the people when it comes to questions beyond those of immediate welfare, there were many causes which worked against reform movements. In the first place, individualism was rampant, and it was thought that "enlightened self-interest" would prove a panacea for the social diseases which came with the new industrial order ; (2) the excesses of the French Revolution frightened even the most advanced English statesmen ; (3) the energies of the nation were strained to the utmost in the struggle for self-preservation ; (4) patriotism stifled the bitter cry of want, for we are told that "reviews, illuminations in celebration of victories, the public funerals of soldiers, and the thanksgiving services in the churches helped to keep up enthusiasm and to restrain dissatisfaction" ; (5) the idea of society as an organism and the new morality which centres around the idea had not yet dawned in the human mind.

The old, mediæval trade regulations, made for a simple and comparatively stable society, proved utterly inadequate for a society rapidly increasing in complexity, numbers, and functional differentiation ; (6) but greater than all other forces was the mad struggle of the mill owners for wealth, which made secondary all other considerations. In addition to the many hindrances in the way of improving the lot of the workers, there were a number of incidents which aggravated the already terrible conditions : (1) the conclusion of the war threw out of employment 121,000 seamen between 1813 and 1817, and many thousands of soldiers as well, who were compelled to seek work in an already over-crowded or depressed market ; (2) improvidence and low wages were alike encouraged by the unwise poor law which permitted the supplementing of wages from the poor-rates ; (3) the natural contraction of the inflated war prices injured agriculture and many industries which were supported by the temporary and abnormal war demands.

Sec. 2.—The Political Economists. Following in the main the doctrines of Adam Smith, but with vicious enlargements and interpretations, the economists were opposed to placing new restrictions on the rapidly-developing industries. Having recognised the failures and fallacies of the mediæval trade regulations, they were naturally antagonistic to renewing, in any form, State interference. They strongly advocated the “enlightened self-interest” doctrine ; they discovered *natural law* in the social world holding the free labourer to perpetual bondage, and the discovery was highly acceptable to the capitalists and mill owners. Malthus wrote about “the misery arising from a redundant population,” and in suggesting a plan for the abolition

of the poor laws, said : " We are bound in justice and honour to disclaim the right of the poor to support." The reverend gentleman added : " If parents desert their child, they ought to be made answerable for the crime. The infant is, comparatively speaking, of little value to society, as others will immediately supply its place." The conclusions of the old school were, in short, that man is a miserable, helpless creature here below, powerless to change anything, and that Nature would have to take its course, starving, eliminating, and yielding up the hindmost to his Satanic Majesty.

Sec. 3.—The Revolt. The conditions finally became so unbearable that the people, who had no voice in shaping the public policy, expressed their deep-seated resentment at the iniquities of the new order in occasional outbreaks. Rick burning and the destruction of machinery showed the determined spirit of the times. Discontent and unrest were rife throughout the North. The suspension of the Habeas Corpus Act and the Six Acts (1819) aimed at the suppression of sedition, revealed the fright of the Government, and virtually declared England to be in a state of anarchy ; while the so-called Peterloo Massacre added fuel to the flames of civil unrest. But it was not by riots and the destruction of property that the people were to secure control over their conditions of life and labour. The work of individualism in striking down and clearing away the old economic, social, and political wreckage had been invaluable ; but its failure to secure to the people the barest comforts of life soon became evident.

Sec. 4.—Factory Legislation. When it became a physical impossibility to endure this terrible state of affairs any longer, the agitation for factory legislation

began. However, the problem was approached with "bated breath and whispering humbleness," for fear of trenching upon the sacred rights of freedom of contract. Human life was nothing when measured against the holy obligation of precedent. Factory legislation in England has been brought about by curious forces. Philanthropists, scheming politicians, men with moral and social convictions, have joined with the workers in the struggle for better conditions. The first step in the direction of legislative control of the new industry was made in 1802. Terrible as were the conditions depicted in reports and pamphlets, they seem to have attracted little attention from the general public until the spread of disease created alarm outside the precincts of factories. Long hours, ill ventilation, filthy homes, scanty food and clothing, and total lack of decent sanitary arrangements, led to the spread of epidemics in the factory districts, and action on the question could not be delayed longer without seriously involving public health. In 1796, the Manchester Board of Health was appointed, and to this committee, Dr. Percival, President of the Manchester Literary and Philosophical Society, submitted a report, in which he said: "In the prosecution of this necessary undertaking, the Board have had their attention particularly directed to large cotton factories established in the town and neighbourhood of Manchester, and they feel it a duty incumbent on them to lay before the public the result of their inquiries: (1) It appears that the children and others who work in the large cotton factories are particularly disposed to be affected by the contagion of fever, and that when the affection is received it is rapidly propagated, not only amongst those who are crowded together in the same apartments, but in the

families and neighbourhoods to which they belong. (2) The large factories are generally injurious to the constitution of those employed in them, even where no particular disease prevails, from the close confinement which is enjoined, from the debilitating effects of hot and impure air, and from the want of active exercises, which are essential in childhood and youth to invigorate the system, and to fit our species for the duties of mankind. (3) The untimely labour of the night, and the protracted labour of the day, with respect to children, not only tend to diminish future expectations as to the general sum of life and industry, by impairing the strength and destroying the vital stamina of the rising generation, but it too often gives encouragement to idleness, extravagance, and profligacy of the parents who, contrary to the order of Nature, subsist by the oppression of their offspring. (4) It appears that the children employed in factories are generally debarred from all opportunity of education, and from moral and religious instruction. (5) From the excellent regulations that subsist in several factories, it appears that many of these evils may, in a considerable degree, be obviated; and we are therefore warranted by experience, and are assured that we shall have the support of the liberal proprietors of these factories, in proposing an application for Parliamentary aid (if other methods appear not likely to effect the purpose) to establish a general system of laws for the wise, humane, and equal government of all such works."

As a result of the agitation on the condition of factory operatives, two years after the opening of the new century a Statute was passed providing for the preservation of the health and morals of apprentices

and others employed in the mills. This Act, which was passed largely through the continued effort of Sir Robert Peel, was intended chiefly to protect the little pauper apprentices. It *reduced* hours of labour for children to seventy-two per week, and regulated night work as well. Children living near the mill in which they were employed were not within the intention of the Act, for they were presumably under the care of their parents. Each apprentice was to secure instruction in reading, writing, and arithmetic, and to be provided one suit of clothes a year. Factories were to be white-washed annually and adequately ventilated, and the sleeping apartments of the sexes separated! This half-hearted measure was to be enforced under a penalty of not more than £5, nor less than 40s.! However, Parliament could not undertake sweeping reforms owing to the selfishness of mill owners and the dense ignorance of operatives, who had been taught to believe that a shortening of hours was inevitably accompanied by a fall in wages. Though the pauper slave market, so far as the cotton mills were concerned, was practically closed by the law, the horrors of child labour were not mitigated. By this Act, Parliament showed no intention of seriously interfering with the "right" of employers and employés to determine their own affairs. So generally accepted was the theory that social warfare was the natural condition of society that a select committee of the House of Commons reported in 1811 that "no interference of the Legislature with the freedom of trade, or with the perfect liberty of every individual to dispose of his time and his labour in the way and on the terms which he may judge most conducive to his interest, can take place without

violating general principles of the first importance to the prosperity and happiness of the community, without establishing the most pernicious precedent, or even without aggravating, after a very short time, the pressure of the general distress, and imposing obstacles against that distress ever being removed." In spite of these profound speculations, people were determined not to be "sweated or stunk to death." The tide had set in toward ever stricter control of the conditions of labour.

In 1815, Robert Owen, the great and revered friend of the toilers of the world, lifted his voice in public protest against the iniquities of the industrial system. With him, interference was not a question of "economic theory," but one of human life. The manufacturers were anxious enough to use the strong arm of the law in their own interests, and Robert Owen seized an opportunity of presenting the claims of the operatives when the mill owners were considering the policy of applying to the Government for a remission of the tax on raw cotton. At a meeting of manufacturers, Owen's proposition for the abolition of the tax was enthusiastically supported; but he failed to find even a seconder of the motion to improve the condition of the employed. In the interest of the workers, he made an eloquent and passionate plea for factory regulation: "Shall we then go unblushingly and ask the legislators of our country to pass legislative acts to sanction and increase this trade—to sign the death-warrants of the strength, morals, and happiness of thousands of our fellow-creatures, and not attempt to propose correctives for the evils which it creates? If such shall be your determination, I, for one, will not join in the application; nay, I will, with all the faculties I possess, oppose every

attempt to extend a trade that, except in name, is more injurious to those employed in it than is the slavery in the West Indies to the poor negroes. For deeply as I am interested in the cotton manufacture, highly as I value the extended political power of my country, yet, knowing as I do, from long experience both here in Scotland and in England, the miseries which this trade, as it is now conducted, inflicts on those to whom it gives employment, I do not hesitate to say, Perish the cotton trade! Perish even the political superiority of our country!—if it depends on the cotton trade—rather than they shall be upheld by the sacrifice of everything valuable in life.”

Owen framed three proposals which he wished to have embodied in a second Factory Act: “(1) To prevent children from being employed in cotton or other mills of machinery until they are twelve years old; (2) that the hours of work in mills of machinery—including one hour and a half for meals and recreation—shall not exceed twelve per day; (3) that, after a period to be fixed, no child should be received in a mill of machinery until he shall have been taught to read, to write a legible hand, and to understand the first four rules of arithmetic; and the girls, in addition, to be taught to sew their common articles of clothing.” For four years Owen was at London attending the Parliamentary sessions, fighting for the passage of the Bill against ignorance, prejudice, selfishness, and personal abuse and slander. In 1819, after Owen’s original draft had been mutilated beyond recognition, the Bill finally became a law. Owen tells us that he learned some things during the agitation. To use his own words: “My intimate acquaintance with these proceedings, for the four years

during which this Bill was under the consideration of both Houses, opened my eyes to the conduct of public men, and to the ignorant, vulgar self-interest, regardless of means to accomplish their object, of trading and mercantile men, even of high standing in the commercial world. No means were left untried by these men to defeat the object of the Bill in the first session of its introduction, and through four years in which, under one futile pretence and another, it was kept in the House of Commons."

The new law forbade the employment of children under nine in the mills, and limited the hours of work to twelve a day, exclusive of meal times, for all between the ages of nine and sixteen. The first Act had only made the State a sort of a guardian for the pauper apprentices; but the Bill of 1819 was "legislative interference between the free labourer and his employer," which the opponents of the measure considered "a violent, highly dangerous, and unconstitutional innovation." It was certainly the first expression of the new doctrine that the State ought to protect the interests of the weaker citizens, and it opened the way for the later restrictive legislation. Gradually it dawned on the consciousness of people that man was determining his own conditions of life. Slowly it began to be realised that beyond the problem of individual development and salvation was the still larger industrial and social problem, which could only be approached through collective action. In 1825, Saturday labour was shortened, and penalties provided for breach of factory regulation. These factory acts, however, did nothing toward assuring certainty of employment and living wages, and little toward improving the lot of the

workers in any but the cotton industry. Misery, starvation, suffering, and degradation made up the common heritage of the labourers, in spite of the factory laws. The spirit of unrest, nevertheless, was abroad in the land. It became evident that the people themselves must assert their authority in the Halls of Parliament.

Sec. 5.—The Rise of Democracy. Democracy, as we know it to-day, is of modern development. As has been pointed out in previous chapters, England at the time of the Industrial Revolution was yet mediæval in its political organisation. George III. had wielded a wonderful power for several reasons: (1) In the hands of the king rested the power to bestow all the honours, preferments, dignities, and positions which turn covetous politicians into sycophantic supporters of the hands which give; (2) the privileges and position of the peers were inseparable from those of the crown, and the greater part of their support and political influence was with the king; (3) but what was still more important, and added most to the placing of unlimited authority in the hands of the king, was the non-popular character of the House of Commons. In the first place, the county representatives were nearly all under the dominion of the county aristocracy; (2) the boroughs which returned members were largely the property of peers or under their control; (3) election work done on behalf of the royal party was rewarded by positions and honour in the Government service; (4) bribery was open and corrupt, and there were even "borough brokers," whose business it was to dispose of the right of representation at the highest prices.

At the close of the eighteenth century the House of

Commons had 558 members, 354 of whom, according to legal form, were returned by "less than 15,000 electors, but actually on the nomination or recommendation of the Government, and 197 private patrons, including many peers." It is thus evident that the younger Pitt's declaration had its foundation in fact: "This House is not the representative of the people of Great Britain; it is the representative of nominal boroughs, of ruined and exterminated towns, of noble families, of wealthy individuals, of foreign potentates." As early as 1653, Oliver Cromwell attempted Parliamentary reform by increasing the county members, giving representation to Leeds, Halifax, and Manchester, and striking off small boroughs from the list. This laudable reform was, however, cancelled when the Stuarts were restored to the throne. From the middle of the eighteenth century Parliamentary reform was again pressed forward, but without avail. The terrors of the French Revolution frightened the governing classes in England, and it was not until Napoleon was safe at St. Helena that reform measures were seriously taken up.

In connection with the agitation for Parliamentary reform, notice should be taken of William Cobbett, who has been called the Father of English Radicalism. In 1816, his *Weekly Political Register* was reduced from 1s. $\frac{1}{2}$ d. to 2d., and by this means cheap political information, good and bad, was supplied to permeate the consciousness of the people with the new principles of reform. Orators, poets, writers, and pamphleteers were busy arousing the working classes, and Hampden clubs were founded all over the country for the purpose of pressing forward the demands for the suffrage. Under the leadership of Lord John Russell, such reform was again

and again forced upon the House, until in 1832, after two defeats, and in spite of the bitter opposition of the House of Lords, the Clergy, the Universities, Army and Navy, and the Inns of Courts, the famous Reform Bill became law, and the tide set in towards Democracy. The conflict was not waged in Parliament alone, however, for all over the country were groups of men determined not to abate their activities until the walls of political privilege were battered down. When the second Bill was rejected by the House of Lords, rioting at once began in the large towns where the news had been anxiously awaited. The third Bill was finally passed by the House of Lords, after threats from the Prime Minister, and warnings from the king.

The enfranchisement of the middle classes in 1832 opened the castle of the privileged to the assaults of the disinherited, and Political History since that time centres about the struggles for enfranchisement of the masses. It is, however, well to bear in mind continually the significant words of Sidney Webb: "None of these enfranchised classes has ever sincerely desired to admit new voters to share the privileges, and submerge the power which it had won; but each political party in turn has been driven to 'shoot Niagara,' in order to compete with its opponents." By the Act of 1832, 143 seats were taken from "rotten" and small boroughs, and distributed among the new centres of population.

In 1867, Radical agitation and rioting forced the Tory Government to extend the electoral franchise in boroughs to householders and certain lodgers, and to reduce the county occupation franchise. In 1878, the tenement occupier was enfranchised. In 1885, the agricultural labourer became a "sovereign voter." The decentralis-

ing local government acts of 1888-1894 have opened the way for local autonomy. Thus within the past one hundred years the world has witnessed a silent revolution in English politics, which has resulted in the vesting of power in the hands of the people.

Sec. 6.—Industrial Democracy. Just as the political history of the past one hundred years has centred in political democracy, so the industrial history, on its economic and social side, has centred in Industrial Democracy. The labour movement has followed two paths, but both lead in the same direction. On one hand, the people are forcing industrial issues upon the national law-making body; and on the other, they are combining in voluntary associations all to the end that better conditions of life and labour may be secured. The first Parliament after the Reform of 1832 took up, among other things, the thread of factory legislation which had been dropped in the struggles over the franchise. In 1833-34, an important Act was passed which applied to all textile industries. The labour of children between the ages of nine and thirteen was limited to forty-eight hours, and that of young persons between thirteen and eighteen to sixty-nine hours per week. Night work for the young was forbidden, and ten hours a day made the limit for children in the silk mills. This Act met with a storm of opposition on the part of capitalists and mill owners, but it did not prevent the conviction of one out of every eleven of the mill owners for failure to observe its provisions. In 1842, the employment of women and children in underground work was forbidden. By the famous Ten Hours Act of 1847, and its supplement in 1850, the labour of women and children was restricted to ten hours a day. Since the

labour of women and children could not be shortened without closing the mills where they were employed, the Ten Hours Bill practically applied to men also, and ten hours a day thus became the general rule for factories. It is impossible to give here even a brief synopsis of the most important of the long list of factory and restrictive acts which have been passed within living memory.

After the breach was once made in the solid ranks of the individualists, and the desirability of collective action became apparent, act after act was passed curtailing the sphere of individual enterprise, and subjecting private gain to the welfare of society at large. The problems of municipalisation and nationalisation are now on, and the tendency is obviously toward public control of the means of life. The battle has been long and hard, and even now only the first redoubts are in possession of the people. The power is theirs, however, but they will progress only so far as their intelligence and character will permit. The future is in the hands of the people, and, as Mrs. Besant says: "Humanity will not break down. The faith which is built on it is faith founded on a rock. Under healthier and happier conditions, humanity will rise to heights undreamed of now; and the most exquisite Utopias, as sung by the poet and idealist, shall, to our children, seem but dim and broken lights compared with their perfect day. All that we need are courage, prudence, and faith—faith, above all, which dares to believe that justice and love are not impossible, and that more than the best that man can dream of shall one day be realised by men."

Sec. 7.—Mutual Aid. Along with the struggle for the factory acts there was developing among the workers a sense of the power and desirability of unity. The

Political Economists who regarded society as composed of a group of independent and warring units did not long occupy the fortress of knowledge unassailed. Owen, Carlyle, Maurice, Kingsley, Ruskin—the humanitarians—impeached in eloquent, if not always logical, English the old assumptions. The position of the assailants is summed up in Kingsley's pungent words: "The man who tells us that we ought to investigate Nature simply to sit still patiently under her, and let her freeze, and ruin, and starve, and stink us to death, is a goose, whether he calls himself a chemist or a political economist." Though it was some time before the idea of corporate humanity determining its own mode of life found expression in the works of the learned, the people instinctively sought protection in mutual aid, and on every hand there sprang up organisations having for their purposes the amelioration of the conditions of their members.

Sec. 8.—Trade Unionism. As has been pointed out, in the eighteenth century there were no well-defined classes of employers and employed. The skilled and industrious artisan, by reason of the small capital required in manufacture, could rise in time to the position of a master workman. When the Industrial Revolution made capital and machinery relatively more important than labour, there was developed a large class of workers doomed by necessity to remain employés all their lives. The mediæval guild regulations were without avail, and in the chaos of the beginning of the new order there were no generally recognised principles of organisation. The workers were not only compelled to accept the bondage, with its shocking conditions as to hours and wages, but they were also forbidden to combine for

mutual assistance and for the defence of a standard of life. In addition to the law of settlement which, though intended for paupers, actually prevented labourers from going from one parish to another in search of work, in 1799 and 1800 acts were passed definitely forbidding workmen to combine for the purpose of securing better conditions. Agitation carried on by Francis Place, assisted by Joseph Hume and J. R. Mulloch, succeeded in forcing a repeal of the restrictive laws in 1824; but the strikes and disorders which followed frightened the Government, and Parliament passed an Act rendering illegal any action arising from the deliberations of the Unions. It is impossible to trace here the growth and vicissitudes of the movement during the Chartist and Corn Law agitation. It was not, however, until 1871-76 that unions were placed on a legal basis. At first Trade Unionism accepted competition, made few appeals to Parliament, and contented itself with collective, in place of individual, bargaining with employers. Within recent years, however, there has been a decided change in the attitude of the Unions towards legislative interference. Having within their ranks not one-fifth of the workers, they are beginning to recognise their own weakness in dealing with vast combinations of capital, while an outside army of unemployed is clamouring for work. The Trade Union Congresses are now appealing to Parliament for assistance in maintaining a standard of life.

Sec. 9.—The Co-operative Movement. Unlike Trade Unionism, Co-operation grew out of a denial of the justice, righteousness, and desirability of the competitive system and its profit-making foundation. Trade Unions accept private capital, competition, and the profit-

making system, and seek by raising certain standards of life to protect the worker from the destructive workings of the industrial order. Co-operation in theory seeks to eliminate profits, and to free the worker from dependence upon capitalists and middlemen. Though the early co-operative movement, with its four or five hundred stores, had collapsed in 1833-34, the second movement, which began at Rochdale in 1844, certainly grew out of the teachings of Robert Owen. The Rochdale Pioneers included in their designs the establishment of a store for the sale of food, clothing, etc., the provision of houses for members, manufacture of certain articles, employment of the unemployed and under-paid in manufacture and agriculture, and the arrangement of the powers of production, distribution, education, and government. The movement grew rapidly. In seven years there were 130 stores; in 1865, the Co-operative Wholesale Society was formed; and in 1897 there were 1,822 stores, with 1,512,128 members, a total capital of £22,984,825, with sales amounting to £59,881,039, and with net profits of more than £6,000,000. Many of the Co-operators are progressive, and if the younger generation shall adhere to the principles of the pioneers, and not become satisfied with large sales and dividends, they can wield an inestimable influence in shaping the destiny of the nation to higher ends. In the words of Mrs. Sidney Webb: "Before we can have a fully developed democracy, the nation at large must possess those moral characteristics which have enabled Co-operators to introduce democratic self-government into a certain portion of the industry, commerce, and finance of the nation. It is, therefore, as moral reformers that Co-operators pre-eminently deserve the place in the

vanguard of human progress. While completing and extending their domain to its furthestmost limits, co-operators should deliberately introduce their methods and experience into the administration of the parish, the municipality, the county, and the State; thus fulfilling, by the sure but slow progress of democratic self-government, Robert Owen's co-operative system of industry."

There are many obvious limits to the complete extension of voluntary co-operation. The very poor, with low wages and uncertain employment, the thousands of small shopkeepers and private traders, and the idle, luxury-consuming rich are entirely out of reach. In fact, the Co-operative Movement is yet far from Robert Owen's ideal of an independent, self-sustaining organisation, for at present it stands or falls with the competitive world from which its members draw their wages. The principles of co-operation are right and just; but the work is scarcely begun.

The co-partnership movement, without denying competition and profit-making, seeks to secure a more equitable division of earnings between capital and labour. It includes profit-sharing, bonus paying, and other similar industrial organisations.

The Co-operative Union, a federation of various co-operative concerns, is a protective and educational "institution charged with the duty of keeping alive and diffusing a knowledge of the principles which form the life of the Co-operative Movement."

Sec. 10.—Conclusion. The brief summary in this chapter cannot be called even an epitome of the constructive social tendencies of the wonderful nineteenth century. It only indicates here and there the larger lines of

development in which the spirit of the time has found expression. It has been the aim throughout to lead the student out into the wider fields of study, wherein he can acquire for himself that knowledge which will give him the power to deal intelligently with the problems of the new century. Volumes have been written on the various subjects which bear directly upon the problems of life and labour. The growth of education in all its forms; the results of investigations in the different branches of science; the further developments in industry; the growth of general intelligence; the reform movements in their diverse aims and methods—these and many other subjects must be studied before one can hope to get a true perspective of the most marvellous century in all the history of man. No one more than the writer realises the fragmentary character of this chapter. The materials for investigation are voluminous, and the problems presented are infinitely complex; but out of the tangled mesh of human affairs three main threads may be drawn: (1) the revolt against the terrible conditions of labour and the *laissez faire* policy; (2) the rise of democracy in England; and (3) the growing consciousness among the people of their power to control their own conditions. These generalisations furnish a rude sketch, which will enable the student to see the relations among the various parts of the larger whole as he works them out for himself in his broader studies.

CHAPTER V

THE INDUSTRIAL PROBLEM FROM THE STANDPOINT OF MECHANICS AND SOCIAL NEEDS

Sec. 1.—Developments and Confusion. We have now traced briefly the main lines of the political and industrial evolution which has changed mediæval into modern England. We have indicated in part the marvellous mechanical and scientific progress which has led men to call this "The Wonderful Century," and we have summarised the developments in democratic association through which the people have sought to establish and maintain certain standards of life and labour, freed from the variable vicissitudes of fluctuating markets. Amid the apparent confusion of industry, mechanics, science, and politics, there is, however, a unity of tendency—the progressive control of man over his environment. The central theme of history is that development political, religious, scientific, and industrial, which has led the human race away from primitive life, in which man was a prey to priestcraft, feudal tyrants, and warring elements, to modern times, in which man is beginning to assert his right and power to determine his own religion and politics, and corporately to control every form of his material environment. In this little book we have necessarily been limited to a synoptic epitome. We have left almost untouched developments in biology and physiology,

with their practical value to man; chemistry in its multifold relations to manufacture, agriculture, sanitation, and health; surgery and medicine; criminology and the scientific treatment of the criminal and insane; metallurgy and mining, and appliances for securing safety to underground workers; electricity in its diversified uses for lighting, heating, transmission of power, telegraphing and telephoning, and innumerable other purposes; sanitation, treatment and utilisation of sewage, control of disease, tunnelling and bridge construction; and various other branches of industry. In short, science has pointed out the way by which space, darkness, flood, famines, and pestilence may be annihilated.

On the other hand, we have scarcely taken account of the socialising forces that have come with the new age, working to give to the people the knowledge, experience, character, and power which will enable them to deal intelligently with the complex problems of the new century. The past one hundred years have witnessed the development of schools for technical and manual training, and for a study of all the arts; co-operation, trade unionism, friendly and temperance society movements; the cheap press supplying books, papers, and magazines to the masses; the telegraph, telephone, and penny postage, cheap travel, and educational movements—all furnishing means which, if rightly directed, must increase the social capacities of individuals. This revolution in every branch of activity has taken place so suddenly, the results of scientific investigation have reached us so pell-mell, differentiation and specialisation have gone on so rapidly, that we find ourselves to-day in a new world in which old landmarks have been submerged, the significance of

which our philosophers and teachers have not yet fully understood, and to the conditions of which the people, from want of knowledge and experience, have been unable to adapt themselves. The immediate effect of the rise of the factory system was the congregation of vast numbers of workers together in manufacturing cities. In the North of England the change was most noticeable. The rich and populous South lost its importance when measured against the great cities that sprang up in the North like magic, and which became centres for the radical agitation of later years. The railways, telegraph, postal system, and daily press broke down narrow isolated provincialism, and paved the way for larger social and political activity. International commerce increased, and while forming the theme for many disputes, was also fraught with no little meaning to international understanding. Individualism and nationalism alike suffered from the development of international commerce, consequent upon the great revolution in transportation and intercommunication. The interdependence of all parts of the world is aptly shown by Herbert Spencer in his "Study of Sociology": "Everyone who watches closely the course of things must have observed also that at a single meal he may take in bread made from Russian wheat, beef from Scotland, potatoes from the Midland counties, sugar from the Mauritius, salt from Cheshire, pepper from Jamaica, curry powder from India, wine from France or Germany, currants from Greece, oranges from Spain, as well as various spices and condiments from other places." Of course, international commerce is as old as history, but its unprecedented development in the last hundred and fifty years has eclipsed all the past.

This increasing intercommunication of all parts of the world is a patent fact, and the complexity of the problems arising therefrom is the stumbling-block of the modern economists. Isolated districts have been thus brought into close relation with each other, and enabled to dispose of their surplus products. Men of every nationality mingle in the streets, markets, and homes of every great city. The cosmopolitan spirit is thus being developed, and narrow provincial traditions broken. Man's horizon of thought is thus broadened, and petty prejudices overthrown by contact with men of all shades of religious and racial character.

Despite the natural tendency with which man clings to age-long customs, and despite his dislike for novelty and violent changes, he is compelled to look upon the passing of the old order and the coming of the new. The ancient codes have been so rudely shaken, and the beginnings of the new system are as yet so chaotic and scattered, that at present we find little unity in diversity. Like giants struggling in the darkness primeval, the various organisations of society are warring with each other, entangled in the old and half conscious of the new.

Sec. 2.—Confusion in Economics. If we turn to any classic work on Political Economy, we shall find chapters on wealth, capital, rents, interest, value, production, distribution, consumption, and international trade; but nowhere an attempted statement of the industrial problem or a suggestion of what ought to be, or how to attain it. Though we have volumes on individual morality, charity, and temperance, the learned apparently have not yet discovered that above and beyond the problems of individual development and

salvation there is the larger social problem, which can only be approached through collective action. The works of Comte, Mill, Darwin, and Spencer demonstrated the organic nature of society. It is generally recognised that society is more than a mere aggregate of individuals; that the individual is not only a sharer in the life of the organism, but is also capable of modifying by his inter-social activities its structure, function, and lines of development. But the organic end to be attained, and the methods of adaptation to be followed in reaching it, have received little or no scientific attention. The individual to-day who is conscientiously seeking guidance by which he may shape his social actions will hunt in vain in the massive volumes and myriad monographs which belong to the body of Literature known as Political Economy.

Without reproaching writers for confining their efforts to attempted statements of what really is, one cannot help wishing that they would use their acquired knowledge and the mass of materials, which they have collected, in an endeavour to analyse present conditions, and to state clearly the industrial problem, regardless of class privileges, vested interests, and political scruples, and to show us "what ought to be," and how we can build on "what is" to attain it. But men who should speak are silent, and the serious student turns from their works in disappointment, to find himself confronted with thousands of penny pamphlets on Socialism, Liberalism, Toryism, Vegetarianism, Land Nationalisation, Municipalisation, Temperance, Foreign Missions, Salvation Army, Penal Reforms, Theosophy, Charity Organisation, and the like—all professing with more or less courage to settle the question, or, at least, some

important phase of it. In the midst of such apparent confusion, the seeker after knowledge is overwhelmed, and seeing that the bases of various reform movements are often diametrically opposed, is tempted to give up the problem as a thing too complex to be even approached, naturally deeming social agitation to be "much cry and little wool."

Sec. 3.—Common Ground. The condition of social health is undoubtedly a subject to which our highest intelligence and our clearest judgment should be devoted. For the most part, however, the learned who are not spending their energies in useful, scientific, and critical investigation are busy waging war against ancient devils, fog giants, metaphysical dragons, and especially in drawing salaries from fat livings. Some are content with declaring that there is no social problem and others hold that there is no criterion for social health, while many persons who attempt to state the industrial problem, start out with metaphysical or theological assumptions which, however true they may appear to some minds, do not find common acceptance. Certainly there is a vast deal of sound logic in the old Catholic argument: "Where there is difference of opinion, there is doubt; where there is doubt, there is no certainty; and where there is no certainty, there is no revelation." Since the metaphysical and theological world is so hopelessly divided, it is apparent to all that no common religious basis for a statement of the social problem could be found, even if it were necessary or desirable. Fortunately, we are not compelled to trench upon the theological ground. We merely use common sense, which implies a common ground. In the first place, here we are in the world, physical beings, and we

want and must have food, clothing, shelter, health, and freedom from pain, misery, and intense, wearing anxiety. (2) Whatever may be the arguments about materialism or spiritualism, all must agree that man has capacities for love, joy, admiration, virtue, and potentialities for conquest, achievement, service. The first task is to produce and distribute the necessaries of life under the best conditions, and with the least possible expenditure of energy, and to secure for each man the material means needful to a healthy, normal life. The second task is to give each individual the opportunity to enrich and expand his heart and head, so that he may fulfil his utmost possibilities in some work serviceable to himself and society.

Sec. 4.—Man. Man secures the material means of life by expending energy upon the physical elements. This energy may be human or extra-human. The problem, so far as man is concerned, is one of health and physical development, and there are many needs involved: (1) pure, wholesome food in proper quantities; (2) healthful homes and environment, gardens, etc., clean, invigorating, and conducive to moral and physical well-being; (3) careful attention to the laws of health and care of the body, diet, exercise, and sleep; (4) public sanitary works of the most effective character; (5) elimination of disease; (6) cure or elimination of the criminal and vicious; (7) prevention of child-breeding among those chronically affected in body or mind; (8) conscientious attention to the rearing of children; (9) education of hand and brain to make the individual strong, healthy, and capable of doing useful productive service. Careful attention to these problems will not only help to make healthier, happier human beings, but will also

be conducive to making man a more efficient productive animal, with increasing capacity for satisfying his mere physical needs, with decreasing expenditure of energy. A simple fact illustrates the desirability of physical improvement. A strong man may do in a given time twice as much work as a weak man, feel less fatigue, and, in fact, experience physical satisfaction. It is hardly necessary here to refute the old ascetic idea which is still found in grotesque and inconsistent forms, that earth should be turned into a hell in order that man may inherit a paradise elsewhere. If a stick gets into the eye of any rational man, he will not think it a curse of God, but a natural accident, and pull it out immediately ; or, if seriously wounded, he will at once call a skilful surgeon. The certain fact is that man has a laudable, healthy instinct which prompts him, under normal conditions, to avoid all pain and misery, all silly platitudes to the contrary notwithstanding. The real aim of social and industrial organisation ought to be the production of strong, healthy men and women, capable of playing and working with the least pain and the greatest joy.

Sec. 5.—Agriculture. In the higher development of agriculture we must (1) save energy by utilising machinery in tilling the soil ; (2) reclaim waste land by irrigation and drainage ; (3) fertilise and render productive areas now sterile ; (4) improve the quality and increase the quantity of grain by continuous selection of seeds. Among the fertilisers, compounds of nitrogen occupy a most important place, and it has long been a question how to secure cheaply an abundance of this chemical. " Our atmosphere," says Tesla, " contains an inexhaustible amount of nitrogen, and could we but

oxidise it and produce these compounds, an incalculable benefit for mankind would follow." This electrical magician has wrestled with the problem for some time, and has now demonstrated that certain kinds of electric currents produce chemical action, and that the combustion of nitrogen in such quantities as to be valuable is possible if the proper electric current can be produced. He has also succeeded in producing the required current, and, to use his own words: "The result illustrated makes it practicable to oxidise atmospheric nitrogen in unlimited quantities, merely by the use of cheap mechanical power and simple electric apparatus. In this manner many compounds of nitrogen may be manufactured all over the world at a small cost, and in any desired amount, and by means of these compounds the soil can be fertilised, and its productiveness increased indefinitely. An abundance of cheap healthful food, not artificial, but such as we are accustomed to, may thus be obtained." This is only illustrative of what science can and will do to increase the productivity of the soil. The continuous selection of the best seeds, combined with scientific fertilisation and intensive tillage, will no doubt work wonders in food production during the coming years.

Sec. 6.—Mechanics. Nearly all the things in daily use are made by machines driven by power, or are an expression of power in some form or other. Let me illustrate this by a chapter out of the life of a printer in Chicago. He lived in a house which was in every particular an expression of power—power-made bricks, power-made glass and wood finishings. He woke in the morning, took his bath in a power-made tub, with water drawn from the city water-works; dressed him-

self in power-made clothes ; ate a breakfast of food-stuffs collected by steam and electricity from the corners of the earth ; rode down to his business in an electric tram ; went up to work in an elevator, and fed a power-driven printing press. Whatever may have been the usefulness of the labour performed, it is certain that a vast expenditure of human energy was saved by the use of extra-human energy. From a mechanical standpoint, the industrial problem is how to extend the use of mechanical appliances and natural forces to take the place of muscular energy in the performance of the world's drudgery. The forms of natural energy now available are water-falls, wind, tide, heat of the earth, sun's energy, coal, wood, petroleum, gas, electricity of the earth, and the like. The amount of power which can be utilised is so enormous that figures can give no adequate conception of it. The amount available at the water-falls of the world has not been carefully estimated, but no doubt it would reach into the hundreds of millions of horse-power. It is, however, computed that at Niagara alone 1,500,000 tons of water, or 340,000,000 gallons, are discharged per minute into an abyss one hundred and seventy-five feet deep, and the force is estimated at 16,000,000 horse-power, which is equal to the energy contained in the world's daily output of coal. There is on foot now a plan to utilise 600,000 horse-power on the Kaministiquia River, near Lake Superior. Statistics are not yet compiled on the amount of wind and tide-power utilised and available. However, to quote Tesla again : " Contrary to popular belief, the power obtainable from the wind is very considerable. Many a deluded inventor has spent years of his life in endeavouring to ' harness the tides,' and some

have even proposed to compress air, by tide or wave-power, for supplying energy, never understanding the signs of the old windmill on the hill, as it sorrowfully waved its arms, and bade them stop. The fact is, that a wave or tide-motor would have, as a rule, but a small chance of competing commercially with the windmill, which is by far the better machine, allowing a greater amount of energy to be obtained in a simpler way." The difficulty in the way of using wind-power is its intermittent character, and the cost of storage of energy.

Though heavy drafts are constantly being made on the coal beds of the world, there are millions of tons left in the earth which, according to Thurston's estimate, if used for power alone, would supply fifteen billion horse-power for 12,000 years. The power in petroleum, natural gas, and wood, has not, to my knowledge, been estimated, but it is certainly enormous. If we could utilise directly the energy of the sun's rays beating upon the surface of the earth, we could get, according to Tesla, a maximum rate of 4,000,000 horse-power per square mile, though of course the intermittent character of sunshine would reduce the power to a very small fraction of the maximum; but even then, if we could invent some economical way of utilising it, it would be enormous. This scientist has set forth plans for the utilisation of the heat of the interior of the earth, and the electric forces of land and air; but of these possibilities we have no real knowledge. Thus it is evident that man need not want for power to do the heavy work of the world. Not only is there plenty of energy available, but there is also a vast amount to be saved by the use of waste products and more efficient machinery in our power plants. No doubt there are

vast forces of which we at present know nothing constantly going to waste. It has only been in recent years that the gas-engine has made possible the economic use of the gas from blast furnaces. At the present time there have been experiments in Scotland, France, and Belgium, which warrant the assertion that efficient power can be obtained from this by-product of iron manufacture. It is estimated that in the United States 2,000,000 horse-power are constantly available, and that the cost of "utilisation plant, with thirty miles of transmission wiring, would only be £12 per electrical horse-power." This is only illustrative of what may be done when our minds grow more analytical and our scientific imagination is fostered and trained. The waste of by-products is not to be compared with that caused by crude machines, notably the steam-engine. According to Professor Thurston, the average steam-engine utilises only one pound in ten, and often but one in twenty, wasting from ninety to ninety-five per cent. of all the heat of its furnaces. Yet this is the crude, wasteful machine we use to transform the energy of the coal into other forms of energy. There is also enormous waste in producing electricity by the present improved turbine. On the River Adda, a tributary of the Po, there is a water-power plant for the production of electricity for the city of Milan, twenty miles distant, and according to scientific estimates, out of 17,300 horse-power delivered to the turbines by water pressure, 13,000 horse-power is yielded electrically—a loss of 4,300 horse-power. Experiments have been made in the Cornell University laboratory, which show that in the production of incandescent electric light, the waste is from $93\frac{1}{2}$ to $99\frac{1}{2}$ per cent., while the waste of the arc

light is from 84 to 95 per cent. According to Professor Langley, the common gas burner wastes 99 per cent. of "the developed energy of combustion." What, then, are the problems for scientists, inventors, teachers, and those who wish to render some service to humanity by lessening the expenditure of energy required to produce the necessaries of life?

(1) To fertilise and utilise the waste places of the earth; to render them more and more productive; and to use more and more natural forces in place of human energy in agriculture.

(2) To invent machines for utilising waste forces—wind, tide, water-falls, sun's heat, and the like.

(3) To invent or discover economical processes for the transmission of power, with or without wires, to the various portions of the earth where power is most needed.

(4) To invent machines to apply this power in doing the rough and over-wearying toil which is now performed by human labour.

(5) To improve our present power-wasting machines.

I am, however, no advocate of idleness. It would indeed be a sad misfortune if man were released from the necessity of work and struggle, for it is a well-known fact that organs which do *not function atrophy*; and according to the old saying, "idleness is the devil's workshop." As a matter of fact, there is no danger of machinery doing away with the necessity of work. Natural forces must be made to do the rough and wearying work, and that which requires regularity of motion, exactness in action, and perfection in adjustment; while the work which refines and beautifies life, and develops clean, healthy, strong bodies, that which

requires the subtle taste, cunning and genius of the human brain, shall fall to the lot of man. It must not be thought that the work of the future will be only brain work, designing and the like. Indeed, technical, manual, and arts training must go on side by side; for this alone, as Kropotkin has well shown, will develop and maintain inventive genius, the hope of the future extension of the powers of man.

Sec. 7.—Organisation of Industry. There is, however, at present, within the reach of every humble citizen of this democracy, a work essentially and fundamentally the same as that of the inventor. Every citizen is a part of the social organism, capable, according to his knowledge and effort, of modifying its structure and changing its varied functions. As stated at the outset, the problem is one of energy, and all energy is in reality the same, whether it be muscular activity or expanding steam. In dealing with social economy, we are confronted with this question: Does the present order of society enable its members to satisfy their needs with the least expenditure of energy, and to devote the largest possible amount to making the earth a place beautiful, healthful, and happy? Here it is necessary to point out the fact that the organisation of industry which obtains to-day is fundamentally different from that of the Middle Ages, and even from that of the beginning of the eighteenth century, when communities and nations were largely self-sufficing, and there was little specialisation in industrial functions.

In primitive society man produced directly for the satisfaction of his own wants, but with the development of society came differentiation of function, exchange and barter arose, various trades sprang up, and with the

necessity of commercial intercourse came the invention of money. In England, money had, for the most part, superseded barter by the close of the fourteenth century. "At first," says Cunningham, "the substitution of payments in money for payments in kind made no difference in the recognised methods of calculating the amount that was due; there was a customary standard of what was fair, which was reflected in a customary price. The intervention of money brought with it a possibility of close bargaining, of which either the buyer or seller was anxious to take advantage." The old idea of barter which was based upon the close calculation of the value of commodities in relation to the needs of the participants in the trade passed away, and in its place came the idea of exchanging for increase in terms of money, and the struggle for profit making. The Industrial Revolution, with its rise of capitalism and wage earning, completed the demolition of the old plan of producing almost directly for the satisfaction of needs, and substituted production for wages and profits, or for the indirect satisfaction of wants. As Spencer shows, each new specialisation in industry arises from a desire on the part of an individual or group of individuals to exploit the remainder of society for profit. While, with Mrs. Bosanquet, we must recognise the value of this as a stimulus to inventive genius in the past, we must not fail to take into consideration the enormous evils it has brought in its train. It has set up money as a goal for employers and employed, and perverted and distorted the whole end and aim of our industrial organisation, by establishing false standards of value. This makes it necessary for the student who wishes to get at the

basis of the problem to distinguish between value in relation to price on the markets, and value in relation to human needs. A waggon-load of rose-wood dog coffins may embody as much labour and sell for as much on the open market as a waggon-load of wheat; while in terms of normal life the former is more than worthless. The value on the market is not determined by "the life-sustaining properties of anything which is neither dependent upon other things nor upon the opinions which people form about it," but by the extent of desire and the ability of a certain class of people to pay. This desire has generally arisen from no examination or understanding of needs, but from queer mixtures of conceit, cravings, vanity, gluttony, vulgar and ridiculous foppery, stupid subserviency to antique delusions, and fear of the gossip of idle tongues. Those workers engaged in producing and shipping celluloid cuffs to African negroes for ankle wear, and receiving in return diamonds to glitter in the tiaras of fashionable women, are as surely non-producers as the idle rich who while away their hours with charity balls and roulette. The manufacture of useless luxuries is socially—hence morally—wrong, as long as millions suffer from improper food, clothing, dwellings, and long hours of labour. There is no excuse for it now, either theological or economic.

This brings us to the final issue—the nature of wealth. There are as many definitions of this term as there are writers on Political Economy. Professor Marshall's definition is a wary evasion of the question. He does not tell us what wealth is; but says: "All wealth consists of things that satisfy wants, directly or indirectly. All wealth, therefore, consists of goods; but

not all goods are reckoned as wealth." The goods not reckoned as wealth he does not mention, nor even characterise. As we cannot deal with the question of waste in production and distribution without a standpoint, it is necessary that we should arbitrarily establish one. Spencer and Ruskin, who, bitterly opposed as individuals, strangely enough agree on fundamentals, have suggested the basis for a definition of wealth. The former, in his "Study of Sociology," says: "Scarcely any decrease is observable in the fallacy that whatever gives employment is beneficial, no regard being had to the value for ulterior purposes of that which the labour produces; no question being asked about what would have resulted had the capital which paid for the labour taken some other channel and paid for some other labour."

According to Ruskin: "To be valuable is to avail towards life. A truly valuable thing is that which leads to life with its whole strength. In proportion as it does not lead to life or as its strength is broken, it is less valuable; as it leads away from life, it is invaluable or malignant." It is apparent to all that joy, success in life, and personal achievement cannot be measured by money. However, in defining wealth for use hereafter, for the sake of convenience, I shall say that wealth consists of all natural products secured, re-shaped, and transported so as to be capable of satisfying healthful, normal, human wants. Here I have used two indefinite words, "healthful" and "normal." By healthful, I mean according to the laws of Physiology; by normal I mean those wants the satisfaction of which gives intellectual and physical enjoyment without causing pain to others or a diminution in their enjoyment, and

which leads to a strengthening of the powers mental, physical, and moral, of the individual satisfied. We assume those forms of law and order which make it possible to have regular and secure satisfaction of normal, healthful wants.

Energy spent in anything but wealth-producing is waste. It is no argument to say that labour keeps men busy and moral, and hence produces wealth. This might be true if there were not useful work for every human hand and brain. Examples of waste and weakness in our industrial organisation are too numerous to mention; but here are a few: (1) Two or more railway stations of competing lines close together, while one would suffice; (2) competing steamships crossing the ocean half full of passengers; (3) printing and advertising beyond that which is necessary to inform consumers concerning centres of distribution; (4) travelling men, soliciting trade for competitive firms; (5) competing railway lines beyond what is absolutely necessary to carry passengers; (6) fruit, fish, etc., allowed to spoil, or thrown away to avoid low prices; (7) business travelling in a large measure; (8) unnecessary transportation of commodities which can be produced locally as cheaply as anywhere else, save for tributes to non-producers in the shape of rents, etc.; (9) private heating, cooking, and laundrying; (10) clothes worn out doing non-serviceable work; (11) non-health-producing things, such as tobacco and whisky to a certain extent; (12) growing crops of wheat, etc., in small fields where machinery cannot be used with profit; (13) use of woman and child labour because competition renders it cheaper than machinery; (14) filthy, little shops stuck in every corner to do

the work that a few large centres could do much better ; (15) doctors of medicine, financially more interested in having cases than in curing or preventing disease, for its disappearance endangers their livelihood ; (16) lawyers more interested in getting fees for law-suits and service than in simplifying law or making it accessible to laymen ; (17) the pressure for a living, making people struggle to preserve institutions which are useless, and do work which is non-productive ; (18) production of ugly and useless things for foolish people ; (19) millions of unoccupied and non-producers, not only adding nothing useful to the world, but perverting themselves and their offspring by idleness and its attendant follies. Thus it is evident that our present industrial organisation is faulty, just as the crude steam-engine is because it wastes energy. The charge of inefficiency, weakness, and crudity made against the present order need not be based upon sentiment about rich and poor or class jealousy, but upon mathematical calculations which can be made as soon as statistical departments turn their attention to the problem.

Sec. 8.—Conclusion. It is clear to any unprejudiced mind that a reorganisation of industry is both necessary and desirable, not that one class may benefit at the expense of another, but that the energy and wealth wasted in an irrational system may be saved to humanity, and that the bare struggle for a living may not occupy the best hours of the workers' lives. There is yet remaining the problem of individual development, which must find its solution in the reorganisation of our educational system on the basis of social need and morality. Education from the lowest to the highest form must have for its object the training of the individual, so that

in seeking the fullest satisfaction of his own nature he will harmoniously perform his function as a member of a corporate society. The desire for achievement must not be crushed, but its goal elevated to social service. Human nature must not be made weak and insipid, but trained so that it may find its expression in useful, and not mere money-making, activity. In short, physical and social health must be made the basis of education.

THE END

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