

second assumption is utterly monstrous and inconceivable. As we have before shown at p. 3, "all the wealth obtained or produced by human exertions is actually distributed and used."

Machinery (using the term generically for all labour-saving processes) is then a powerful co-efficient to wealth-creation. All honour to those true benefactors of mankind whose scientific discoveries and mechanical inventions have supplemented man's physical weakness, and have added immensely to his power over the material world—who have pressed nature into the service of man, and have placed her forces as instruments in his hands!

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#### CHAPTER IV.

Facilities of Inter-communication Promote the Creation of Wealth—  
Scientific Discoveries Lessen the Expenditure of Human Labour  
on the Production of Given Results, and Largely Increase the  
Ultimate Demand for Labour.

A 5. FACILITIES OF INTER-COMMUNICATION.—  
Until the progress of navigation had led to the discovery of America, the inhabitants of the Eastern and Western Hemispheres were as much cut off from all knowledge of and intercourse with each other as though they existed in two different planets. If it be admitted that Columbus has by his achievement benefited the world (though at the cost of partial cruelty and injustice), the admission is tantamount to asserting that the isolation of one part of the globe from the other is an

evil. The opinion of mankind (excepting, perhaps, of the Chinese and, until recently, the Japanese) has been in conformity with that conclusion, and the general principle may, without further discussion, be taken as conceded.

Our business here, however, is specially to point out in what ways the creation of wealth is promoted by "facilities of inter-communication." One of the most efficient modes in which these facilities act towards that end is by fostering, assisting, and extending the operations of that great contributor to wealth-creation, the division of labour. The full beneficial effects of those operations cannot be realised if the means of conveying the cheaper and better productions of one country to be bartered for the cheaper and better productions of another country, be slow, cumbrous, and expensive. There will be nothing gained if the advantages of such barter be absorbed and neutralised by the difficulties or dearness of inter-communication. Were it not for rapid transit and low freights, cotton from America or wool from Australia could never have come to England to be wrought into fabrics by English labour and machinery, and to be re-exported in that shape to all parts of the world. The superior cheapness of the manufacture would be overborne and outweighed by the extra cost of dear conveyance. In countries where there are no roads, or few and bad roads, intercourse is restricted, the benefits of division of labour are hardly felt, and general poverty prevails. The principle (subdivision of labour) works at its maximum rate in densely populated

and freely accessible districts, and in large cities. It is there that the classification of labour into distinct tasks is carried farthest, that its organisation is most complete, that competition most pressing sharpens invention, that capital obtaining quick returns is satisfied with the smallest profits, and that copiously supplied markets furnish commodities in every possible variety, and at prices nearest to cost of production.

On the other hand, among a sparse and scattered population, with scanty means of inter-communication, the very contrary takes place. Labour instead of being subdivided is cumulated, and one man works clumsily at several trades; there are no opportunities for organisation, so that each hamlet or family moves in its own little orbit; there is very little competition and no invention, for who could utilise the invention, and where is the incentive? In short, the working of division of labour is at its minimum. But introduce among this loose and isolated population facilities of inter-communication, and it will be like breathing life into so many marble statues. Give them the use of roads, canals, railways, ships, telegraphs, and telephones, and this torpid population will gradually develop into action and vigour. The movement, slow at first, will acquire momentum. Emulation will be aroused, and will beget competition, which is the mother of energy and invention, skilled and special will be substituted for rude and miscellaneous labour; or, in other words, the division of labour will again be at its beneficent work, and the whole aspect of things will be changed.

What the inertness of solid ice is to running water, such is the quiescence of stagnant isolation to the activity of easy and rapid intercourse.

In another and a more direct way do "facilities of inter-communication" also promote the creation of wealth—they make those productions useful, and therefore of value, which, being otherwise out of the reach of consumers, would be unused, and therefore of no value. Let us, for an exemplification of this, take the case of Minnesota, one of the United States of America, in contrast with Tamboff, one of the most fertile provinces of Russia in Europe. Both are blessed with a soil and a climate exceptionally favourable to wheat-cultivation, viz., a deep alluvial mould and a clear sunny sky. In no other part of the world are cereals raised in greater luxuriance, and with a smaller expenditure of capital and labour. Both produce wheat in very great excess of home consumption; and both are, unfortunately, situated at a very great distance from a shipping port on the seaboard, through which their surplus produce might find a vent in the outer world.

But here the parallelism between the two ceases. The surplus produce of Minnesota is all utilised abroad, and therefore constitutes wealth. The surplus produce of Tamboff is not utilised abroad, but is wasted, and rots unconsumed at home, and therefore becomes not wealth, but "simply matter in the wrong place." The reasons of this contrast are not far to seek. The paternal and autocratic Government of Russia discourages private enterprise; the fraternal and democratic Government of

the United States gives it full scope. The energy and enterprise of free American citizens have extended their railway system to every part of their vast country where there are either passengers or goods to carry. By this time (1881) the total mileage over which their locomotives run is not far short of one hundred thousand miles. By means of these great "facilities of communication" the large surplus over home consumption of wheat grown in Minnesota is conveyed, rapidly and at a moderate cost, to a distant shipping port, and thus finds a remunerative market in Europe.

Now let us look at the other side. The distance between Minnesota and the Atlantic sea-board is five times greater than that between Tamboff and the Sea of Azov; but, nevertheless, the large surplus over home consumption of wheat grown in Tamboff is debarred from all access to a shipping port from want of communication, and can therefore find no market whatever. There are not only no railroads, but even no common roads that can be used for the conveyance of the grain; and what would be a mass of wealth if it could be transported to Taganrog, or any other port on the Sea of Azov, remains at home to be shovelled into a mound in the open field, for it is not worth even the expense of a shed. There the grain sprouts and decays, the upper stratum germinates into a sickly and ephemeral vitality, and the whole soon decomposes into a mere heap of manure. We have referred to this waste at p. 3 as an exceptional instance of undistributed wealth. And the reason of its non-distribution is the absence of "facilities for inter-

communication." This absence of such facilities is again strikingly illustrated in the case of those local famines in India, of periodical recurrence, which have been known to co-exist with superabundance of food in districts not very remote, but from which relief was debarred by the difficulties of inter-communication.

But rapidity and cheapness of locomotion, whether for men or goods, are not the only means by which facilities of communication promote the creation of wealth. Infinite is the variety of ways in which the use of the electric telegraph and of the telephone conduces to a saving of time and labour, both of which, being thus liberated, may be utilised for other wealth-creating purposes. The production of a given result by the smallest possible expenditure of human energies, leaves the more of those energies available for the attainment of other beneficial results.

A 6. SCIENTIFIC DISCOVERIES.—Every stage in the progress of the exact sciences has contributed to furnish man with fresh appliances for utilising the resources of nature, and, as a consequence, to increase his capacity for creating wealth. Each fresh scientific discovery furnishes him either with new objects on which, or new agencies by means of which, he may exercise his skill and ingenuity. The additional power which he thus acquires enables him to abridge his work by the substitution of short, cheap, secure, or decisive, for long, expensive, dangerous, or uncertain processes, and in several other ways to effect a considerable saving of labour and capital. The

inventors and improvers of machinery could have made but slow advance without the aid of scientific investigation and discovery. Indeed, in many cases the powers of discovery and of invention have been combined in the same individual. But even when they were not, their mission lay in the same direction. Science discovered, and invention applied the discovery to practical purposes. Sometimes a long period elapses between the discovery and its application, as was the case, for instance, with electricity. Franklin's reply to the question, "What is the use of electricity?" was another question, "What is the use of a baby?" And he was right; the baby grew and matured into telegraphy.

Although science has achieved so much, and has extended our knowledge of the laws of nature a long way beyond the bounds of what was once considered to be the "knowable," far from finding ourselves nearing such bounds, the horizon recedes as we advance, and our expectations of farther progress are livelier than ever. Each fresh discovery widens the field for investigation; and the more we conquer of Nature's secrets, the more eagerly and hopefully do we aspire to fresh conquests. There are still a vast number of things which we need to know, and of objects which we desire to accomplish; and just as during the last half-century progress has been more rapid than at any former epoch, so do we hope and anticipate that the advance of scientific discovery during the next fifty years may be proportionately accelerated. Who is there bold enough to prescribe limits to the possibilities that may result from scientific

investigations? One thing is certain: that each step forward will increase man's power over external nature, and will enable him to obtain larger results with smaller efforts.

But it is the exact sciences only that have exhibited this immense activity of progression. The mental sciences (metaphysics, psychology, &c.) have remained nearly stagnant, and in these Herbert Spencer is only a short way in advance of Aristotle. In the moral sciences, among which religion and politics exercise by far the most powerful direct influence over the welfare and destinies of man, some slight improvement is visible, but it is infinitesimal as compared with the rapid progressive movement of the exact sciences. In these, every step is a step forward—one discovery serves as a fulcrum wherewith to elicit another—and the ground once gained is never lost again. For instance, that electricity yields a powerful light with little heat is a fact so easily demonstrable, and so palpable to the senses of a common observer, that no one will be found to dispute it, and it will prove a recognised starting-point to other improvements, such as lighting mines without danger of explosion, &c. &c.

But it is otherwise with the mental and moral sciences. There is hardly a proposition in connection with these that is not contested by some one or other. Writer after writer on the subject partially assents to some things, and totally objects to others—to old he substitutes new definitions, which lead to fresh disputes—and at last he finds, in the strictures of others upon his own propositions

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a parallel to his own strictures upon the propositions of his predecessors. Meanwhile, new and old propositions, new and old definitions, and new and old conclusions, all get mixed up in inextricable confusion, and the result is chaos and inconclusiveness. All attempts to rear up a solid scientific structure must necessarily fail where there is dissension and discordance about the foundation-truths. The fact is that the mental and moral sciences have to deal with man and his ever-varying and erratic volition ; the exact sciences with matter and its fixed and constant properties. It is regrettable that no universally acknowledged standard of truth in politics, morals, &c., has yet been reached by means of the former class of sciences, but we must accept things as they are, and all we can do is to use the direct material benefits which the exact sciences confer on us for the purpose of indirectly promoting the moral and intellectual welfare of our race.

The operation of scientific discovery on the creation of wealth corresponds very nearly with that of machinery and other labour-saving processes. It similarly tends to increase the sum of human enjoyments, and, at the same time, to lessen the expenditure of human labour on the production of given results. By way of illustration, let us imagine that science should discover a cheap and easy method of supplying heat for the use of man, thus superseding the employment of coal, wood, and other fuel, and let us see what would follow.

1. There would be a demand for labour and

capital to work the new discovery. This, having supposed it to be "cheap and easy," might require, in order to produce a given quantity of heat, one-tenth, let us say, of the labour required to produce the same quantity of heat through the agency of coal.

2. The demand for coal would cease, and the coal-miners would be thrown out of employment.

3. Out of every hundred thousand of these miners, ten thousand might probably be re-absorbed as labourers on the new discovery. The other 90,000 would gradually find employment in other industries, for, as we have explained at p. 38, the fund out of which wages are paid would, even at the outset, remain the same, and if less of it were spent on one class of labour, more of it would be spent on other classes. The general demand for labour would be at least as great, and numerically as many workers would be employed—only, a little time would be required for the re-adjustment of the old supply to the new demand.

4. This displacement of workers from coal-mines to other fields of industry would no doubt be productive of inconvenience and even suffering to the 90,000 miners during the period of transition. But would the most zealous protectionist contend that the new discovery should be scouted, and its use prohibited, on account of the transient injury which its adoption would inflict on the coal-miners? If, indeed, the 90,000 displaced miners were permanently to remain without work and wages, and hence were left to perish in misery and starvation, that would be a catastrophe from which all men would recoil with horror. The erroneous impression

that such would truly be the result has led many honest and simple-minded persons to view with misgivings, if not with aversion and condemnation, most innovations and improvements; they not seeing their way to the avoidance of the catastrophe aforesaid. Their misgivings, however, do more honour to their hearts than to their heads. We, with feeling certainly not less sympathetic towards our fellow-men, know that the evil is exceptional and transient, while the benefit is universal and permanent, and that it would be a miserable weakness, not to say an unpardonable crime, to reject the latter in order to avoid the former. It is perfectly clear to all who reflect that the sum which would have been paid in wages to the 90,000 miners, and was not so paid, will, just the same, be expended in wages for labour in some other form; and that the general demand for labour which will re-absorb the 90,000 miners, will at once be at least as great as before, and eventually be much greater than before, although it may be for labour of a different kind. The only evil, therefore, that can result from the new discovery is the partial and temporary displacement of labour and capital.

5. Let us now look at the benefits which it confers. Through this cheap heat-supplying discovery, the labour of 10,000 men supplies the world with the same quantity of heat which it required 100,000 men to supply before; and, in addition, the world gains all the increased wealth which the labour of the 90,000 disengaged miners will now create by devoting that labour to the production of other commodities. This large addition to the store of

“such objects of human desire as are obtained or produced by human exertions” is all profit. It is the difference between what the same aggregate quantity of labour produced before and what it produces now. It is a gratuitous boon to mankind.

It may be objected by some that it is harsh and unjust to the working men to adopt processes that shall throw any of them out of work, that it is our duty to find them employment, not to deprive them of it, and that we ought thus to afford “protection to native industry.” The fallacy which underlies this argument against all improvement is simply this. It is therein assumed that the labour-sellers, who, whether by novel mechanical appliances, or by fresh scientific discoveries, or by changes in fashion, or by the repeal of protective duties, are once thrown out of work, are condemned to remain permanently unemployed, to cease to earn a living, and to become unproductive consumers evermore, until they die off in misery and destitution. Now no such thing ever does occur. Both experience and reason show the absurdity of such an assumption. The stage-coachmen, stablemen, ostlers, &c., who were “disestablished” by the railway system, did not perish as paupers, but found other channels for honest employment.

Year after year new processes to abridge labour are adopted in every branch of trade, which, provisionally, throw a certain number of men out of employment, but it is only for a short time that their labour is lost to themselves and to the community. It is soon shifted into another groove, and continues its contributions to the national store.

We trust that we have succeeded in demonstrating that the ultimate and permanent issue of all labour-saving improvements is largely to increase the general demand for labour. As we showed at page 32, "the whole of the earnings of fixed capital are, directly or indirectly, appropriated to the remuneration of labour, that is, to the payment of wages." Whatever portion of the wage-fund might not be wanted for the payment of one kind of labour will be expended on some other kind of labour. All that portion of wealth which is created by the capital and labour set free in consequence of new discoveries or of improved processes is so much added to the world's previous wealth, so much to the good, so much more to distribute towards the supply of man's wants.

Whenever masses of industrious workers have been permanently deprived of work, it has not been in consequence of improved processes creating the same amount of wealth with the employment of less labour. On the contrary, it has occurred when production, instead of being expanded, has been abridged, when mills, furnaces, and workshops stood idle, when capital, crippled by commercial failures, or paralysed by panic, had withdrawn from its co-operation with labour. Those are the circumstances under which labour-sellers are exposed to prolonged suffering. On the other hand, the happy days of active production and of general prosperity have usually been those immediately following the vigorous impulse to trade given by the adoption of some important discovery tending to save labour. Even the most antiquated advo-

cate for "protection to native industry" would ridicule and ignore a discovery that tended not to save but to increase the labour requisite to produce a given result! The very men who went about in 1776 breaking up machinery lived to see that same machinery generally adopted, and joyfully to find that four times as many men were employed at good wages on those machine-worked manufactures as when hand-labour alone was used.

It must not be said that we dwell too persistently on this point. The erroneous assumption that, by labour-saving processes or by cheaper production in other ways, labour is not only displaced but destroyed—that the labour-seller once thrown out of work remains for ever out of work, and ceases henceforth to be an agent of production,—is at the root of many economic fallacies, and cannot be too forcibly exposed.

To sum up, we must enrol scientific discoveries among the most powerful auxiliaries in the noble and beneficent work of wealth-creation.

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## CHAPTER V.

Education and Morality promote, and are promoted by, the Creation of Wealth—Erroneous Notions concerning the Virtues of Industry and Frugality.

A 7. EDUCATION AND MORALITY.—It will hardly be required of us to do much more than simply enunciate the following proposition, viz.: The universal diffusion of sound knowledge tends to