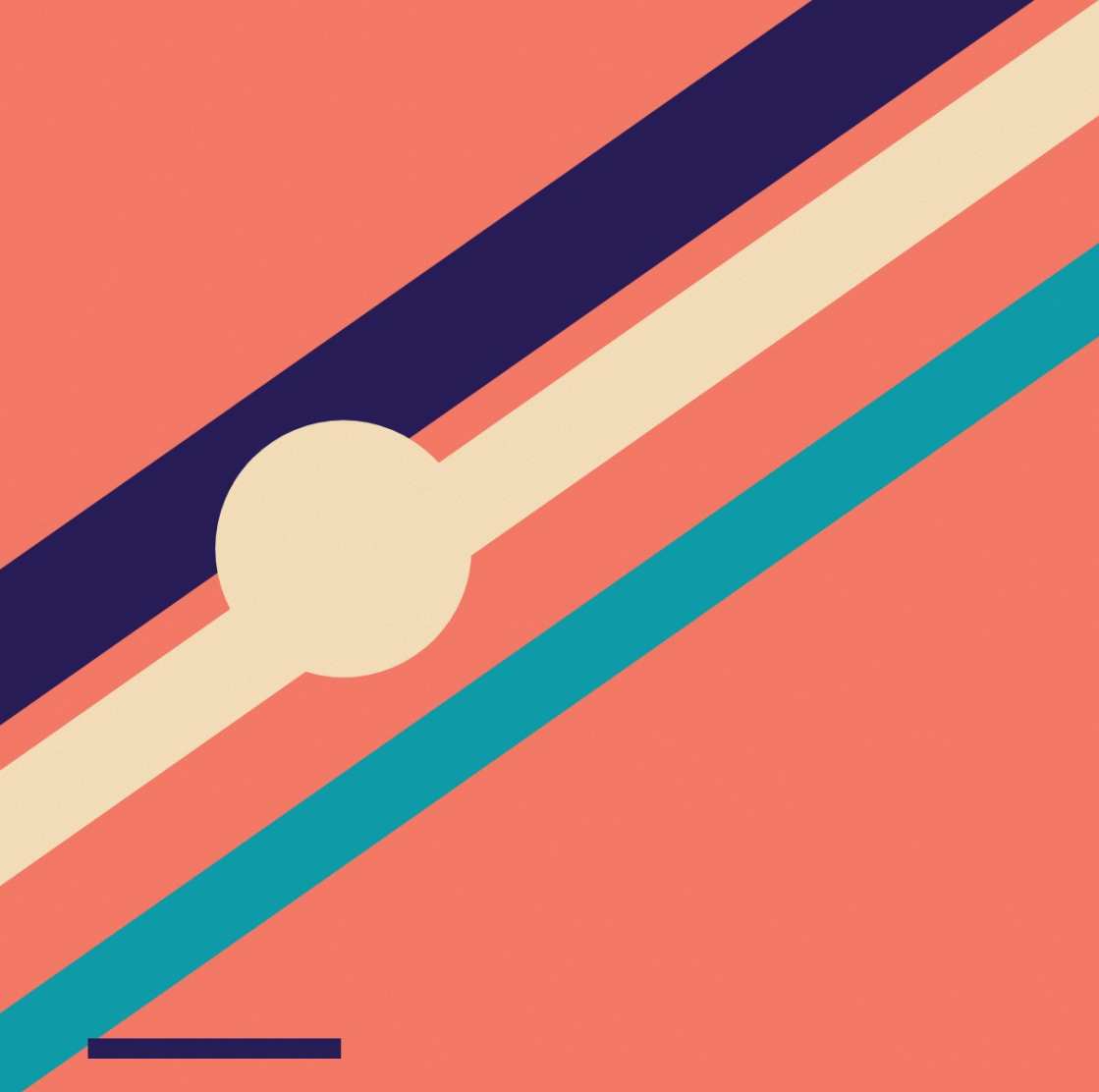




ON THE ECONOMY OF MACHINERY AND MANUFACTURES

CHARLES BABBAGE

JVA EDITORA



CHARLES BABBAGE

On the Economy of Machinery and Manufactures

First published: 1832

Public domain edition

JVA Editora

On the Economy of Machinery and Manufactures by Charles Babbage 1832

Preface

The present volume may be considered as one of the consequences that have resulted from the calculating engine, the construction of which I have been so long superintending. Having been induced, during the last ten years, to visit a considerable number of workshops and factories, both in England and on the Continent, for the purpose of endeavouring to make myself acquainted with the various resources of mechanical art, I was insensibly led to apply to them those principles of generalization to which my other pursuits had naturally given rise. The increased number of curious processes and interesting facts which thus came under my attention, as well as of the reflections which they suggested, induced me to believe that the publication of some of them might be of use to persons who propose to bestow their attention on those enquiries which I have only incidentally considered. With this view it was my intention to have delivered the present work in the form of a course of lectures at Cambridge; an intention which I was subsequently induced to alter. The substance of a considerable portion of it has, however, appeared among the preliminary chapters of the mechanical part of the Encyclopedia Metropolitana.

I have not attempted to offer a complete enumeration of all the mechanical principles which regulate the application of machinery to arts and manufactures, but I have endeavoured to present to the reader those which struck me as the most important, either for understanding the actions of machines, or for enabling the memory to classify and arrange the facts connected with their employment. Still less have I attempted to examine all the difficult questions of political economy which are intimately connected with such enquiries. It was impossible not to trace or to imagine, among the wide variety of facts presented to me, some principles which seemed to pervade many establishments; and having formed such conjectures, the desire to refute or to verify them, gave an additional interest to the pursuit. Several of the principles which I have proposed, appear to me to have been unnoticed before. This was particularly the case with respect to the explanation I have given of the division of labour; but further enquiry satisfied me that I had been anticipated by M. Gioja, and it is probable that additional research would enable me to trace most of the other principles, which I had thought original, to previous writers, to whose merit I may perhaps be unjust, from my want of acquaintance with the historical branch of the subject.

The truth however of the principles I have stated, is of much more importance than their origin; and the utility of an enquiry into them, and of establishing others more correct, if these should be erroneous, can scarcely admit of a doubt.

The difficulty of understanding the processes of manufactures has unfortunately been greatly overrated. To examine them with the eye of a manufacturer, so as to be able to direct others to repeat them, does undoubtedly require much skill and previous acquaintance with the subject; but merely to apprehend their general principles and mutual relations, is within the power of almost every person possessing a tolerable education.

Those who possess rank in a manufacturing country, can scarcely be excused if they are entirely ignorant of principles, whose development has produced its greatness. The possessors of wealth can scarcely be indifferent to processes which, nearly or remotely have been the fertile source of their possessions. Those who enjoy leisure can scarcely find a more interesting and instructive pursuit than the examination of the workshops of their own country, which contain within them a rich mine of knowledge, too generally neglected by the wealthier classes.

It has been my endeavour, as much as possible, to avoid all technical terms, and to describe, in concise language, the arts I have had occasion to discuss. In touching on the more abstract principles of political economy, after shortly stating the reasons on which they are founded, I have endeavoured to support them by facts and anecdotes; so that whilst young persons might be amused and instructed by the illustrations, those of more advanced judgement may find subject for meditation in the general conclusions to which they point. I was anxious to support the principles which I have advocated by the observations of others, and in this respect I found myself peculiarly fortunate. The reports of committees of the House of Commons, upon various branches of commerce and manufactures, and the evidence which they have at different periods published on those subjects, teem with information of the most important kind, rendered doubly valuable by the circumstances under which it has been collected. From these sources I have freely taken, and I have derived some additional confidence from the support they have afforded to my views. *

Charles Babbage
Dorset Street
Manchester Square
8 June, 1832

[*Footnote: I am happy to avail myself of this occasion of expressing my obligations to the Right Hon. Manners Sutton, the Speaker of the House of Commons, to whom I am indebted for copies of a considerable collection of those reports.]

Preface to the Second Edition

In two months from the publication of the first edition of this volume, three thousand copies were in the hands of the public. Very little was spent in advertisements; the booksellers, instead of aiding, impeded its sale; * it formed no part of any popular series and yet the public, in a few weeks, purchased the whole edition. Some small part of this success, perhaps, was due to the popular exposition of those curious processes which are carried on in our workshops, and to the endeavour to take a short view of the general principles which direct the manufactories of the country. But the chief reason was the commanding attraction of the subject, and the increasing desire to become acquainted with the pursuits and interests of that portion of the people which has recently acquired so large an accession of political influence.

[*Footnote: I had good evidence of this fact from various quarters; and being desirous of verifying it, I myself applied for a copy at the shop of a bookseller of respectability, who is probably not aware that he refused to procure one even for its author.]

A greater degree of attention than I had expected has been excited by what I have stated in the first edition, respecting the 'Book-trade'. Until I had commenced the chapter, 'On the separate cost of each process of a manufacture', I had no intention of alluding to that subject: but the reader will perceive that I have throughout this

volume, wherever I could, employed as illustrations, objects of easy access to the reader; and, in accordance with that principle, I selected the volume itself. When I arrived at the chapter, 'On combinations of masters against the public', I was induced, for the same reason, to expose a combination connected with literature, which, in my opinion, is both morally and politically wrong. I entered upon this enquiry without the slightest feeling of hostility to that trade, nor have I any wish unfavourable to it; but I think a complete reform in its system would add to its usefulness and respectability. As the subject of that chapter has been much discussed, I have thought it right to take a view of the various arguments which have been advanced, and to offer my own opinion respecting their validity—and there I should have left the subject, content to allow my general character to plead for me against insinuations respecting my motives—but as the remarks of some of my critics affect the character of another person, I think it but just to state circumstances which will clearly disprove them.

Mr Fellowes, of Ludgate Street, who had previously been the publisher of some other volumes for me, had undertaken the publication of the first edition of the present work. A short time previous to its completion, I thought it right to call his attention to the chapter in which the book-trade is discussed; with the view both of making him acquainted with what I had stated, and also of availing myself of his knowledge in correcting any accidental error as to the facts. Mr Fellowes, 'differing from me entirely respecting the conclusions I had arrived at', then declined the publication of the volume. If I had then chosen to apply to some of those other booksellers, whose names appear in the Committee of 'The Trade', it is probable that they also would have declined the office of publishing for me; and, had my object been to make a case against the trade, such a course would have assisted me. But I had no such feeling; and having procured a complete copy of the whole work, I

called with it on Mr Knight, of Pall Mall East, whom until that day I had never seen, and with whom I had never previously had the slightest communication. I left the book in Mr Knight's hands, with a request that, when he had read it, I might be informed whether he would undertake the publication of it; and this he consented to do. Mr Knight, therefore, is so far from being responsible for a single opinion in the present volume, that he saw it only, for a short time, a few days previous to its publication.

It has been objected to me, that I have exposed too freely the secrets of trade. The only real secrets of trade are industry, integrity, and knowledge: to the possessors of these no exposure can be injurious; and they never fail to produce respect and wealth.

The alterations in the present edition are so frequent, that I found it impossible to comprise them in a supplement. But the three new chapters, 'On money as a medium of exchange'; 'On a new system of manufacturing'; and 'On the effect of machinery in reducing the demand for labour'; will shortly be printed separately, for the use of the purchasers of the first edition.

I am inclined to attach some importance to the new system of manufacturing; and venture to throw it out with the hope of its receiving a full discussion among those who are most interested in the subject. I believe that some such system of conducting manufactories would greatly increase the productive powers of any country adopting it; and that our own possesses much greater facilities for its application than other countries, in the greater intelligence and superior education of the working classes. The system would naturally commence in some large town, by the union of some of the most prudent and active workmen; and their example, if successful, would be followed by others. The small capitalist would next join them, and such factories would go on increasing until competition compelled the large capitalist to adopt the same system; and, ultimately, the whole faculties of every man

engaged in manufacture would be concentrated upon one object—the art of producing a good article at the lowest possible cost—whilst the moral effect on that class of the population would be useful in the highest degree, since it would render character of far greater value to the workman than it is at present.

To one criticism which has been made, this volume is perfectly open. I have dismissed the important subject of the patent-laws in a few lines. The subject presents, in my opinion, great difficulties, and I have been unwilling to write upon it, because I do not see my way. I will only here advert to one difficulty. What constitutes an invention? Few simple mechanical contrivances are new; and most combinations may be viewed as species, and classed under genera of more or less generality; and may, in consequence, be pronounced old or new, according to the mechanical knowledge of the person who gives his opinion.

Some of my critics have amused their readers with the wildness of the schemes I have occasionally thrown out; and I myself have sometimes smiled along with them. Perhaps it were wiser for present reputation to offer nothing but profoundly meditated plans, but I do not think knowledge will be most advanced by that course; such sparks may kindle the energies of other minds more favourably circumstanced for pursuing the enquiries. Thus I have now ventured to give some speculations on the mode of blowing furnaces for smelting iron; and even supposing them to be visionary, it is of some importance thus to call the attention of a large population, engaged in one of our most extensive manufactures, to the singular fact, that four-fifths of the steam power used to blow their furnaces actually cools them.

I have collected, with some pains, the criticisms* on the first edition of this work, and have availed myself of much information which has been communicated to me by my friends, for the improvement of the present volume. If I have succeeded in

expressing what I had to explain with perspicuity, I am aware that much of this clearness is due to my friend, Dr Fitton, to whom both the present and the former edition are indebted for such an examination and correction, as an author himself has very rarely the power to bestow.

[*Footnote: Several of these have probably escaped me, and I shall feel indebted to any one who will inform my publisher of any future remarks.]

22 November, 1832.