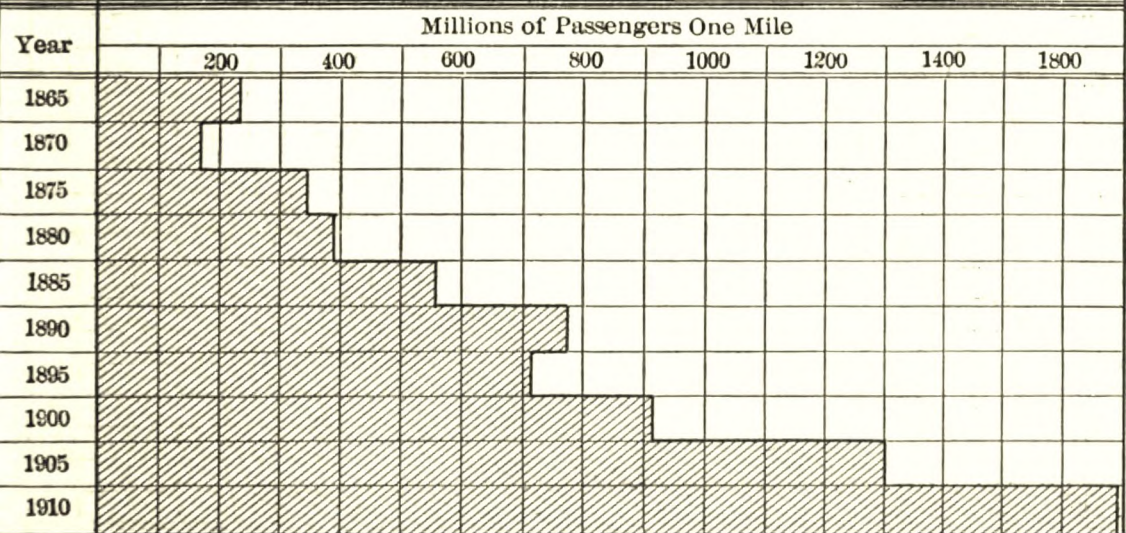
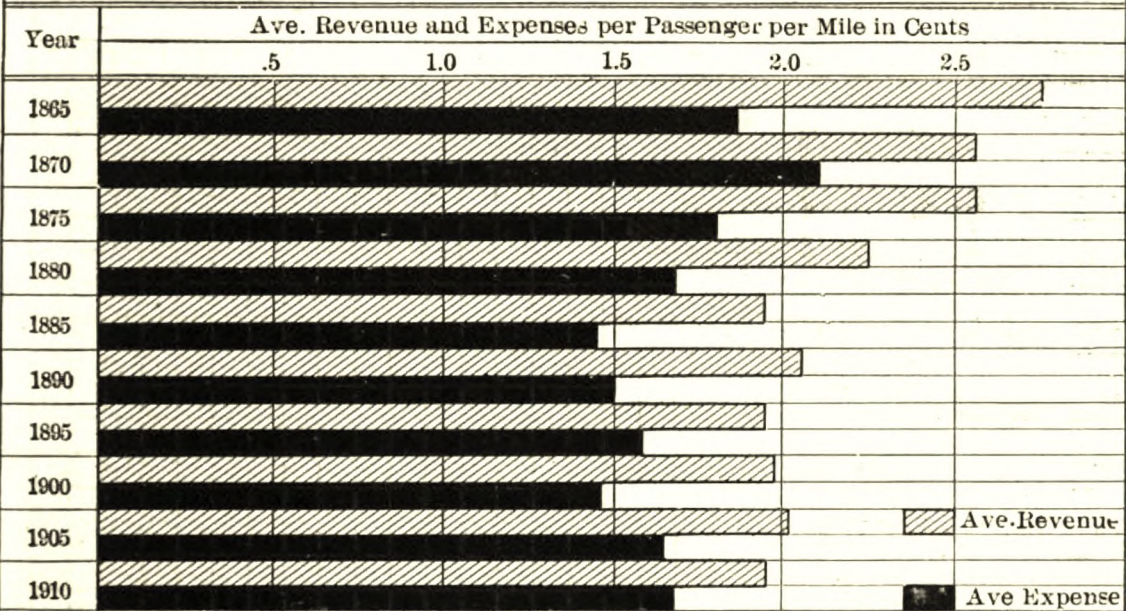


PENNSYLVANIA RAILROAD - PASSENGER BUSINESS

Passengers One Mile 1865 to 1910	32,075,856,012 @ .02748 = \$ 881,444,523.21
Total Revenue 1865 to 1910	666,565,889.38
Difference	214,878,633.83



Technology and Industrial Efficiency

Congress of Technology,
Massachusetts Institute of Technology

TECHNOLOGY
AND
INDUSTRIAL EFFICIENCY

Published by the
McGraw-Hill Book Company
New York

Successors to the Book Departments of the
McGraw Publishing Company Hill Publishing Company

Publishers of Books for

Electrical World	The Engineering and Mining Journal
Engineering Record	American Machinist
Electric Railway Journal	Coal Age
Metallurgical and Chemical Engineering	Power

TECHNOLOGY

AND

INDUSTRIAL EFFICIENCY

A SERIES OF PAPERS PRESENTED AT THE CONGRESS
OF TECHNOLOGY, OPENED IN BOSTON, MASS.,
APRIL 10, 1911, IN CELEBRATION OF THE FIFTIETH
ANNIVERSARY OF THE GRANTING OF A CHARTER
TO THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY

McGRAW-HILL BOOK COMPANY
239 WEST 39TH STREET, NEW YORK
6 BOUVERIE STREET, LONDON, E.C.
1911

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PREFACE

THE charter of the Massachusetts Institute of Technology was signed by Governor Andrew on the 10th of April, 1861. In the half-century that has elapsed since that date, the Institute has steadily advanced in power and influence. Its educational policy has served as a model for numerous similar institutions in this country and abroad, and its graduates have taken a prominent part in opening up the country, in developing its industries, in conserving the health of its citizens, and generally in adding to the national welfare by the application of scientific methods to the great practical problems of the day. To celebrate the fiftieth anniversary of its founding, a Congress of Technology was opened in Boston on the 10th of April, 1911, and at this Congress a series of papers was presented by alumni of the Institute and by members of its faculty. These papers are here collected and reproduced in such abbreviated form as the exigencies of space demand. The work of abbreviation has been entrusted to a board of editors, and, of course, has necessitated liberties being taken with the original form of presentation. In no case, however, has any substantial change been consciously made.

A paper entitled "Thirty Years' Work in Boiler Testing," by George H. Barrus, '74, Consulting Seam Engineer, Boston, has been omitted because it was too long to publish *in extenso*, and could not be presented satisfactorily in abstract form.

An interesting discussion of "Some Problems of High Masonry Dams," by John R. Freeman, '76, Consulting Engineer, Providence, R. I., has unfortunately not been reduced to writing in time for publication.

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THE SCIENTIFIC DEVELOPMENT OF THE NEGRO.

By **ROBERT R. TAYLOR, '92,**
Director of Industrial Training, Tuskegee Institute.

It is about forty-five years since the negro was emancipated and, therefore, about forty-five years in which he has had an opportunity to think for himself. Prior to that time he was subject to the master class, who were responsible for providing work for him and seeing that he performed this work according to plans and methods definitely laid out. He engaged in the mechanical trades: there were the colored contractors in carpentry, in brickmasonry and in other mechanical lines, and the actual work of construction was done by colored mechanics. He built the houses, boats and bridges, made the wagons and buggies, did ordinary machine work. In some of the trades he developed a certain degree of skill, showing a large native capacity, but these were few and isolated cases. Where fine work was to be done, demanding a high degree of skill, men were brought from other parts of the country, or even European countries, to do the work. Whatever skill of hand may have been developed, the negroes were an unlettered people, and therefore lacked the mental training to back up the skill of hand. The negro was the farmer of the South: he raised millions of dollars' worth of cotton, the crop which has been the basis of the wealth of the South. The fruits and vegetables, the grains, were almost entirely the results of his labor. He did the domestic and personal service work, the work of the barbers, the waiters, the laundresses, the cooks. The colored man was, therefore, almost entirely a laborer, doing the unskilled work; in few, if any, cases did he engage in the higher forms of industrial or technical work. The years following the war were different in many ways, but the results of the training of years could not be changed overnight, and with them, as a whole, there was still the same feeling of dependence for the guiding, directing spirit of those who had done this so long. There was another element which now entered into the negro's life. The relation which had existed prior to the war had been one of laborer and director. The director in the eyes of the laborer was a man of leisure, one who had led a life of ease and plenty and happiness. It is not strange that, with changed conditions, with a chance to choose a career, he should turn to the

life which he had seen lived by the ruling class, which, however full it really was of responsibilities and complex situations necessitating high administrative ability, appealed to him as a life of idleness and of pleasure. This was his idea of a freeman, and as a freeman he aspired to a life of this kind. He began to think of leaving his old way of living and to hope for a new order. The ability to reach out and develop new lines of work, to study the things by which he was surrounded and to make the most of them, to go down into the earth and find the coal and the iron, the gold and the silver concealed there, to find out what the land would produce and how it would produce more in quantity and in variety by proper additions to the soil (in other words, the secrets of chemistry, of physics, of mathematics, of the principles of mechanics), all this was to him a closed book. And a people so environed could not get the most from their surroundings, nor themselves reach any higher development. Without the necessity of meeting emergencies which are constantly arising in every-day business life, there was no need to develop resourcefulness, quick expedients to overcome the unlooked-for occurrence, or the accident which happens, perhaps, the next minute. Constantly under the will of another and subjected to his personal oversight, there was no place for that highest of opportunities in the business, commercial and technical world, the chance to organize, to direct, to administer. Executive ability or the chance to develop it by taking charge of work, of a business, laying out the plans, gathering the workmen and material, keeping everybody busy, looking ahead to avoid delays, these things which seem so natural to those with different surroundings and which are a part of their inheritance, had no part in the colored man's life. In fact, the opposite condition seemed the perfectly natural one. Instead of keeping material on hand to avoid delays, by not having them on hand, a few idle days might result, and where bread and clothes and shelter come whether one works or not, and no more and no less whether he works or not, the chances are that with most of us under such circumstances we would welcome the idle days, especially if the weather were warm and the fishing good.

Technical training has been the last of the educational methods to be accepted by the negro. As has been pointed out, the powerful and all-dominating influence of the master class in slavery days held up to him the constant example of what appeared to him as the power of a liberal education to secure comfort without effort. Hence as a freeman he aspired to the same life, and thought that the means of attaining to such a life was to be "liberally" educated. Book learning, as such, was therefore the panacea for all his ills. No sacrifice was too great, by parent and none by child, to

attend school and get pure book learning, and as much of it as possible. Experience soon demonstrated that to the great number there must be added to the "liberal" education the ability to do a particular thing well.

One or two pioneer young men more venturesome than others conceived the idea of becoming doctors. Some of their friends treated it as a joke. In spite of this they persisted, became regularly graduated physicians, and afterwards successful practitioners. This opened a new field and now there are about 3500 colored physicians in successful practice. From the doctor it was but a natural step to the dentist, the pharmacist and the trained nurse.

The engineer, the architect, the chemist were persons met with occasionally in the South, but rarely by the negro, and their impress on him was slight. The industrial conditions under which he had worked were not such as to lead him to seek any special industrial equipment. He was seeking to get away from it as far as possible. If not for himself, certainly he had other ambitions for his children. With deeper insight and a clearer vision, some of the white friends of the negro and some of the colored men themselves, studying the situation and noting the drift away from the industrial pursuits as applied to the skilled trades, and that great human industry, agriculture, began a crusade for the revival of an interest in them. With some personal degree of satisfaction I feel that I have taken some small part in this renaissance, and it is alluded to here because it has been through the influence of our Alma Mater in the results of the training received in this institution that such has been possible.

Years ago, when it was known that I was to leave my home to study at the Massachusetts Institute of Technology, many of the home people asked, What is the use? And a question of similar nature was asked by many in other places. After graduation, what? Where is the field?

Leaving the Institute immediately after graduation I took up the practice of architecture and designed several private and public buildings. Five schools offered to me the direction or organization of the industrial work, and after some hesitancy I responded to the call to go to the Tuskegee Normal and Industrial Institute, at Tuskegee, Ala., to serve as its architect and instructor in architectural and mechanical drawing. There was no drawing attempted at the Tuskegee Institute at that time, and the mechanical work was largely in the hands of men trained in the old way, who did their work usually without definite plans or drawings. Introducing plans, blue-prints and specifications as a part of every mechanical job, however small, and instructing the students in making and using drawings, led to changes which inevitably follow newer and better ways of doing

things. Unable to respond to the new methods, the older men gradually gave way to younger and better trained men. After experience elsewhere, I later returned to Tuskegee to occupy a new position as Director of Mechanical Industries, including the direction and supervision of twenty-five trades, embracing among others architectural drawing, steam engineering, electrical engineering and the building trades.

The work at Tuskegee Institute has offered the opportunity to come in contact with thousands of young men. These young men as graduates or undergraduates from the Tuskegee Institute have gone over large parts of this country. Some of the methods and plans of the Institute of Technology have been transplanted to the Tuskegee Institute and have flourished and grown there; if not the plans in full, certainly the spirit, in the love of doing things correctly, of putting logical ways of thinking into the humblest task, of studying surrounding conditions, of soil, of climate, of material and of using them to the best advantage in contributing to build up the immediate community in which the persons live, and in this way increasing the power and the grandeur of the nation. And there has been an ever-widening influence: one graduate of the Tuskegee Institute has done satisfactory architectural work for the United States Government, another is an architect in New York City, another is in successful practice in the State of Missouri, another is an installing and operating electrical engineer for a Southern town, another is a mechanical and operating engineer for an ice plant and water system for another Southern town. This list might be continued at considerable length and should serve as a witness of the part which the Institute of Technology is contributing to the scientific awakening of the negro.