

# Scientific American.

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## THE PRIZE ESSAY OF OUR SEMI-CENTENNIAL ANNIVERSARY NUMBER.

We take much pleasure in announcing that the winning essay in our prize competition on the subject of the progress of invention during the past fifty years was written by Mr. Edward W. Byrn, of Washington, D. C.

The names of the writers of the five next best essays, to be published in subsequent issues of the SCIENTIFIC AMERICAN SUPPLEMENT, are as follows: Edmund Becker, Washington, D. C.; George M. Hopkins, Brooklyn, N. Y.; Gardner D. Hiscox, New York City; Frederic de Garis, Patchogue, Long Island, and A. M. Farlow, Barlow, Ohio.

When our readers learn that the successful essay was closely pressed for first place by many of its competitors, they will understand that the competition, taken as a whole, was of an exceptionally high order. As compared with the half dozen essays which head the list, the balance of the manuscripts are rated by the judges at a high standard, and we may say that there are few that lapse into mere mediocrity.

This result is particularly creditable to the competitors, and especially so, when we bear in mind the great breadth of the subject and the amount of careful research that was necessary to its ample but discriminating treatment. We were guided in our selection of this subject as much by the fact that to handle it successfully would involve many hours of careful preliminary reading, as by the fact that it was specially appropriate to a semi-centennial number. The result has fully justified our expectations, and our readers will find that the winning essay, which we publish in the adjoining columns, and those which will follow in consecutive numbers of the SCIENTIFIC AMERICAN SUPPLEMENT, bear the internal evidence of careful and systematic research.

The presence of college students among the competitors calls for mention of the fact that the proximity of the summer examinations has shut out many college men from this competition; and the efforts of those who did send in their essays call for a word of special recognition.

It is an interesting fact, worthy of record here, that the interest in the competition was not confined to America, but that it brought some excellent MSS. to this office from different quarters of the globe. Any further discussion of the merits of the essays can best be given in the words of Judge A. P. Greeley, of the Patent Office, Washington, who, in forwarding his report, says: "Many of those which I have placed somewhat low on the list are of decided merit, and only fail of higher rating because of failure to cover the broad field of invention. Some of them show a remarkably full and accurate knowledge on particular lines, without the broad grasp of the whole field.

"I have been much interested in these essays. They evidence a widespread knowledge and appreciation of the progress that has been made in the last fifty years. It has been by no means easy to determine the best one of the half dozen or more at the top of the list; but the selection I have made is the result of careful consideration, and is my best judgment in the matter."

The result of the vote on the question as to what invention introduced during the past fifty years has conferred the greatest benefit upon mankind places Bessemer Steel in the place of honor. Then come the Telephone and the Telegraph—though we think the relative order of these two should more justly be inverted. Following these come the Sewing Machine, the Reaper, the Electric Light, the Electric Motor, the Bicycle, the Grain Binder and the Westinghouse Air Brake. There were several miscellaneous votes, which we cannot give in detail; but our readers will pardon our mentioning with all modesty that not a few correspondents wrote that the SCIENTIFIC AMERICAN has conferred the greatest benefit upon mankind. While we cannot agree with this opinion, we appreciate highly the kind feeling which prompts the sentiment.

In the course of the past fifty years expressions of good will like this have been by no means infrequent; and we enter upon the second half century of our journalistic life with the confidence that these cordial relations between ourselves and our subscribers will strengthen as the years go by.

Our cordial thanks are due to Judge A. P. Greeley, of the Patent Office, Washington; Prof. R. H. Thurston, of Cornell University; and Prof. R. S. Woodward, of Columbia University, for the valuable service they have rendered in acting as a jury in the above competition. It would be difficult to find three gentlemen whose time is more fully occupied; and that they should have taken in hand just now a matter involving so much careful attention places both ourselves and our readers under a debt of obligation which we take this opportunity to acknowledge.

## \$250 PRIZE ESSAY COMPETITION.

### THE AWARD.

Editor SCIENTIFIC AMERICAN:

Dear Sir: Having completed our examination of the essays on the subject of "The Progress of Invention During the Past Fifty Years," we beg to announce that the essay receiving the highest average rating was written by "Beta," who, on opening the sealed envelope accompanying the manuscript, was found to be Mr. Edward W. Byrn, of Washington, D. C. To him, therefore, the prize of \$250 should be awarded. The names and addresses of the five authors receiving the next highest average ratings are given in order below. It remains only to add that each member of the committee examined the essays independently, marking them on a scale of 100, and that the average of the three independent ratings was taken in each case for the final rating of an essay.

"Liberty," Edmund Becker, office of Lighthouse Board, Treasury Department, Washington, D. C.  
"Investigator," George M. Hopkins, Brooklyn, N. Y.  
"Semper Fidelis," Gardner D. Hiscox, N. Y. City.  
"Verbun Sap. III," Frederic de Garis, Patchogue, Long Island, N. Y.  
"A. Malcom," A. M. Farlow, Barlow, O.

Very truly yours,

R. H. THURSTON, Cornell University.

A. P. GREELEY, U. S. Patent Office.

R. S. WOODWARD, Columbia Univ.

Committee.

## THE PROGRESS OF INVENTION DURING THE PAST FIFTY YEARS.

PRIZE ESSAY BY "BETA" (EDWARD W. BYRN, A.M.)

If the life of man be threescore years and ten, fifty years will about mark the span of ripe manhood's busy labor, and the sage of to-day, turning back the pages of memory, may, as the times pass in review, enjoy the rare privilege of personal observation of, direct contact with, and positive knowledge concerning the events of this prolific period. To him what a vista it must present; what a convergence of the perspective; for the past fifty years represents an epoch of invention and progress unique in the history of the world. It is something more than a merely normal growth or natural development. It has been a gigantic tidal wave of human ingenuity and resource, so stupendous in its magnitude, so complex in its diversity, so profound in its thought, so fruitful in its wealth, so beneficent in its results, that the mind is strained and embarrassed in its effort to expand to a full appreciation of it. Indeed, the period seems a grand climax of discovery, rather than an increment of growth. It has been a splendid, brilliant campaign of brains and energy, rising to the highest achievement amid the most fertile resources, and conducted by the strongest and best equipment of modern thought and modern strength.

The great works of the ancients are in the main mere monuments of the patient manual labor of myriads of workers, and can only rank with the buildings of the diatom and coral insect. Not so with modern achievement. This last half century has been peculiarly an age of ideas and conservation of energy, materialized in practical embodiment as labor-saving inventions, often the product of a single mind, and partaking of the sacred quality of creation.

The old word of creation is, that God breathed into the clay the breath of life. In the new world of invention mind has breathed into matter, and a new and expanding creation unfolds itself. The speculative philosophy of the past is but a too empty consolation for short-lived, busy man, and, seeing with the eye of science the possibilities of matter, he has touched it with the divine breath of thought and made a new world.

It is so easy to lose sight of the wonderful, when once familiar with it, that we usually fail to give the full measure of positive appreciation to the great things of this great age. They burst upon our vision at first like flashing meteors; we marvel at them for a little while, and then we accept them as facts, which soon become so commonplace and so fused into the common life as to be only noticed by their omission.

Perhaps, then, it will serve a better purpose to contrast the present conditions with those existing fifty years ago. Reverse the engine of progress, and let us run fifty years into the past, and practically we have taken from us the telegraph, the sewing machine, the bicycle, the reaper and vulcanized rubber goods. We see no telephone, no cable nor electric railways, no electric light, no photo-engraving, no photo-lithographing nor snapshot camera, no gas engine, no web perfecting printing press, no practical woodworking machinery nor great furniture stores, no passenger elevator, no asphalt pavement, no steam fire engine, no triple expansion steam engine, no Giffard injector, no celluloid, no barbed wire fence, no time lock for safes, no self-binding harvester, no oil nor gas wells, no ice machines nor cold storage. We lose the phonograph and graphophone, air engines, stem winding watches, cash registers and cash carriers, the great suspension bridges, iron frame buildings, monitors and heavy ironclads, revolvers, torpedoes, magazine guns and Gatling guns, linotype machines, all practical typewriters, all pasteurizing,

knowledge of microbes or disease germs, and sanitary plumbing, water gas, soda water fountains, air brakes, coal tar dyes and medicines, nitro-glycerine, dynamite and gun-cotton, dynamo electric machines, aluminum ware, electric locomotives, Bessemer steel, with its wonderful developments, ocean cables, etc. The negative conditions of that period extend into such an appalling void that we stop short, shrinking from the thought of what it would mean to modern civilization to eliminate from its life these potent factors of its existence.

As the issue of patents in this country is based upon novelty, it will aid us in the effort to appreciate this great movement to note the increase of United States patents in the past fifty years. Beginning in 1846, and dividing the time into periods of five years, the increase is shown most graphically in the scaled diagram No. 1.

If the growth of United States patents and the progress of the last half century can be taken as fairly correlated, what an insignificant thing is the little attenuated triangle back of 1846 compared with the swelling curves of the later period! It is probably safe to say that fully nine-tenths of all the material riches and physical comforts of to-day have grown into existence in the past fifty years.

It is interesting to observe how closely the grant of patents and the prosperity of the country are related. Referring to scaled diagram No. 2, the zigzag line marks the increase or decrease in the patents issued from year to year. We note the depression of the civil war, followed by the rapid reaction and growth of reconstruction. Again, the depression caused by the financial panic of 1873, and again in 1876, the unsettled and dangerous condition of politics incident to the contested presidential election. This was followed by another wave of prosperity, indented with depressions in the presidential election years, while the stringency of the times from 1890 to 1894 shows a marked influence in the corresponding depression in the line, all of which indicates a most sympathetic relation.

Passing now to the chronological development of the period, Morse had just harnessed the most elusive steed of all Nature's forces, and put it in the permanent service of man; when nitro-glycerine, discovered by Sobrero, in 1846, for the first time lent its terrible emphasis, and seemed to bring an awakening of the dormant genius of man.

Within the first decade (1846-1856) came the sewing machine, Bain's chemical telegraph, the Suez Canal, the House printing telegraph, the McCormick reaper, the discovery of the planet Neptune, the Corliss engine, the collodion and dry plate processes in photography, the Ruhmkorff coil, the Bass time lock for safes, the electric fire alarm of Channing & Farmer, Gintle's duplex telegraph, the sleeping car of Woodruff, Wilson's four-motioned feed for the sewing machine, Ericsson's hot air engine, the Niagara suspension bridge, and the building of the Great Eastern.

The next decade (1856-1866) brought with it the Atlantic cable, the discovery of the aniline dyes by Perkin, the making of paper pulp from wood, the discovery of coal oil in the United States, the invention of the circular knitting machine, the Giffard injector, for supplying feed water to steam boilers; the discovery of caesium, rubidium, indium and thallium; the McKay shoe sewing machine, Ericsson's ironclad monitor, Nobel's explosive gelatine, the Whitehead torpedo, and the first embodiment of the fundamental principles of the dynamo electric generator by Hjorth, of Denmark.

The next decade (1866-1876) marks the beginning of the most remarkable period of activity and development in the history of the world. The perfection of the dynamo, and its twin brother the electric motor, by Wilde, Siemens, Wheatstone, Varley, Farmer, Gramme, Brush, Weston, Edison, Thomson, and others, soon brought the great development of the electric light and electric railways. Then appeared the Bessemer process of making steel; dynamite; the St. Louis bridge; the Westinghouse air brake; and the middlings purifying and roller processes in milling. That great chemist and probably greatest public benefactor, Louis Pasteur, added his work to this period; the Gatling gun appeared; great developments were made in ice machines and cold storage equipments; machines for making barbed wire fences; compressed air rock drills and the Mont Cenis tunnel; pressed glassware; Stearns duplex telegraph, and Edison's quadruplex; the cable car system of Hallidie, and the Janney car coupler; the self-binding reaper and harvester; the tempering of steel wire and springs by electricity; the Lowe process for making water gas; cash carriers for stores; and machines for making tin cans.

With the next decade (1876-1886) there arose a star of the first magnitude in the constellation of inventions. The railway and telegraph had already made all people near neighbors, but it remained for the Bell telephone to establish the close kinship of one great talkative family, in constant intercourse, the tiny wire, sentient and responsive to the familiar voice, transmitting the message with tone and accent unchanged by the thousands of miles of distance between. Then come in order the hydraulic dredges, and Mississippi jetties of Eads; the Jablochhoff electric candle; photography by electric light; the cigarette machine; the Otto gas en-