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# NEW YORK, SATURDAY, MAY 30, 1896. Contents (Illustrated articles are marked with an asterisk.)

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#### OUR PRIZE ESSAY COMPETITION.

Woodward, of Columbia University, have consented introduction to our readers, and intending competi- he was doing only that." tors will feel that the wide experience and ripe atthe Geological and Lake Surveys of the United States tributions to scientific and technical literature during the past twenty years cover a wide range of subjects, scientific societies of both nemispheres.

gineers, and his name appears upon the roll of many ventions of the century. other engineering societies in Europe and America. Perhaps he is best known by his many works upon engineering and kindred subjects, which form a valusion, has won his present high position in various competitive examinations, in which he has gained succesdetailed acquaintance with the development of the various arts in the past half century.

earliest convenient date.

#### .... THE INVENTION OF THE BESSEMER PROCESS.

Some further correspondence relating to the invention of the Bessemer process has lately appeared in cast iron bars for the Sellers Company. Before testthe technical press, and as it comes from the pen of ing they were placed in a tumbling barrel to be Mr. Bessemer himself and of one of the contemporaries cleaned, and when they came to be broken in the and co-workers of Mr. Kelly, it is of special interest. transverse testing machine Mr. Outerbridge "noticed By reference to the presidential address of Mr. Joseph | with surprise that the average strength of the entire D. Weeks before the American Institute of Mining series was considerably higher than was usual with Engineers, published in the SUPPLEMENT of April 25, similar iron mixtures." A careful inquiry was made it will be seen that among other witnesses quoted to ascertain the cause of the difference; but it was therein as testifying to having seen Mr. Kelly's ex- found that the machine was in good order and that periments is Mr. John E. Fry, who was at the time the metal was of normal composition. The next step a foundry moulder at the Cambria Works. Mr. Fry's in the investigation was to cast twelve bars from one testimony, as quoted by Mr. Weeks, gives some details | pattern and one runner. Six of these were cleaned of the apparatus used by Mr. Kelly, and describes the by the tumbler and six with a wire brush. Upon experiments up to the point at which "the pipe was breaking the twelve bars in the machine, it was found shoved down with the blast on," and "a cover of that those which had been subjected to four hours' pieces of sheet iron was laid across the top to pre-incessant concussion in the tumbler were ten to fifteen vent the sparks flying too freely." In his reply to the per cent stronger than the other bars! Various explaaddress, Mr. Bessemer complained that Mr. Fry's nations were offered and proved by experiment to be testimony stopped short at the very point where it false, until Mr. Outerbridge suggested that the increase became most interesting, and he claimed that the of strength might be due to the "mobility of moletestimony of the witnesses "would have been in- cules of cast iron at ordinary temperature when subfinitely more to the purpose if they had told us some- jected to repeated shocks." This theory was tested thing about the way in which this metal was taken by subjecting each of six new cast iron bars to 3,000 out, in what state of partial or complete solidity it taps with a hammer upon one end. When they were was obtained," etc., and he drew the conclusion that broken in the machine they showed the same in-"the absence of these facts affords very strong cir-|crease of strength as the bars that had been cleaned cumstantial evidence that Kelly never had produced in the tumbler. He reasonably concluded that he homogeneous malleable iron, and had never made an had proved his case, and the engineering world is ingot by his process."

The publication of the address, and Mr. Bessemer's remarkable property of cast iron. reply, caused Mr. John E. Fry to write an explanatory | The details of Mr. Outerbridge's experiments were letter to Mr. Bessemer, which has been widely pub- given in a paper which he read before the Pittsburg lished in the English technical press. The letter, meeting of the American Institute of Mining Engiwith Mr. Bessemer's comments upon it, will be found in the current issue of the SUPPLEMENT. Mr. Fry, who is now the manager of the Cambria Steel Works, states in this letter that the evidence , which was quoted in the presidential address was extracted from some "personal recollections" which he furnished to Mr. Weeks in the course of a two hours' conversation on the subject of the early Kelly experiments, a conversation which took place at Mr. Weeks' request. In connection with this interview, he furnished Mr. Weeks with a drawing of Mr. Kelly's apparatus made in 1858, and also with a copy of an arti-<sup>5</sup> cle which he had written in 1894, entitled "The Bessemer Industry: Johnstown's Contribution to it." He goes on to say: "My interview with Mr. Weeks gave him vivid personal recollections antagonistic to falling weight were carried out. his views. The drawing proved that, as late as the s year 1858, Mr. Kelly's experiments and ideas had not very first public announcement of Mr. Kelly's abso- also cleaned with the brush, were then in turn sub-

lute failure to accomplish anything that would give We take much pleasure in announcing that Judge ground to his claim of being the inventor of the A. P. Greeley, of the Patent Office, Washington, Prof. pneumatic process of converting cast iron into its R. H. Thurston, of Cornell University, and Prof. R. S. malleable products." He further says of the Johnstown publication above referred to, "In it I made as to act as judges in our forthcoming prize essay com- plain as circumstances would warrant that Mr. Kelly petition. Their names are so well and honorably was copying your methods as fully as his limited known in the world of science and art as to need no sources of information enabled him to do, and that

The publication of this very timely letter can have tainments of these gentlemen are a guarantee that but one effect as far as the evidence in favor of Mr. their interests will be in safe and discriminating hands. Kelly's claims is concerned. It shows that whatever Prof. R. S. Woodward, who is the Dean of the other testimony may be adduced in his favor, the School of Pure Science and Professor of Mechanics, evidence of the man who was told off by the Cambria Columbia University, was for many years engaged in authorities to assist Mr. Kelly is emphatically against him. It is scarcely necessary to add that Mr. Fry Government, during which time he formed one of the has completely cleared himself of any suspicion of Transit of Venus Commission. His voluminous con- giving a distorted or partial statement of the facts as far as he knew them.

It is to be hoped that, with the publication of Mr. and have won for him a high reputation among the Fry's letter, the public has heard the last of this long-buried question. It is the great value of the Prof. R. H. Thurston, Director of Sibley College and testimony of Mr. Fry that has led us to bring it Professor of Mechanical Engineering, Cornell Univer- again before our readers, coupled with the convicsity, was for many years Professor of Engineering at tion that the full testimony will serve to settle any the Stevens Institute of Technology. He is a past doubts which may have been aroused as to the hispresident of the American Society of Mechanical En- torical facts connected with one of the greatest in-

#### MOLECULAR ANNEALING.

Thanks to the investigations of Mr. Alexander E. able part of the technical literature of this country. Outerbridge, Jr., the ghost of the old theory of the Judge Arthur P. Greeley, Examiner in Chief at the crystallization of cast iron under the influence of re-Patent Office, Washington, who is a lawyer by profes- peated shocks is "laid" forever. According to this gentleman, not only is cast iron not weakened by repeated blows, but it is actually and considerably sively the position of third, second, first assistant and strengthened thereby. Mr. Outerbridge, who is now principal examiner. His long and varied experience in the mist to the William Sellers Company, of Philathe Patent Office has given him at once a broad and delphia, noticed some years ago, when he was engaged in metallurgical work in a car wheel factory, that "chilled cast iron car wheels rarely cracked in ordi-With the selection of a jury, the arrangements for nary service after having been used for any considthe competition are now complete, and we trust that erable time; if wheels did not crack when comparaintending competitors will facilitate the work of these tively new, they usually lasted until worn out or congentlemen by forwarding their manuscripts at the demned for other causes." Although this curious fact was noticed, its real explanation was not discovered at the time, the cracking of new wheels being attributed to imperfect annealing in the oven.

In 1894 Mr. Outerbridge had occasion to test some certainly indebted to him for the discovery of a most

neers. He claims that while it is very well known that the annealing of castings increases their strength by releasing the strains set up in cooling, it is not known that "the molecules of cast iron are capable of movement (for they do not touch each other) without the necessity of heating the castings, and they can thus rearrange themselves in comfortable relation to their neighbors and relieve the overcrowding near the surface of the casting; or, in more technical words, a molecular annealing may be accomplished at ordinary temperatures which will release the strains in the castings, precisely as does annealing by slow cooling in heated pits or ovens."

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In addition to the transverse tests already enumerated, a series of impact experiments by means of a

"Six of the 1 inch square test bars, cleaned with the wire brush, were broken upon the impact machine by s progressed beyond the operation of the 'finery fire,' dropping the weight from a sufficient height to break and the printed article gave what I believe to be the each bar at the first blow; the six companion bars,