were actually stronger at low than at ordinary temperatures. Strange as these results may appear, the number of experiments made by the author and the care with which they were conducted, utterly preclude the supposition that any source of error has affected the results. But as the author applies these results to the question of the strength of railway materials in winter, Mr. Sandberg has deemed it necessary to institute experiments on this subject, the results of which are apparently opposed to the conclusion drawn by the author, and are presented in the form of a valuable appendix to this work.

Although the translator, as he admits, adopted a rough and ready method of testing which strikingly contrasts with the refined experiments of the author, he nevertheless has the advantage of experimenting with entire rails such as are really subject to shocks in railway traffic, while it must be remembered that the author employed bars so thin as to be little else than stout wires, and which therefore would be very considerably influenced by any slight irregularity of structure arising from the mode of manufacture.

Another source of difference between the results obtained by the translator and those by the author is to be sought in the chemical composition of the bars examined; for while Mr. Sandberg used ordinary rails, which may be supposed to contain a considerable proportion of phosphorus (the Cwm Avon rail, according to the author, contains 0·20 per cent). Mr. Styffe experimented for the most part on comparatively pure materials. But the chief source of discrepancy, doubtless, arose from the different manner in which the strain was applied in the two sets of experiments. The author examined the *tensile* strength of his samples, and, for this method of testing, his results are doubtless accurate: but the translator subjected his bars to the *impact* of a falling weight, and thus dealt with forces which are of a more practical nature. It is, therefore, as the translator justly admits, only the conclusions which the author draws from his results that require modification and not the results themselves.

To the scientific reader this work will prove an interesting and valuable work. It has received warm commendation from the scientific press of England, and will doubtless be equally well received in this country. The experiments will be of peculiar value to those interested in the manufacture of iron with charcoal and coke. We commend the work as one of much practical and scientific importance, and a valuable addition to the literature of metallurgy.

MODERN PRACTICES IN FINANCE.

The anxiety to become suddenly rich, which now so widely prevails in this country, has promoted a marked demoralization in business circles—quite different from what it was a few years since when our merchants and bankers were expected to keep themselves above even a suspicion of wrong doing.

We do not intend to say that all honor has fled the business community. On the contrary, New York, and other cities, can boast a large class of strictly honorable business men, but we do mean to say that certain transactions in and out of Wall street, if perpetrated fifteen years ago would have brought the authors to merited punishment and disgrace, but are now set down as merely shrewd operations, and their authors walk abroad among a host of admirers and would-be imitators.

The sad result of these iniquitous practices appear in the columns of our daily journals with startling frequency, in the shape of safe and bank robberies, defalcations, and other somewhat more genteel villainies. The men concerned in these things are simply noted down as "sharpers," and flourish mightily on their ill-gotten gains. It would not be a difficult task to designate the parties who have been the chief instruments of this wide-spread demoralization, but when protected as they are by venal judges, it is useless for the press to expose them as they deserve.

Money in Wall street is loaned out at large usurious rates. Indeed, all respect for this wholesome law has long since disappeared from our money centers, and the "sharpers" fleece all they can. Our Grand Jury has just now put on a show of virtue, and proposes to indict certain well-known money brokers, but we fear that the whole thing will be but a "flash in the pan."

Gas as a Calorific Agent.

While the use of coal gas for illuminating purposes has extended rapidly, in this country at least, its adoption as a calorific agent has been so slow as to disappoint the hopes of its early advocates. The advantages claimed for gas in this respect are cleanliness and freedom from trouble, it being unnecessary to carry coal or other fuel to feed the fire, or to remove the ashes, etc. The rapidity with which heat may be generated and the ability to instantaneously extinguish the fire are great recommendations—particularly in summer when it is desirable to perform the duties of the *cuisine* with as little elevation of temperature as possible.

The Gas-Light Journal says that, in England, and particularly in London, gas is largely used for cooking, and it is said to perform its office most acceptably. For families living in apartments, where the trouble and expense of carrying coal or other fuel would be great, gas has proved a great desideratum. By means of approved burners, and admixture with the proper portion of atmosphere air at the time of consumption, a large amount of heat is generated, and where sufficient ventilation may be had, the products of combustion are readily conveyed away, causing no inconvenience or injurious results. Possessing these advantages, it may appear strange that it is not more generally adopted; doubtless it would be, but for the high price of gas in this country; the ordinary methods for generating heat have the preference because of their economy. The probability is that if the price of gas were reduced, so as to make it practicable to employ it for heating, the demand for it would increase in a large ratio, and the concession might be more than atoned for in the enlarged sales which would undoubtedly follow.

That the calorific properties of gas are equal to other agents used for heating, is proved by the fact that in analytical chemical laboratories, charcoal and other fires have been, to a considerable extent, replaced by gas, and the operations of boiling, evaporation, fusion, ultimate organic analysis, and even cupellation, are now performed by easily regulated gas furnaces, their use conducing far more to the personal comfort of the operator, than the troublesome and cumbersome stoves formerly employed. The inventions of gas furnaces, such as are constructed by Griffin and others in England, and Krause and Haskins in this country, have displayed much ingenuity, and, by their use, the laboratory of the chemist presents a much cleaner appearance than formerly— no dangerous sparks or cinders being formed, nor ashes being blown about the room, to the detriment of other substances in the vicinity.

From the success attending the use of gas stoves in the laboratory, it is safe to assert that many of the operations of the household could be performed in the same manner.

The introduction of the improved process of manufacturing gas by the Gwynne-Harris plan of decomposing high steam to produce hydrogen as a heating agent, and for a motive power, in lieu of steam power is commencing a new epoch in the history of political and domestic economy. The same process applied to the ordinary coal gas manufacture lessens the first cost of production so greatly that it will soon be a matter of consideration with gas companies whether the selling price may not be lessened, with a view to its introduction into these new industries; thus opening a much more extensive demand, which, in the aggregate, will largely increase the dividends of gas companies, and add a new element to the progress of the age.

Steel Rails---Their Durability.

The annual report of the State Engineer of New York, prepared by S. H. Sweet, Deputy Engineer, contains the following regarding steel rails: "Bessemer steel rails have been in regular and extensive use abroad over ten years. For some five years large trial lots have been laid on various American roads having heavy traffic, and during the last two years importations have largely increased. The manufacture of steel rails has also been commenced at four large establishments in this country, and some 7,000 tuns of home manufacture have been produced and laid down. It is estimated that from 40,000 to 50,000 tuns of steel rails are in use on our various railways. Among the users of steel rails are the Hudson River, Erie, and Pennsylvania Railway—10,000 tuns or more each; the Lehigh and Susquehannah (entirely built of steel); also the Philadelphia and Baltimore ;Camden and Amboy line; Lehigh Valley; New York Central; New York and New Haven; Naugatuck; Morris and Essex; Cumberland Valley; South Carolina; Chicago and Northwestern; Chicago and Rock Island; Chicago and Alton ;Michigan Central; Lake Shore line; Chicago, Burlington, and Quincy; Pittsburgh, Fort Wayne and Chicago; also the Boston and Providence, Boston and Worcester, Boston and Maine, Boston and Albany, Eastern, Connecticut River, and other lines in New England.

"THE WEAR OF STEEL RAILS.—As no steel rails are reported to have worn out on our roads, the comparative durability of steel and iron cannot be absolutely determined. The president of the Philadelphia and Baltimore Railway states (in the letter before quoted) that the use of steel commenced in 1864, that the rails (25 miles in all) were laid on the most trying parts of the line; that none have been taken up on account of breakage, wear, or defect; that upon the portion of the line near Philadelphia, the first steel rail imported had already worn out sixteen iron rails; and that none of the steel rails have shown any imperfection, but are all wearing smoothly and truly.

"On the Pennsylvania Railway, the Report of the Chief Engineer for 1868 states that 11,494 tuns of steel rails had been purchased, and 9,956 tuns laid. The first were laid in 1864. They are all wearing smoothly, showing no change except the slight dimunition of section to be reasonably expected from the heavy traffic. No steel rails have yet worn out. The report of the superintendent (Feb. 1869,) says: 'The use of steel rails continues with satisfactory results, and 4,544 tuns of this material have been laid since date of last report.' It is officially reported that on the Camden and Amboy line, some of the steel rails laid three years ago are now good in places where iron lasted but a few months.

"The last report of the Engineer of the Lehigh Valley Railway says: 'Another year's wear has made no perceptible impression upon the 200 tuns (of steel rails), the first of which was laid in May, 1864, none of which has broken or given out since last report. These rails have had a severe test, being, in those places in the track where they are subject to the greatest wear, laid with a chair, which is much inferior to the most approved joint now in use. There is no longer any possible doubt as to the superiority of steel over iron in economy, as in every other respect.'

"Unofficial reports from the Erie, Hudson River, and other roads, show that the above statements represent the average quality of steel rails. The last report of the New York and New Haven Railway states that 'the subject of steel rails has received special attention, and after a careful investigation of all the points involved, it has been determined hereafter to make all renewals of track with steel rails only; 2,900 tuns of Bessemer steel rails have been contracted for on account of renewals for the present year.' The report of the Morris and Essex Railway for 1868 says: 'During the last year one track through the tunnel has been ralaid with steel' —also some 150 tuns of steel laid elsewhere. 'The wear of steel shows conclusively that economy will require its use on all heavy grades and sharp curves.' The last report of the New Jersey Railway and Transportation Company says: 'It is probable that steel rails will be gradually laid the entire length of the road, the greater durability of these rails, overcoming the objection to their increased cost.'"—*Railway Times.*

Editorial Summary.

THERE seems to be no end to great engineering projects, for, besides the underground railroad which has got a start, books are now open for subscriptions to form a capital stock of $6,000,000 for the purpose of cutting a ship's canal from New York to Newark. On the completion of the canal it is proposed to run ferry boats over it half hourly. The length of time which it is estimated a trip either way will consume is but 40 minutes—less time than it takes to go by rail at present from here to Newark. The proposed ferriage will be particularly serviceable to those who find it economical to do their transportation by team. The value of property alone to be created by its construction will reach, it is thought, between $12,000,000 and $13,000,000.

A GOOD APPOINTMENT.—Commissioner Fisher has recently determined to place all interference cases under the charge of a single Examiner, to be specially designated for that work and relieved from other duties; and we understand that John M. Thatcher, Esq., Principal Examiner recently in charge of the class of harvesters, etc., has been promoted to the place. The duties of Mr. Thatcher's new position are arduous and important, requiring for their successful performance a very high order of ability, with great industry and integrity. The Commissioner could hardly have made a better selection, and we are confident that the interests of inventors will be decidedly promoted by the new method of adjudicating these important cases.

THE Century Plant, about to blossom in Rochester, N. Y., has reached a hight of 15 feet 9 inches, and will probably reach 20 feet. It has 20 branches and buds now visible, which are to bear the clusters. The lower branches are about 15 inches in length and 5 inches apart, where matured, and they gradually shorten until they reach the top. The lowermost arm is 11 feet 6 inches from the ground, and there are 105 distinctly formed buds in this cluster. We estimate there will be 1,500 flowers on the plant. The great beauty is the wonderful pyramidal form which it attains when in full bloom, the large clusters and numerous flowers in each, which will appear at the ends of the arms or branches, the lower ones being the longest, and gradually shortening in pyramidal form till they reach the top, where there will be a huge cluster of flowers.

A CALIFORNIA journal announces with becoming gravity that the problem of aerial navigation is solved, and that, within a year, travel will be habitually carried on between San Francisco and New York, Europe and China, by aerial carriages. It says that within four weeks, the first aerial steam carriage, capable of conveying six persons, and propelled at a rate exceeding the minimum speed of thirty miles an hour, will wing its flight over the Sierra Nevada, on its way to New York and remoter parts. The notice here given is very short, but we do not doubt that our citizens will organize to give hospitable welcome to the celestial visitor.

WE notice druggists' advertisements in some of our city exchanges of dry pure earth for surgical purposes. It is well known that earth has been used with great success lately as an application to putrid sores and ulcers. The earth kept for sale is not claimed to have any superior efficacy to other earth, but as it is difficult in large cities to obtain the proper quality of earth at short notice, its being kept in stock at apothecaries establishments, will prove a great convenience.

ON the 29th June we received a package from California having been only seven days in making the transit. This is one of quite a number lately received from various parts of California which have been only from seven to nine days in making the passage.

THE *Tribune* makes itself responsible for the statement that a man in Adair county, Iowa—name of the town not given—has invented a cannon which he claims will throw a projectile fourteen miles, and has gone to Washington to get a patent. He proposes to offer it to the Government for $1,000,000.

THE underground railroad corporation has already commenced business and $10,000 have been subscribed to begin work. The capital stock is fixed, we believe, at $10,000,000, therefore there remains to be taken only $9,990,000 to complete a work which interests all New Yorkers.

ALEX. T. STEWART returns an income for 1868 of $3,019,218, upon which he pays a tax of upwards of $150,000. Wm. B Astor returns an income of $1,072,212. Mr. Stewart is said to be the richest man in the world who has made his own money.

CREDIT was inadvertently omitted to the excellent article on "Copper, Brass, and Iron tubes," page 39, present volume, which was copied from *Engineering*.

LAVA has been known to flow over a layer of ashes, underneath which was a bed of ice. The non-conductivity of the ashes saved the ice.