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THE SCIENTIFIC AMERICAN SUPPLEMENT
No. 150,
For the Week ending November 16, 1878.

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STEAM FROM PETROLEUM.

A recent article in one of our daily papers, entitled "Steam from Petroleum," evidently the production of an over-sanguine inventor or an imaginative reporter, has brought us a number of inquiries concerning the use of petroleum as a fuel.

The theoretic calorific power of ordinary petroleum is about 16, of anthracite coal 13, of bituminous coal 15; that is to say, a pound of petroleum, with perfect combustion, will raise 16,000 lbs. of water 1° Fah., a pound of anthracite coal 13,000° lbs. water 1°, etc., but the heating effects depend so largely upon the methods of combustion that, in ordinary practice, these theoretic values are but little considered, the estimation in which they are held as working agents being determined by the practical economies resulting from their use.

The extreme wastefulness of the methods of using coals has long exercised ingenious and scientific minds in endeavors to find some remedy; but the best results thus far obtained by the improved Siemens and Ponsard gas furnaces and the pulverized fuel process show a utilization of but 20 to 25 per cent of the total heat of the fuel—a great gain certainly over the 7 to 8 per cent utilization in the ordinary reverberatory furnace, but still far short of the object aimed at.

On the discovery of petroleum in America the attention of metallurgists was at once directed to it in the hope of finding a fuel possessing important advantages over coal, and in every direction methods were devised for its application to metallurgic purposes; but its constitution and character were so little understood, so little known of the peculiar treatment demanded for the development of its powers as a fuel, that most of the proposed methods proved worthless.

After the elimination of the majority of these, several remained which possessed, in a greater or less degree, certain points of value. It had been determined, for instance, that the oil should be reduced to a fine spray or atomized, as it is called; that a jet of steam impinging upon a drip of the oil and conveying it into the furnace was the most effectual agent for this purpose; and that an exceedingly large amount of air was required to combine with the gases to insure complete combustion.

These points were thought to cover all the requirements, and various styles of apparatus were designed to carry them into effect, and were experimented with in various places. The results of some of the most favorable workings, as reported by Boards of Naval Engineers, showed economies of from 38 to 68 per cent over the use of anthracite coal in the generation of steam, and the further advantages of great reduction in weight and bulk of the fuel, in labor of firing, and in quick attainment of high temperatures.

As might be expected, however, of these early attempts, the apparatus was, in all cases, imperfect, the conditions necessary to complete combustion not yet understood, nor the dangerous character of the fuel fully provided against; therefore, notwithstanding the economies shown, the incomplete combustion with its accompanying offense, the difficulty of controlling the temperatures, and the occasional explosions and fires which alarmed both owners and insurance companies, led, on all sides, to the temporary abandonment of the new fuel.

Further investigations, however, here, as well as in England and France, determined that the steam jet as used, though apparently indispensable for atomizing or scattering the oil into spray, greatly interfered with its combustion by abstracting heat from the flame, and that, to be effective, to permit perfect combustion, it should be superheated to so high a degree that it would vaporize the oil on contact. The amount of air required for smokeless combustion—52 volumes to 1 of petroleum vapor—and the fact that they should be thoroughly mingled, were also ascertained.

Within the past few years so good an account has been made of this knowledge that all indications strongly point to the general substitution, in no very distant future, of petroleum for coal in the manufacture of glass, of iron, steel, and other metals, and for the formation of steam.

Prolonged workings in puddling and heating furnaces have demonstrated that by its use double the number of heats, as compared with coal results, can readily be obtained in a given time and with an economy of full 50 per cent with coal at $5 per ton and oil at $10 per barrel. In crucible furnaces, wherein a higher temperature is required and less of the calorific value of coal is utilized than in any other metallurgic operations, the advantages of the new fuel, as demonstrated in Pittsburg in the manufacture of steel for the East River bridge, are still more decided.

Under boilers an average evaporation of 14·98 pounds of water from 212° Fah. has been obtained from 1 pound of the oil, which had a theoretic efficiency of 17·5; and another instance is given of an evaporation of 16·77 pounds of water from 212° by a pound of oil, 17·52 theoretic value.

The great disparity between the practical effects of oil and coal—so much in excess of the difference in their calorific powers—is explained by the wasteful consumption of the solid coal, as above noted; while the combustion of the oil is very nearly or quite perfect, and is completed within the furnace, thus securing for the work from 85 to 90 per cent of its total heat.

The intensity of the oil flame, too, is a most important factor in the economy, assuring a temperature of nearly 3,500° Fah., in a properly-constructed furnace. This heat and the exceptional purity of the flame—there being no residual ashes or sulphurous gases—also insure purer iron in the puddling and melting, and better welding in the heating furnace, and the present unusual advantages to workers of glass.

The dangers ordinarily attending the use of this new fuel have been overcome, in one instance at least, by an ingenious and simple device that has been approved by those underwriters who have had it brought to their notice, thus removing an objection which has operated seriously against the earlier adoption of the process.

Coal tar and the residuum of petroleum are also utilized in this manner by liquefying them by heat or mixture with the oil, so that they will flow readily, but the residuum of ashes from their combustion is objectionable in some cases. Coal oils also are capable of being used with good results by this method, but the supply of petroleum will not, for a long while at least, be likely to become so limited or its price so high that economy will require any of these substitutes.

It is not, by any means, to be supposed that science and ingenuity have been exhausted in bringing the petroleum fuel process to its present strong position; it is yet in its infancy, and, as attention is drawn to it, will be improved in many respects. Because of its youth and the little experience with it, and its former unsatisfactory performance, it has been slighted by manufacturers; and because it will revolutionize the present methods of furnace-firing, it will for a considerable time be successfully opposed by the workmen, who like not to be forced out of their well-worn ruts, and who usually control such matters in the majority of iron works.

There are many rival inventors in this field striving to pass one another in the race, but most of them seem to be almost hopelessly out with their crude and unpractical appliances and ideas; and to this class, judging from inspection of the furnace, etc., at the Brooklyn Navy Yard, and from general observation, belongs, in our esteem, their designer.

Quite recently the inventor of perhaps the most perfect system for using this fuel has applied it to the manufacture of polished sheet iron, with results superior to any before attained in this country.

It would be difficult, we think, to name any process which, even at its present stage of development, is more worthy of the attention of all those manufacturers to whom cheaper fuel is a matter of any importance.

ANOTHER NEW ELECTRIC LIGHT.

During the past week the Electro-Dynamic Light Company of New York have exhibited an electric light which is, to say the least, very promising. The apparatus employed was the Sawyer-Man electric lamp, the joint invention of William E. Sawyer, a well known and successful electrical inventor of this city, and Albon Man, of Brooklyn. As we hope soon to lay before our readers a complete description of the lamp, with illustrations of its mechanism, we will merely remark in this connection that the lamp is inclosed in a hermetically sealed globe of glass, filled with nitrogen, and appears to differ from the common mode of exhibiting the electric light in non-supporters of combustion, mainly in the addition of a slender pencil of carbon, which completes the circuit between what would otherwise be the two carbon poles, and by its incandescence furnishes light, in the place of the ordinary voltaic arc. An essential feature of the invention is an ingenious device for dividing the current, and for maintaining a constant uniform resistance in the circuit, whether the lamps are on or off. The light exhibited was steady and brilliant.

A REMARKABLE BANK ROBBERY.—SCIENTIFIC SAFEGUARDS NEGLECTED.

The robbery of the Manhattan Savings Institution, Sunday morning, October 27, was one of the most daring and successful burglaries ever effected in this city. By some means unknown the burglars entered the bank building after the departure of the night watchman, at 6 o'clock, compelled the janitor to surrender the keys to the vault and secret of the combination of the lock, opened the vault, and spent nearly three hours of broad daylight in breaking open the inner safes and rifling them of their contents. They carried away something like three million dollars' worth of bonds, chiefly registered, and perhaps a hundred thousand dollars in negotiable paper and cash.

The most remarkable feature of the affair was the circumstance that an institution having the reputation of being one of the soundest in the country should prove to have its treasures so poorly guarded. The fact that the combination of the outer lock of the vault was intrusted to a feeble old man living in the same building is scarcely less astonishing than that the directors of the institution should have availed themselves of none of the well known electrical and mechanical appliances for defending their safes, not only from the assaults of burglars, but even the unauthorized entrance of those who had them in charge, except during banking hours. It is but another evidence of the amazing indifference of most men not scientifically educated to the scientific aspects of modern life, and the means which science provides for extending the scope and security of life and property. Here were men of reputed culture and sagacity intrusted with the care of the savings of thousands, who must have known of the existence of chronometer locks, by means of which the vault would have been closed against even the over trusted janitor who held the combination, during all hours not devoted to regular business. They must have known also of electrical appliances, by means of which

not only the vault but the entire premises of the bank could have been so securely guarded that no well informed burglar would venture to attack it; and if some blunderer did enter the police would be instantly warned, and the invader captured in the act, as has occurred in several instances where the electric alarm has been used.

Yet these reputedly intelligent and careful directors did not realize that they were neglecting to take "all reasonable precaution" to insure the safety of the property in their care. It is, we say, but an additional evidence that men not scientifically educated are very apt to lack an adequate comprehension of the real conditions of modern life—what science has done and is daily doing to change the conditions to which life and property are subject. The incessant advances which science and invention are making to bring even the occult powers of nature into subservience to man are, it is true, so multitudinous and rapid that it is hard for the most studious to keep pace with them. It is true also that the best trained minds are apt to lose their alertness with age, and settle down into grooves out of which it is hard to get. But that only makes it all the more necessary for those in positions of great trust, like bank directors, to have in their employ some one who makes it his business to inform himself some one whose scientific bias leads him to look for scientific aids, and whose scientific training impels him to run counter to tradition and that easy-going confidence in what once sufficed, which, in the case of the Manhattan Bank, led to its easy plunder. Burglars are quick to avail themselves of scientific appliances. They must be met and vanquished in the same field.

It may be observed in this connection that the application of the telephone to the list of electrical safeguards presents a very promising field for experiment and invention. Warehouses, vaults, even the interior of safes, might be secretly and securely connected out of business hours with police headquarters, in such a manner as to insure the certain detection of any unwarranted entrance and the complete reporting of any burglar's movements.

A GRAND WORLD'S FAIR IN NEW YORK.

A numerously attended meeting was held in this city, October 31, for the purpose of initiating a movement for a world's fair to be held in New York in 1889. As expressed by the call, which was signed by many prominent manufacturing and commercial firms the object of the meeting was, in full, to consider the propriety of suggesting to the Mayor of New York that delegates from all the States be invited to assemble in this city on the 30th of April next, that being the ninetieth anniversary of the inauguration of Washington as the first President of the United States, and the establishment of constitutional government, in order that the proposition to hold a great exhibition of the industry of all nations in the city of New York, in the centennial year of that event (1889), or sooner, might be maturely considered.

At the meeting it was unanimously resolved, "That there be appointed an executive committee of ten, with power to add to their number, who shall take into consideration the subject for which this meeting was called, to determine when a National World's Fair shall be held in the city of New York, and authorizing such committee to take such action in the matter as shall be deemed advisable."

A Mexican Exhibition

The Mexican Minister of Public Works has just announced that the Government is about to nominate a commission to organize a special exhibition in that city at a conveniently early date. The exhibition is to be confined exclusively to American and Mexican productions, and to be under the direct auspices of the Mexican Government.

Mr. De Zamacona, who has the credit of suggesting this enterprise, is confident that it will be carried out. It certainly promises to furnish an admirable opportunity for our merchants and manufacturers to extend the export trade of the country. At any rate the friendly spirit shown by Mexico in thus limiting the exhibits to the productions of the United States and Mexico, ought at least to be met in a corresponding spirit; and the best way to show that would be by making a special effort to have our country, its resources and industries, adequately represented.

Australia to have a World's Fair.

The Department of State has been informed by the American Vice-Consul-General at Melbourne that it has been decided to hold an international exhibition in that city, commencing October, 1880. A public garden in the center of Melbourne has been secured for the exhibition, and Parliament has voted $300,000 for the erection of the necessary buildings. This will be the greatest exhibition ever held in the Southern Hemisphere. The Vice-Consul-General suggests that American inventors, for their own protection, should take out patents in each of the Australian colonies, each colony having a different patent law.

THE MOTION OF A WAGON WHEEL.

The instantaneous photographs of trotting horses, taken by Muybridge, of San Francisco, furnish the first visible demonstration of the much disputed fact that the top of a wagon wheel, when running along the ground, moves faster than the bottom. It is obvious that an instantaneous photograph of a wheel, revolving upon its axle in the air, would show all parts of the wheel with equal distinctness. But if the wheel have a progressive motion, and any one portion has a greater motion than its corresponding part, above or below, there must be a liability to blurring in that part of the picture.

These pictures are taken with so brief an exposure that the horse, though moving at a 2:24 gait, is sharply outlined. The wheels of the driver's sulky, however, have a different tale to tell. The lower third of each wheel is sharp and distinct as if absolutely at rest. Not so with the top, that part of the wheel showing a perceptible movement during the two-thousandth part of a second of the exposure of the plate. The upper ends of the spokes are blurred, and the rim likewise, thus giving a physical demonstration of the truth which mathematics establishes.

THE PARIS INTERNATIONAL PATENT CONGRESS.

The mails bring us part of the papers read at the International Congress on Industrial Property, held at Paris September 5th, and following days. The congress was authorized by a decision of the Minister of Agriculture and Commerce, under date of May 12, 1878, and the preparation was zealously undertaken by able men. An elaborate prospectus was prepared containing questions proposed for discussion, some of them rather metaphysical than practical, as will be seen by the resolutions which were adopted. The question of preliminary examinations has been discussed with great heat, but we are not yet informed as to the result. The tendency seems to be toward the adoption by all European countries of a preliminary examination modeled after our own, as a protection to the inventor himself. The committee of organizations consisted of M. Renouard, Senator, Member of the Institute, etc., President; M. Bozérian, Senator; M. Tranchant, Member of the Council of State, Vice-President; Count Maillard de Marafy, President of the Consulting Committee on Foreign Legislation of the Manufacturers' Union; MM. Pataille, Huard, Pouillet, Rendu, authors of works on industrial property; Tusca, Member of the Institute, President of the Society of Civil Engineers; and many manufacturers.

About 300 persons, including members from nearly every state in Europe, were represented at the first session of the congress. From the United States were present Messrs. A. Pollock, of Washington, and Francis Forbes, of New York city. Mr. Pollock was elected one of the Vice-Presidents. The congress met in both the morning and afternoon; in the morning, in three divisions, according to the subject, namely, patents, trade marks, or designs and models. In the afternoon the questions presented by the divisions were debated and passed on by the whole congress. The members were thus enabled to concentrate their attention on the division which particularly interested them.

The following resolutions had been voted on and agreed to up to the time of the close of our advices:

1. The right of inventors and authors in the domain of industry, over their works, or of manufacturers over their marks, is a property right; civil law does not create it; civil law only regulates it.
2. Foreigners ought to be assimilated to citizens.
3. The stipulations of reciprocal guarantee of industrial property ought to be made the subject of special treaties independent of commercial treaties, as well as treaties for the reciprocal protection of literary and artistic property.
4. A special department for industrial property should be established in each country. A central depot for patents, trade marks, designs, and models ought to be added to it for the instruction of the public. Independently of all other publications, the department of industrial property should publish a periodical official journal.
5. A provisional protection ought to be granted to patentable inventions, designs, models, and trade marks shown at official or officially authorized international expositions.
6. The time during which inventions, marks, models, and designs are shown at official international expositions ought to be deducted from the total duration of ordinary protection, and not be added to it.
7. The provisional protection granted to industrial inventors and authors who take part in official international exhibitions ought to be extended to all the countries which are represented at these exhibitions.
8. The fact that an object is shown in an international exposition ought not to be an obstacle to the right of seizure of the article if it is an infringement.
9. Each of the branches of industrial property ought to be the subject of a special and complete law.
10. It is desirable that in the matters of industrial property the same laws should govern a state and its colonies, as well as the different parts of a state. It is equally desirable that the treaties reciprocally guaranteeing industrial property concluded between two states should be applicable to their respective colonies.

PATENT RIGHTS, AND WHO OPPOSE THEM.

In a communication to the Industrial Property Congress, lately held in Paris, Mr. Henry Bessemer, the inventor of the process of steel making known by his name, remarks that our food, our clothing, our light, our homes, with all their thousand luxuries, owe their present character to that indomitable spirit of research and improvement which is characteristic of the present age—a spirit powerfully fostered and deservedly encouraged by those laws which proclaim a personal property in inventions. Without this protection, not merely in the bare idea of some new force or unknown object, but in the development and creation of practical means, based on the new idea, whereby results never before obtained are realized for the benefit and advancement of mankind, Mr. Bessemer has no doubt that the rapid progress which the world has made, and is still making, in arts, sciences, and civilization, would receive a severe check, which would at once stop the avenues to wealth and fame, and would thus dam up the now overflowing stream of human intelligence, bar every road to improvement in the industrial arts, and send us back to those days of superstition and ignorance, from which the light of science has emancipated us.

Yet there are men who oppose all laws securing property in inventions, and whose "retrograde notions" are now being pressed upon the world with unwonted force. Who are they? Mr. Bessemer answers:

First. A class of manufacturers whose purely selfish view is to make the most of their present imperfect means of production. Such men, on principle, oppose all change, because it would personally inconvenience them.

Second. The unintelligent, in all positions of society, who have through life dragged their unimaginative existence along in the same rut, and believe in no other than the beaten path which only they are able to tread. Such people are opposed to all novel ideas.

Third. A too numerous class who, while able to appreciate an improvement in their trade, are not honest enough to pay an inventor for the benefit he has conferred on them, and who either openly set him at defiance, or try to escape his just claims by some miserable evasion of the law; but having been convicted in so doing, have had to pay heavy damages to the persons they have wronged. It is this class of opponents who cry out most loudly against the patent laws.

Doubtless, adds Mr. Bessemer, there are also some honest and honorable men who oppose patents conscientiously, and simply because they believe them to be injurious to the public interests; but this is a very small class, and is composed chiefly of persons having no real practical knowledge of the question, either in its scientific or commercial bearings.

It would be impossible to state more patly and compactly the composition of the anti-patent forces; and it would be well to test the motives of those who shall assail our patent system in Congress next winter by the fact noted under the third classification.

A STEAM JURYMAN.

The other day a summons, commanding Thatcher Magoin to present himself for service in the jury box, was returned to the Commissioner of Jurors with the information that it had been served upon the wrong party. The Commissioner said to the bearer:

"That settles it as far as you are concerned, but Magoin must come here and show cause why he should not be a juror."

"He can't," was the reply, "he's too busy. If he did come he would make things hot for you. Besides, you would have to send a derrick and a truck to bring him. He turns the scales at 5,000 lbs."

The Commissioner was incredulous; worse, he made remarks not complimentary to the speaker's condition with respect to sobriety. Then the summoned man explained.

"I am telling you facts, Mr. Commissioner," he said. "Thatcher Magoin is a steam engine, and is located at the foot of Fletcher street. I am Nicholas Morris, stevedore. Years ago I was employed by a man named Thatcher Magoin. I named my engine on pier 19, East River, after him. When the Directory man came to the dock to get names he saw the name of Thatcher Magoin on the engine, and thinking that he was the boss, put it in the book. You'll see it on page 949."

This, we believe, is the first time that a steam engine has been called to do political duty. There appears to be no reason, however, why a well conducted or well constructed piece of machinery, with a phonographic metric attachment, should not be able to hear and weigh evidence quite as efficiently as the average jury.

Cleopatra's Needle.

Northern climates are ill-adapted for the preservation of stone monuments, at the best; and when there is added to the inclemencies of the weather the action of a corrosive atmosphere, like that of London, the hardest stone stands small chance of preserving its integrity for any great length of years. The Egyptian column, Cleopatra's Needle, is scarcely in position on the banks of the Thames when the question of its preservation engages the attention of the Metropolitan Board of Works. At a recent meeting, the engineer and consulting chemist of the board reported that the surface of the Needle was in a condition that made it liable to be rapidly disintegrated by the action of the London atmosphere and by frost. It was recommended that a trial be made of a "stone solution," to harden the surface and make it impervious to the weather; but, on the assertion by members of the board that the same solution had been used without success on the Houses of Parliament, the matter was referred to a committee for further inquiry.

Electrical Test for Oils.

Professor Palmieri, of Naples, has recently constructed an apparatus which allows the purity of oils to be judged of by the resistance that they offer to the passage of electricity. Olive oil—a poorer conductor than any other—is taken as the standard of comparison. The apparatus may also serve to reveal the presence of cotton in silk fabrics; for a very small proportion of cotton in silk tissues greatly increases the conductivity of the latter.