Scientific American.

MUNN & CO., Editors and Proprietors.

PUBLISHED WEEKLY AT
NO. 37 PARK ROW, NEW YORK.

O. D. MUNN. A. E. BEACH.

TERMS.

One copy, one year - - - - - - - - $3 00
One copy, six months - - - - - - - - 1 50
CLUB RATES { Ten copies, one year, each $2 50 — 25 00
Over ten copies, same rate, each — 2 50

VOL. XXVIII., No. 3. [NEW SERIES.] *Twenty-eighth Year.*

NEW YORK, SATURDAY, JANUARY 18, 1873.

Contents.

(Illustrated articles are marked with an asterisk.)

CAN BUILDINGS BE SET ON FIRE BY STEAM PIPES?

The recent destructive fires have raised the question as to the safety of the use of steam pipes in heating buildings; and as in some instances the true cause has been enveloped in mystery (which is quite natural, as fire destroys all evidences) the Fire Marshal of New York has found it most expedient to throw the blame simply on steam, in those cases where the buildings were warmed by that agent.

As steam may be considered to be the most safe, healthy, and economical of all modes of heating buildings, such a suspicion is to be deplored, as it is apt to raise a prejudice against it; hot air furnaces may be considered dangerous, as proved by the well established evidences of the fire records, but not so with the steam heating. In fact, there is not any well authenticated case on record wherein pipes, through which steam passes, have actually set fire to woodwork, and no one experimentor has yet succeeded in igniting wood with such pipes. We maintain that any man of science who has studied the subject of steam, or any practical engineer of common sense, knows that all that steam can do, even when superheated, is to make the woodwork hot and dry, and to predispose it to catch fire. The spark must be supplied from another source; the steam tubes can never attain, outside the heating apparatus, the high temperature of 900° or 1,000° Fah. required for the red heat which is necessary to set woodwork on fire.

In this city many of the steam heating apparatuses are worked on a pressure not above 10 lbs. per square inch, in excess of atmospheric pressure, which gives a heat of 241° F. for the water in the boiler, and a somewhat less heat, of course, for the steam which circulates through the pipes. In the majority of buildings heated by steam, a common boiler is used, from which steam pipes are carried through the premises, and an ordinary pressure for such boilers is 40 lbs. per inch, which gives a heat of 289° F. At a pressure of 120° lbs. above the atmospheric pressure, we have a heat of 355°. It will thus be seen that at pressures, far above any that are used for heating purposes, the heat circulated in the steam pipes is much below that required for the ignition of wood.

That steam pipes predispose woodwork to combustion, and even may assist the spontaneous combustion which is apt to commence in rags soaked with any animal or vegetable oil, cannot be denied; but then any heating apparatus will do the same, and steam is in this respect not so dangerous as a draft of hot air proceeding from a furnace, in which a leak may carry a spark upward, while a leak from a steam tube is utterly harmless. In regard to spontaneous combustion, any danger of that, from oil, may be avoided by using for lubrication the heavy lubricating petroleum. This material is not apt to oxidation or spontaneous heating, as one of our esteemed correspondents discovered and published in our paper several years ago; which valuable property is now also being publicly recognized in Europe.

THE AUSTRIAN SHOW BEFORE THE SENATE.

It is probably needless to state, that the bill granting $100,000 as an appropriation for American representation at the Vienna Exposition having passed the House, the supporters of the scheme will concentrate every effort to induce the Senate to increase that sum, in order to allow of a raid upon the Treasury proportionate to the extravagant figures heretofore fixed upon by the United States Commissioner. The Senate undertakes the consideration of the measure with a full knowledge of the objections which ever since its reception have been strenuously urged, and with the advantage of the previous discussion on the merits and demerits of the bill.

We have traversed the whole ground so fully and so minutely that there is little, in addition to that which we have already presented, left for us to say. We would urge upon the Senate the simple fact that for this appropriation there is no necessity; because, first, as has already been stated by a representative, our citizens should know that for individual success they must depend upon individual enterprise, individual merit and individual energy, and that they are not to be nursed by the Government so that the few may be enriched at the cost of the great body of the people. Second, because we are sure of an adequate representation in any event. This is but a natural conclusion drawn from the precedent of previous European industrial expositions, in which nearly every large manufactory on the Continent exhibited devices of American origin. Corliss Steam Engines, McCormick Reapers, Amoskeag Steam Fire Engines, Howe, Singer, and Wheeler & Wilson Sewing Machines, Gwynne's Rotary Pumps, Burleigh Rock Drills, Blake's Stone Crushers, Blanchard's Lathes (in every country where they make gunstocks, lasts, spokes for wheels, or irregular forms of any kind), Whitney's Cotton Gins, Gatling's Mitrailleurs, Remington Rifles, Hotchkiss Projectiles, Tilghman Engraving, Root Blowers, Colt's Revolvers, Clothes Washers and Boilers, Silver's Marine Governors, Henderson's Process for Iron, Danks' Rotary Puddling Process, Hayden's Invention for Hollow Ware, Hyatt's Pavements, Print Writing Machines, American Pianos, and Hoe and Bullock Printing Presses are but a portion of the large number of our inventions in constant use abroad which it is safe to say will be found in the coming show.

We would remind Congress that our Centennial Exhibition is now a suppliant for a national subsidy, and that although the same objection to extending Government pecuniary aid to the advertising of private business holds here as well as in the case of the foreign show, still, of the two, if it is deemed expedient to grant such assistance, our own Exposition certainly merits the preference. We need not dwell upon the fact that there are hundreds of matters productive of more benefit to the country at large—the reduction of the national debt, the renewing of our commerce, and the improvement of the navy are but examples—to which every spare dollar in the Treasury could be advantageously applied.

The Centennial has met with decided disfavor from the people, as shown by the withholding of individual subscriptions. Such an expression of popular opinion has but one unmistakable interpretation, and that is that the public, if they refuse to countenance an exhibition, which will draw the industries of other countries to our own borders, which presents no obstacles to the safe display of the world's best products, which at the same time will afford an opportunity for aggrandizing ourselves by the exhibit of our wonderful progress during the past century, they look with still less approbation upon a plan which presents not only an equal but a larger number of disadvantages, with a far less proportionate amount of benefits to be gained.

We trust that, so far from increasing this appropriation, a plan which we understand is to be advocated, the Senate will either strike it out altogether or, if it must be passed, curtail its figures. In reference to the latter event, it may be well to remember that the Chairman of Foreign Affairs in the House, during the recent debate, made the following assertions: "The Secretary of State has sent to the Austrian Government the project of a law that will entirely protect the inventors of this country. That has been received by the Government of Austria, and the Secretary of State expects that it will be approved by that Government. No expenditure will be made under this appropriation except with the approval of and by the direction of the Secretary of State." A strong intimation was added to the effect that, until this law was passed, no disbursements would be made. We would call attention to the fact that it is now several months, according to the showing of the United States Commissioner, since this "project" was forwarded to Austria, and that ample time has elapsed to have some action taken. The feeling in this country is well known to that government, and has been commented upon in the Vienna journals. It is therefore advisable, in view of the rapidly approaching time of opening of the Exposition, April next, that an amendment embodying the above proviso be inserted, in case an appropriation is granted, merely as a protective measure.

COLLAPSING BOILER FLUES.

A correspondent, O. L. M., writes from Niles, Trumbull county, Ohio, to inform us of an accident which affords another illustration of the criminally careless or ignorant engineering which annually destroys so many lives, and which, we regret to be compelled to confess, finds a larger number of victims in the United States than in any other country on the globe. The fact is due probably more to the proverbial recklessness of our people than to any other defect in our national character. So far as it is a consequence of ignorance, we may hope that the pages of the SCIENTIFIC AMERICAN and its engineering contemporaries may be found to furnish a valuable preventive; experience only can teach our reckless people prudence, or even that a good business policy dictates greater caution in proportioning and working steam boilers.

In the case mentioned, the steam boilers of a blast furnace are forty-eight inches in diameter, thirty feet long, and have each two flues seventeen inches in diameter, and three sixteenths inch thick.

The usual pressure carried is forty-five pounds per square inch. Recently, while the engine was standing, the steam pressure rising to fifty-five pounds, one flue was collapsed its entire length. Our correspondent desires to know "what was the cause of the accident." The boiler was well supplied with water, and everything apparently all right.

The cause was, undoubtedly, simply weakness in the flues. They were, probably, a little out of shape when put in, had become somewhat weakened by use, and finally collapsed when the pressure was a little higher than usual. If these flues had been *perfectly round*, they would have had a collapsing pressure, when new, of about $606{,}000 \times (\frac{3}{16})^2 \div 30 \times 17 = 55{\cdot}5$ lbs., as determined by the rule which Fairbairn deduced from his experiments on the strength of flues.

The laps of the girth seams would strengthen the flues to a slight extent, and, in this case, about an equally slight weakening had taken place by loss of shape and by use, so that the collapse finally occurred at just the pressure indicated.

These flues should have been made at least one quarter inch thick, or should have been strengthened by properly fitted rings of angle iron at intervals of seven and a half feet. A good engineer, designing such boilers with a view to making good work and sustaining his reputation rather than deferring to a penny-wise, pound-foolish spirit of economy, would have made them of 5-16, or even 3-8 inch boiler plate. Although our law dictates that boilers should have, when new, a strength only about four times greater than their working pressure, good engineers are inclined to make the "factor of safety" six or more in every part.

The other flues of these boilers should be looked after at once, or they may produce a more serious disaster. It would also be well for those whose lives and property are jeopardized, to ascertain how it happened that, where steam was nominally carried at forty-five pounds, the pressure could by any possibility rise to fifty-five.

PROSPECTS FOR 1873.

We are gratified to be able to state that the subscriptions to the SCIENTIFIC AMERICAN for the new year of 1873 are pouring in from all directions, and there is every prospect that our regular edition for the year will reach the round number of *Fifty thousand copies per week.*

We hope our friends who have not yet renewed and all who are engaged in the formation of clubs will send along their names as rapidly as possible. To prevent the loss of back numbers to those whose remittances are a little tardy, we electrotype each issue and preserve the plates, whereby we shall be enabled to print new editions of any numbers that may be required.

The terms of the SCIENTIFIC AMERICAN are $3 a year· $1.50 for six months.

DU MOTAY'S PROCESS FOR OXYHYDRIC ILLUMINATIO

Our excellent cotemporary, *Les Mondes*, a Parisian scientific weekly, translates our recent article upon oxyhydric illumination, from which, to use its own words, it derives "affliction and consolation at the same time." Speaking of M. Tessié du Motay's system, it says: "Misunderstood in France, the inventor and the invention are received and applauded abroad—in England, Germany, Belgium, and America. The glory of the one and the benefits derived from the other will be the consequence of this unfortunate importation."

Our cotemporary strongly dissents from the adverse report of M. Le Blanc, and adds that proof of the value of the process are pouring in from all sides. The best, it continues, is the demonstration recently made that, by the inventions of M. du Motay, the cost price of about 35 cubic feet of hydrogen is reduced to two cents, and that of a smaller quantity of oxygen to the price of about 13¾ lbs. of coal or other fuel. The lowest quotation of coal, as now selling in Paris, given by the commercial journals, is $10 per tun; so that 2¼ lbs. of fuel costs about one cent; consequently oxyhydrogen gas is worth, per thousand cubic feet, a fraction over $1.14. In this city and the environs, ordinary street gas varies from $2.80 to $3.50 per thousand feet.

The economy of the process is obvious from the fact of fuel in this country being much cheaper. Ten dollars per tun is far above our market rates. Taking into consideration the mechanical nature of Du Motay's process, and even allowing for the increased expense of labor in this country, we should judge, from the above, that this improved and excellent mode of illumination might be supplied at a cost not exceeding one half, or, at most, two thirds that of the inferior gas now in use.

OXIDIZING AGENTS.

We are frequently asked by correspondents to name some of the leading agents employed by chemists, to produce what is called oxidation. The operation is an important one in the arts, as upon it depends the success of bleaching, disinfection, and similar processes. We will mention some of the methods now preferred by chemists for the purposes indicated.

Ozone, if it could be cheaply made, would be almost invaluable, but the cost of production stands in the way of its common use. The permanganate of soda or potash is a chemical compound that cannot be excelled in its oxidizing properties, and its use has gone on steadily increasing for years. In England, under the name of Condy's fluid, it is a common article about the household, and for hospitals and bleacheries it is coming into vogue. A little more knowledge of its value would soon lead to its production on a large scale.

Bleaching powders have long been known and used as oxidizers, and, as they can be had in any quantity, are likely to continue to be employed.

Chromic acid, whether in saturated or dilute solutions, has the power of converting carbonic oxide into carbonic acid, readily and completely under ordinary temperatures. Ammonia gas is powerfully oxidized by it, and it readily destroys organic matter. The chlorates and nitrates can also be mentioned in this connection.