SCIENTIFIC AMERICAN

[Entered at the Post Office of New York, N. Y., as Second Class Matter.]

A WEEKLY JOURNAL OF PRACTICAL INFORMATION, ART, SCIENCE, MECHANICS, CHEMISTRY AND MANUFACTURES.

Vol. XLVI.—No. 16. [NEW SERIES.] NEW YORK, APRIL 22, 1882. [$3.20 per Annum. [POSTAGE PREPAID.]

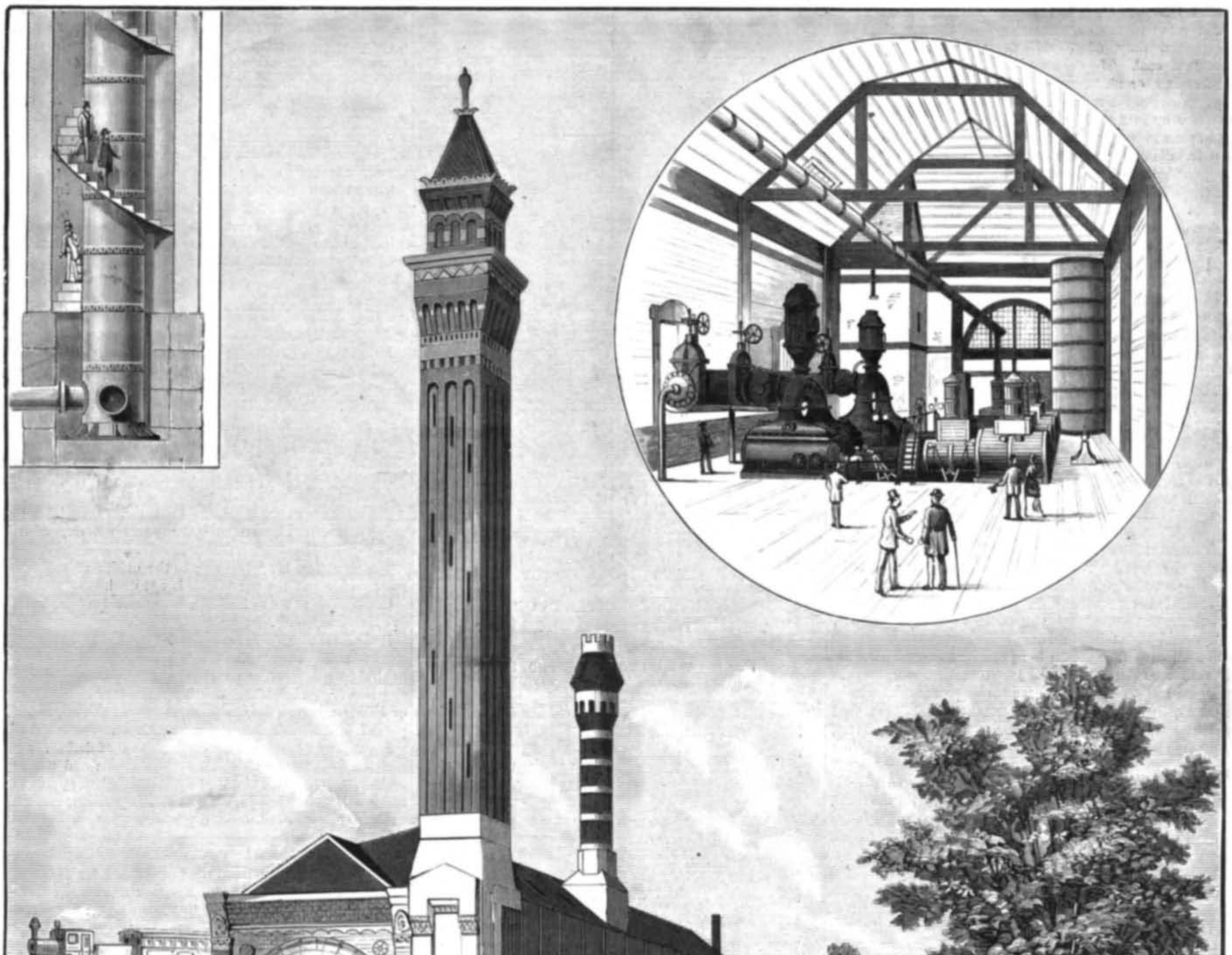
THE NEW HIGH-SERVICE PUMPING WORKS, NEW YORK CITY.

We give interior and exterior views of the new high-service water works which supply all of the higher portions of New York city with water. The architectural design of the building is so well shown in the engraving as to need no description. The tall tower contains the iron stand pipe which gives the head necessary to force the water to the highest point in the city.

The works were built in 1879, under the supervision of the Department of Public Works, of which Mr. Isaac Newton is Chief Engineer. The construction was carried on under the immediate supervision of Mr. G. W. Birdsall, assisted by Mr. Jno. E. McKay.

The Worthington pumping system was selected as being the most desirable on account of its simplicity, the directness of its action, and its peculiar adaptability to the work. Although we have on one or two occasions described the Worthington pumping engines, we will give some of the particulars of its construction and working.

The valves for both cylinders of each engine are arranged on the same stem by raising the chest of the smaller, and each valve is provided with a balancing piston. The valves of one engine are operated by bell cranks directly from the reciprocating parts of the other engine, and no rotary movements with accompanying complications are required. Double cylinder ports are provided; the outer ones receive steam past the ends of the valves, and admit it to the cylinder in the usual way. The inner ones communicate with the exhaust cavity of the valve only, and enter the cylinder at such distances from the ends that, when steam is exhausting through one of the ports, the main piston will run over and close it, and cushion upon the steam thereby inclosed,



THE NEW HIGH SERVICE PUMPING WORKS AT NINETY-EIGHTH STREET AND NINTH AVENUE, NEW YORK CITY.

the outer port being at the time shut off by the main valve. Valves are provided to put the two cylinder ports at each end in communication to regulate the extent of cushioning. The pump valves consist of rubber disks arranged in chambers above and below the plungers. Each plunger runs without packing in a long grooved ring in a central diaphragm. In operation, one engine, while in full action, moves the valves of the other, when the pistons of the latter gradually begin to move and finally attain full velocity, as those of the first are checked by the steam cushions, and gradually come to rest, the pump valves meantime seating quietly.

The first engine pauses a moment till the second engine admits steam, when it commences a return stroke, and the second comes to rest—the action of one blending into that of the other as each alternately takes up the load—the result being that the discharge is uniform, a uniform pressure is maintained in the main, and the pumps under heavy or light pressure operate without jar or noise.

In the Ninety-eighth Street works there are two compound condensing Worthington pumping engines, each capable of raising 7,500,000 gallons 100 feet high in 24 hours. This is equivalent to 132 horse power each. The high pressure cylinders are 21 inches diameter; the low pressure, 36⅜ inches; water plunger, 26 inches diameter; all 48 inches stroke. The high pressure cylinders have cut-off valves in the steam ports, so that part of the expansion takes place in the small cylinder. This is a new feature introduced for the first time on this engine.

According to the department report, these engines are showing a duty of 70,000,000 foot pounds with 100 pounds of coal. They are pumping over 8,000,000 gallons per 24 hours, or about one-eighth more than contract capacity. There are 4 return flue tubular boilers, each 6 feet diameter by 16 feet long, with 75 4-inch tubes. They are set in pairs in brickwork. The stand pipe on delivery main is 6 feet diameter and 150 feet high. It is made of boiler iron, one-half inch thick at the base, and thinner toward the top. The tank on the suction pipe is 8 feet diameter and 44 feet high. Suction and delivery pipes are each 36 inches in diameter.

The engine and boiler house extends from Ninety-seventh to Ninety-eighth streets, and is 50 feet by 200 feet, and has room for a third engine and more boilers. In connection with the main engines there is a Worthington pump of 16 inch steam cylinders, 10¼ inch water cylinders, and 10 inches stroke, which returns the water of condensation of the large engines back into the mains. This small pump exhausts into the condensers of the large engines.

The water is supplied to these works through a 36-inch main from the Central Park reservoir.

Taken all in all, this system of pumping is as fine an example of the direct and economical application of the power of steam as could be desired. The pumping proceeds with perfect regularity, without noise or jar, and is accomplished without rotating shafts, wheels, or gearing of any kind.

The Fastest Steamer.

A recent trial of the new Clyde built steamer Stirling Castle gave results upon which her owners claim her to be the fastest ocean going steamer in the world. Six consecutive runs at the measured mile gave a mean speed, on the Admiralty method, of 18·418 knots, or 21$\frac{3}{16}$ miles per hour. The actual time taken in running each mile respectively was 3 minutes 13 seconds; 3 minutes 23 seconds; 3 minutes 12 seconds; 3 minutes 18 seconds; 3 minutes 13 seconds; and 3 minutes 18 seconds.

On the trial there was a cargo of 3,000 tons dead weight on board. Her length is 430 feet, breadth 50 feet, and depth 33 feet, and she registers 4,300 tons. Her engines are of the three cylinder type, and have developed 8,237 horse power. The diameter of the high pressure cylinder is 62 inches, and the two low pressure 90 inches, with a 5 foot 6 inch stroke. Surface condensers are used with Gwynne's "Invincible" circulating pumps. The boilers are of steel, and present a total heating surface of 21,161 feet; the grate surface is 787 square feet; and the working pressure 100 pounds to the square inch. The propeller is made of manganese bronze, is 22 feet 4 inches in diameter, with a pitch of 31 feet. The maximum number of revolutions at the trial was 66½ per minute, accompanied, the *Engineer* says, by absolutely no vibration of, except in the immediate vicinity of the screw shaft. The hull is built of steel, on plans approved by the Admiralty, with a view to national requirements, and is capable of carrying coal for a twenty days' cruise.

The Stirling Castle is intended for the tea trade. In view of her performance the recommendation of our board of naval advisers to build "fast" cruisers having a maximum speed of 15 knots would seem to be a trifle out of season. Twenty-five knots should be the figure aimed at.

A Foolhardy Project.

Captain Fred. Norman, who crossed and recrossed the Atlantic with George Thomas in the Little Western (16½ feet long by 6½ feet wide), now proposes to row across the Atlantic alone. He says he will use a boat built under his own supervision, about 12 feet long by 4 feet wide, and from 2 to 2½ feet deep, partly covered fore and aft. He will take a floating sea anchor to keep the boat's head to the wind while he sleeps. He will have no fire but a lamp, and will use prepared food, condensed coffee, and carry about fifty gallons of water. He thinks he could make the voyage in 100 days.

Scientific American.

ESTABLISHED 1845.

MUNN & CO., Editors and Proprietors.

PUBLISHED WEEKLY AT

No. 261 BROADWAY, NEW YORK.

O. D. MUNN. A. E. BEACH

TERMS FOR THE SCIENTIFIC AMERICAN.

One copy, one year postage included $3 20
One copy, six months postage included 1 60

Clubs.—One extra copy of THE SCIENTIFIC AMERICAN will be supplied gratis for every club of five subscribers at $3.20 each: additional copies at same proportionate rate. Postage prepaid.

Remit by postal order. Address

MUNN & CO., 261 Broadway, corner of Warren street, New York.

The Scientific American Supplement

is a distinct paper from the SCIENTIFIC AMERICAN. THE SUPPLEMENT is issued weekly. Every number contains 16 octavo pages, uniform in size with SCIENTIFIC AMERICAN. Terms of subscription for SUPPLEMENT, $5 00 a year, postage paid, to subscribers. Single copies, 10 cents. Sold by all news dealers throughout the country.

Combined Rates.—The SCIENTIFIC AMERICAN and SUPPLEMENT will be sent for one year postage free, on receipt of *seven dollars*. Both papers to one address or different addresses as desired.

The safest way to remit is by draft, postal order, or registered letter.

Address MUNN & CO., 261 Broadway, corner of Warren street, New York.

Scientific American Export Edition.

The SCIENTIFIC AMERICAN Export Edition is a large and splendid periodical, issued once a month. Each number contains about one hundred large quarto pages, profusely illustrated, embracing: (1.) Most of the plates and pages of the four preceding weekly issues of the SCIENTIFIC AMERICAN, with its splendid engravings and valuable information; (2.) Commercial, trade, and manufacturing announcements of leading houses. Terms for Export Edition, $5.00 a year, sent prepaid to any part of the world. Single copies 50 cents. ☞ Manufacturers and others who desire to secure foreign trade may have large, and handsomely displayed announcements published in this edition at a very moderate cost.

The SCIENTIFIC AMERICAN Export Edition has a large guaranteed circulation in all commercial places throughout the world. Address MUNN & CO., 261 Broadway, corner of Warren street, New York.

NEW YORK, SATURDAY, APRIL 22, 1882.

Contents.

(Illustrated articles are marked with an asterisk.)

TABLE OF CONTENTS OF

THE SCIENTIFIC AMERICAN SUPPLEMENT

No. 329,

For the Week ending April 22, 1882.

Price 10 cents. For sale by all newsdealers.

UNIFORMITY IN CHEMICAL NOMENCLATURE.

We possess authority for the statement that a rose would smell as sweet by any other name, and we have had olfactory demonstration that hydro-sulphuric acid, hydric sulphide, or sulphureted hydrogen retains its characteristic repulsiveness under all its numerous aliases. Notwithstanding that the premises are granted, it must be confessed that too many names for one substance are objectionable. Chemists have long recognized the fact, and while they have no desire (or power) to change the old familiar terms used in trade and in the arts, such as bluestone, aquafortis, and vitriol, they are making a vigorous effort to establish uniformity in scientific nomenclature. A convenient basis for such a change is offered in the circular recently issued by the editor of the *Journal of the London Chemical Society*, containing "Instructions to Abstractors." The nomenclature here advocated is employed in the new supplement to "Watts' Dictionary of Chemistry." As both of these works are widely read and acknowledged as authority on scientific matters, whatever nomenclature is adopted therein must soon become familiar to most English-speaking chemists, and ought to come into use sooner or later in their writings.

Some of the rules laid down in the circular seem rather arbitrary, and many familiar names give place to those that are new or unfamiliar. Without, however, stopping to criticise, we will proceed to describe some of the most important points.

In naming salts, use the name of the metal followed by an adjective representing the acid or negative radical: sodium chloride, potassium sulphate, ferrous sulphate, mercuric chloride. The terminals *ous* and *ic* are used only when there are two salts of the same metal, differing only in degree.

When a metal or alcoholic radical unites with hydroxyl (OH) the compound is called a *hydroxide* instead of a hydrate: thus, potassium hydroxide for caustic potash, or potassa, KOH; and phenyl hydroxide for carbolic acid, $C_6H_5(OH)$. The name hydrate is reserved for compounds supposed to contain water of combination or crystallization.

The term *acid* is applied only to compounds of hydrogen with negative radicals, such as HNO_3, H_2SO_4, H_3PO_4. Oxides which replace acids are called *anhydrides* as before.

Salts in which all the hydrogen of the acid is displaced by the metal are called *normal* instead of neutral salts. The old bisulphate or acid sulphate of soda becomes hydrogen sodium sulphate.

The principle of naming hydrocarbons is best shown by a few examples; thus, CH_4 is methane; C_2H_6, ethane, etc.; C_2H_4 is, as before, ethylene; C_2H_2, acetylene; C_3H_4, allene.

All alcohols have names ending in *ol*; thus, quinol for hydroquinone, resorcinol for resorcin, glycerol for glycerin, mannitol for mannite. Words like indol that now end in *ol* have an *e* added, thus, indole. Furfurol becomes, however, furfuraldehyde. Ethers derived from phenols have names ending in *oil*.

Alcohols are to be spoken of as mono-, di-, or tri-*hydric*, instead of monobasic, etc.

Bodies such as acids of the lactic series containing the group OH should be termed *hydroxy-* and not oxy- derivatives.

The term *ether* is applied only to the oxides of hydrocarbon radicals, and the word *esther* is not used.

Compounds of the radical SO_3H are called *sulphonic* acid, or *sulpho-compounds*.

Basic substances have names ending in *ine*, as aniline, instead of anilin, the termination *in* being retained for certain neutral compounds like palmitin, albumin, etc. The compounds of basic substances with hydrogen chloride, bromide, or iodide receive names ending in *ide* and not *ate*, as morphine hydrochloride and not hydrochlorate.

For formulæ dots are employed instead of dashes; Me is used for CH_3, Et for C_2H_5, Ph for C_6H_5, etc.; and the formulæ is written *in one line* if possible. This latter point will make a large saving in the cost of composition, and be a welcome change to editors and printers.

CARELESSNESS AS A CAUSE OF FIRE.

The records of the city Fire Department for 1881 show that the commonest cause of fire was sheer carelessness. There were 1,785 fires in all, in 70 per cent of which the damage was less than $100. Eleven fires were proved to be of incendiary origin, and the causes of 168 were not discovered.

The largest item in the classification of causes was carelessness with respect to matches, smoking, lights, and hot ashes. There were 413 such fires, and nearly as many more were attributed to accidents, not necessarily through carelessness, with stoves, fires, furnaces, and grates.

Sixteen fires were traced to boys' bonfires, 81 to children playing with fire and matches, and 13 to malicious mischief on the part of children. Sixty-three fires originated in kitchens, many of them by the falling of fat meats and the like into the fire. Ten cases are attributed to contact of clothing with stoves. Defective flues, fireplaces, chimneys, stove-pipes, and grates caused 62 fires; beams built in flues, 14; overheated stoves and pipes, 41; foul chimneys, 186; falling soot, 41; coals from stoves and grates, 18. Six fires were caused by overturned or leaky kerosene stoves, and 127 by accidents to kerosene lamps. Fires from gas were fewer: 28 from escaping gas; 3 from explosion of gas; one gas meter exploded, and one gas stove was upset, causing fire. Still fewer were the fires charged to electricity, only 4 being attributed to this agent. One of these fires, which occurred in the Germania Theater building, was in its origin decidedly