

THE  
AMERICAN GAS LIGHT ASSOCIATION.

---

REPORT OF PROCEEDINGS

OF THE

Seventeenth Annual Meeting, Held at Baltimore,  
OCTOBER 16, 1889,

THE

Eighteenth Annual Meeting, Held at Savannah,  
OCTOBER 15, 1890,

AND THE

Nineteenth Annual Meeting, Held at New York,  
OCTOBER 21, 1891.

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**SEPTEMBER, 1892.**

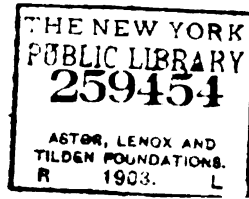
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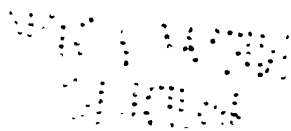
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in this class, in noting the various forms that have achieved commercial success, we find that no matter how much they differ in design, in proportion, in detail, or in construction, there is one great central feature common to all—a feature that has made the system a success, and which is the basis of their classification, as a process—and that feature is: the use of a superheater for storing up waste heat from the generator, by which to fix or make permanent the mixture of steam and oil gases.

In the second class—or Section B (“Generator Processes in which water gas is made, carbureted and fixed entirely in one operation, one apparatus, and one fire; usually through the medium of a superheater”)—we have:

- 1st. The Lowe apparatus.
- 2d. The Granger apparatus.
- 3d. The Hanlon-Leadley apparatus.
- 4th. The Springer apparatus.
- 5th. The McKay-Critchlow apparatus.
- 6th. The Flannery apparatus.
- 7th. The Martin apparatus.
- 8th. The Pratt and Ryan apparatus.
- 9th. The Van Steenburg apparatus.
- 10th. The Loomis apparatus (early type for illuminating gas.)

*The Lowe Process and Apparatus:*—The credit for the invention of the process (which is the basis of the class of apparatus we are now about to notice), whether considered chronologically, practically, or legally, belongs unquestionably to Prof. T. S. C. Lowe, of Norristown, Penn.

Identified with gas interests since the war of the rebellion, where as chief aeronaut of the army of the Potomac, he was engaged in the manufacture of gas for ballooning purposes, and later connected with the illuminating gas interests, in 1872 he took out a patent containing some of the features of and leading up to the patent of 1875, which is the base of the modern water gas system. This, as to time, is about the same period as the first Tessie du Motay plant in New York.

Devoid of technicalities, the Lowe process covers broadly the use, in connection with a generator, of a superheater or fixing chamber, fired by the combustion within it of the gases

which are formed in "blowing up the heat" in the generator; also the introduction of oil, or other enriching substances, into the hydrogen gas and the fixing of the two by passage through the superheater into one permanent fixed gas. The process also covers the use of the superheater for superheating steam, if so desired, instead of for fixing the gas.

The first Lowe apparatus was erected in Phoenixville, in 1873; the next at Conshohocken, and the third at Columbia, Penn., all by the inventor himself.

Messrs. S. A. Stevens & Co. then took an agency (their first works being at Utica, N. Y.,) and later organized the "American Gas, Fuel and Light Co." to whom a general license was given. About the same time Messrs. A. O. Granger & Co. commenced building this apparatus, closely followed by Messrs. Pierson Bros., and the "National Gas Co."

By these various parties, Lowe apparatus was erected at very many places throughout the country, until 1882, when the patent rights were acquired by the United Gas Improvement Co., of Philadelphia, who have since continued the erection of the apparatus.

I show two cuts of the Lowe apparatus. Fig. 20 shows the earliest and original form. Fig. 21 shows the latest construction. In general features, sequence of parts and operation, they are alike: "A," the generator, a fire-bricked lined chamber, contains anthracite coal, or coke, which is raised to a state of incandescence by an air blast, admitted beneath the grate. The products of combustion, or gases, formed in this operation pass out at the top through the "goose-neck" connection "C," to the base of the superheater "B," where, by the admission of a secondary air blast, they are burned, heating the fire brick with which the superheater is filled. When the proper heats are obtained, the blasts are shut off, stack valve closed, and steam admitted beneath the grate in generator "A." This passing up through the coal, and decomposing, forms a non-luminous water gas, and meets the oil vapors for enriching, which are admitted through pipes in the top of the generator. The oil and steam gases then pass through pipe "C" to superheater, where, by contact with the red hot fire brick, they are "fixed" into a permanent illuminating gas.

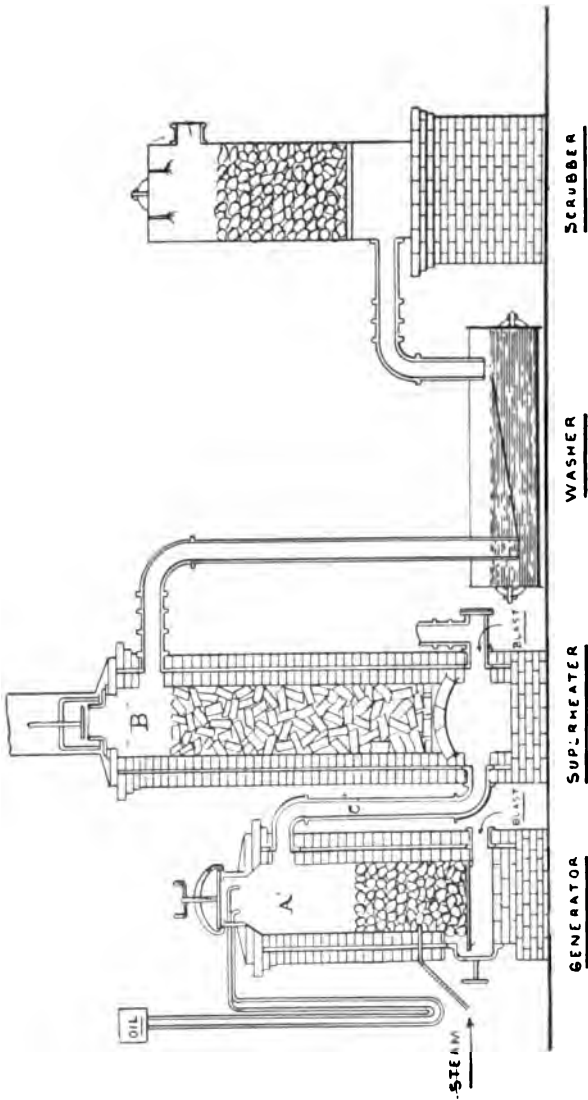


FIG. 20.—ORIGINAL FORM LOWE APPARATUS, 1873.

Fig. 20 is of interest as showing the crude early construction of the apparatus, and the old form of hydraulic seal or "washer," with diaphragm, which, holding the gases under water, not only

“washed” the gases, but frequently, also, washed out some portion of the illuminants. For which reason this form was speedily discarded.

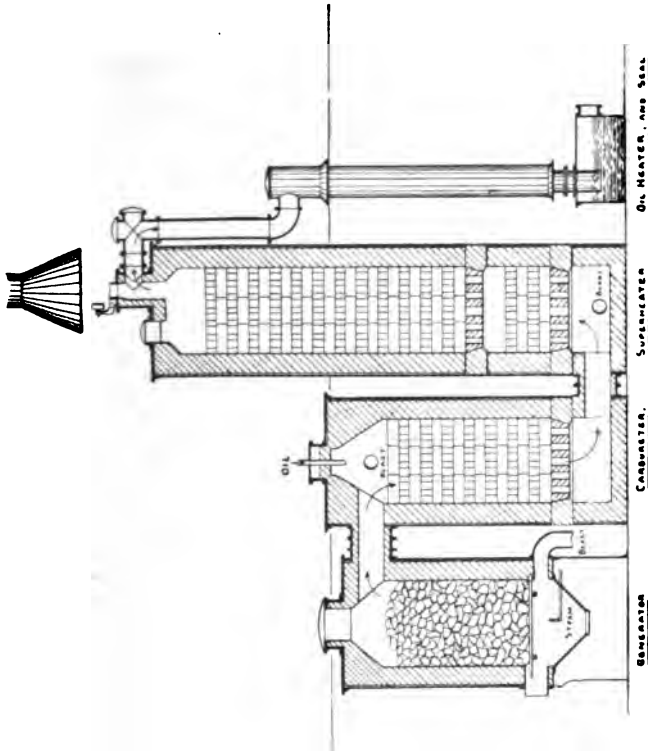


FIG. 21.—MODERN FORM LOWE APPARATUS, 1889.

Fig. 21 shows the modern or “double superheater” construction—the chief changes (aside from the mechanical and detail work) being the increase in depth of the generator, and the enlargement of the old pipe connection “C” into an entire superheater.

The filling brick in this first superheater, or “carbureter,” as it is usually termed, from the fact of the hydrocarbons being often there admitted, is peculiarly arranged for the use of heavy oils. Ordinary checker bricks are used, but so laid up that continuous “core holes” are formed from top to bottom, which in the use of crude oils, allow the heavier impurities to drop entirely to the cleaning doors at base.

A highly efficient form of the double superheater type is that known as the "Humphrey's" setting, as erected at Chicago, Toledo, Terre Haute, etc. In this arrangement two complete sets of apparatus are connected by flue at the generators. Both sets of apparatus are "blown up" together. In gas making steam is admitted at the rear of one set, is superheated and carbureted in this set, and passing on to the second is finally gasified and "fixed." During the next run this course is reversed, steam being admitted in the opposite set. This setting is particularly adapted to large works.

The claims for this form of apparatus, aside from the general ones of high economy, etc., are, first—by the great depth of generator, the ability to use coal or hard or soft (gas house) coke at pleasure; second, by the utilization of waste heat, for the highest pre-heating of the oil, and by the use of two superheaters, maintained at different heats, the ability to use, to the best advantage, cheap crude oils, or distillates, etc., and, third, by the great superheating capacity, the ability to properly fix the gas at moderate heats: so doing away with the danger of lamp-black and naphthaline accompanying high heats, and the question of lack of fixing of the gas, present in some other forms of apparatus.

The Lowe apparatus, in various forms, has been erected all over the country. I will not here attempt to list the places; a glance at the chart behind me will show its record.

*The Granger Apparatus:*—The first of this class to make its appearance after the Lowe was the Granger apparatus, of which I show a typical setting in Fig. 22.

The firm of A. O. Granger & Co., dating from 1878, originally erected Lowe water gas apparatus, under license from S. A. Stevens & Co., then controlling the patents. In doing this, many improvements in detail and in construction were made, and finally, patents were taken out for the "Granger" form, which you can readily see is an evolution from the Lowe. The two most essential differences were: First, the doing away with the old goose neck, heat-radiating connection ("C" in Fig. 20) by locating the generator in the cellar, with the shells slightly lapping, thus giving a short direct connection from shell to shell, and bringing all the operations of gas making upon one

floor; and, second, the introduction of the oil, at a high temperature, in the form of a spray or vapor, at the base of the superheater; the claim being that in such a form it was much more readily taken up and gasified by the hot stream of water gas than as before when dropped upon the top of the coal bed of

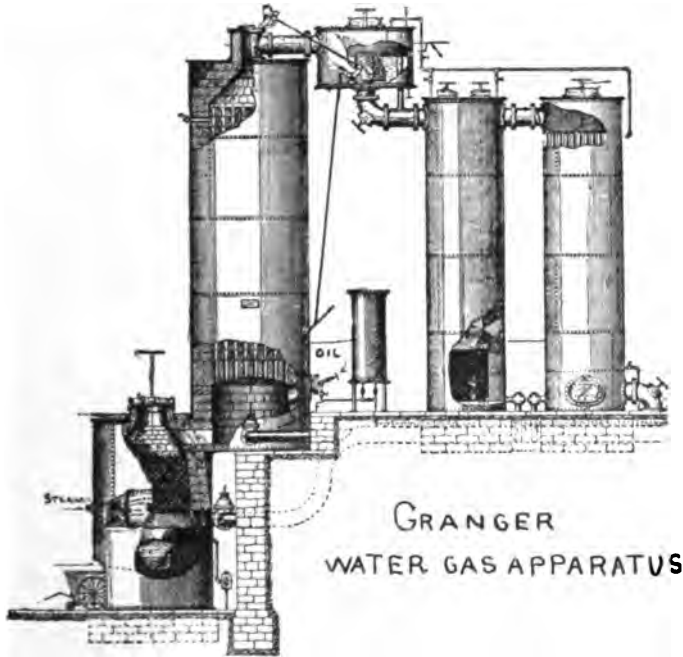


FIG. 22.

the generator in a solid stream. Messrs. Granger & Co. went largely into the detail of parts and of construction, and by erecting a simple and effective plant, did much to popularize this type of water gas apparatus. Their efforts were highly successful, for up to 1885 they erected, chiefly in the middle and eastern States, over seventy sets of apparatus. One plant erected by this company at Chicago, with generator 13 feet in diameter, is interesting as indicating the limit of size to which a generator may be made. This plant in question, while turning out great quantities of gas, yet owing to the large mass of fire to be handled, and practical difficulties of construction and

operation, was not entirely satisfactory, and precisely as experience has determined a practical limit in size for retorts, so were Messrs. Granger & Co. well convinced that the limit for size of generators had been exceeded.

In 1885, the Granger Water Gas Co., was consolidated with the United Gas Improvement Co., since which time this form of apparatus has been erected by the latter company.

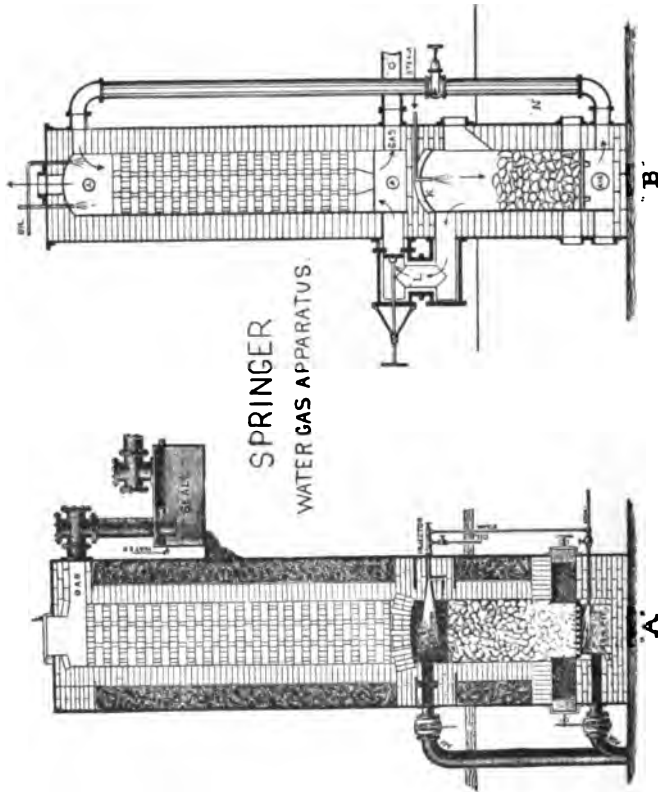


FIG. 23.

*The Springer Apparatus:*—Closely following the preceding, as a practical and efficient apparatus, comes the “Springer” cupola system. This form of construction, under the patents of Mr. T. G. Springer, which were later transferred to the “National Gas Light and Fuel Co.,” by whom the system is now controlled, has the chief distinctive features of a generator and superheater

entirely in one shell; of certain new methods of introducing the oil and of certain modifications of the course of the gas through the apparatus; the advantages claimed being the minimum of radiation and the maximum of heat conserved for the superheater, together with superior economies in general.

This single shell, or "cupola" form of apparatus, was also one of the several earlier forms of apparatus erected by Prof. Lowe, and has since been adopted by later constructors, as will be noted further on.

The first Springer plant was erected in Chicago, in 1882, since which time it has rapidly grown in favor, large plants having been erected in San Francisco, St. Paul, Minneapolis, Chicago, etc., and also in many smaller cities and towns, chiefly in the Western States, around the upper Mississippi.

Fig. 23 illustrates this apparatus; "A" being the original form and "B" a modification of it. In this latter form, the generator is "blown up" in the usual way, the gases passing through the combustion pipe "L" around the solid arch "K" to the superheater.

In making gas, steam admitted at "M" (the pipe "L" being closed) passes down through the coal bed and up the external pipe "N," to top of superheater, where it meets the oils, which together pass down through the superheater, and out at "O." A still later modification of this construction permits the course of the steam and gas currents to be either up or down.

*The Hanlon-Leadley Apparatus:*—The first Hanlon-Leadley apparatus was erected at Passaic, N. J., 1884, by the United Coal and Oil Gas Co. controlling the patents. Since then numerous plants have been erected at other points, viz.: Reading, New Haven, Chicago, Manchester, Philadelphia, etc. The apparatus, containing all the essential features of the Lowe, is chiefly distinguished by the use of two or three generators on a common communicating base. Perhaps the best illustration of which is the latest plant erected, known as the "W" setting, and which I show in Fig. 24. The three generators are all blown up to a proper heat together, part of the products of combustion being used to heat the small superheaters "B," the bulk of the gases, however, passing through the three pipes, "K" "K" "K," to heat the two superheaters "P" "P," also