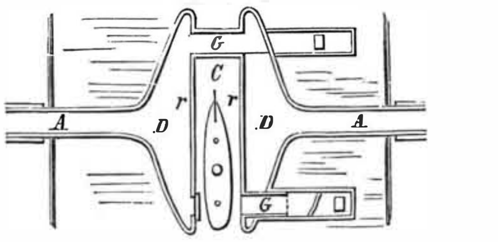
ers, and other craft, yet with exceptional provision and capacity to allow large ships with the highest masts to pass through up to London Bridge, without stopping for one second the vehicular and passenger traffic. My patent bridge, as is seen in the drawing, has but one approach from each shore. When these approaches have extended into the river about one third its width, the roadway splits into two roads, each the same width as the approaches, by easy inclined angles outwardly extending till they meet midway, thus forming a sort of angular oval or loop in the largest diameter. I have on each side two openings, practically covered and united by platforms, turning on their centres, each opening or closing by one operation. These openings permit the entrance on the port side of the largest ships that come up the Thames ; there is also a sufficient width allowed for the length of the ships within the loop. From the central piers on which the turntables work there is extended a platform uniting the two extremes, so that this platform lies with the axis of the river, dividing the loop into halves, furnishing the means of mooring the ship a few minutes alongside by mooring-blocks. There are two other platforms running parallel to the chief platform, which keep the ships straight on their road. The vessels return on the opposite, still going port; thus all risk of collision is avoided. The platform will have narrow lighters, rising and falling with the tide, thus protecting both piers and vessels from injury. As soon as a vessel is about to enter the loop, the roadway on the side by which it is to enter is closed, and the vehicular and general traffic, by closing the gates (when the roads divide), is diverted to the opposite side ; then immediately the turn-table bridge is opened, and the vessel enters the loop, so that when it is fairly in, the bridge is closed behind it, and, as before described, the traffic is diverted on the road behind the ship, and the opposite turn-table is opened, suffering the ship to pass out on its way. By these means the traffic will suffer neither delay nor inconvenience ; the vehicles and general traffic will pass imperceptibly from one side of the loop to the other. Neither frost nor fog will prevent the traffic across the river, which must inevitably occur with the ferries.

Should my patent bridge be adopted, I should propose that it be either a girder or trellis bridge, with three granite tiers on each side, on which the movable roads should work.

Either girder or trellis bridges possess great advantages ; firstly, by occupying so small a part of the stream by the columns that carry the roadway ; secondly, by their costing such an inferior outlay ; and lastly, by their rapidity of construction.

I have little doubt such a bridge could be opened for traffic in less than two years from its commencement.

The historical researches of the author as to ancient and modern bridges are quite interesting, but not sufficiently thorough in respect to the originality of the particular plan that he presents in connection with his name as inventor and patentee. Had he searched the records of the American Patent Office, or the pages of the SCIENTIFIC AMERICAN, which are on file in the library of the British Patent Office, he would doubtless have observed that the plan of double draws is an American invention of several years' standing. We give beneath, as one example, a diagram from the patent granted in this country, April 7th, 1868, to Thomas S. Speakman, of Camden, New Jersey.



G G are two draw-bridges, one of which is always open to admit vessels into the draw, while the other is closed to permit the constant passage of traffic, which moves from the roadways A along the widened parts D, according to the respective positions of the draw-bridges.

ON GAS-BURNERS.

By J. PATTINSON, President of the Newcastle Chemical Society.

HOW best to burn coal-gas so as to obtain the greatest amount of light it is capable of producing, is a subject which is perhaps as yet but imperfectly understood, even by those who know most about it. Great improvements have, however, been made in recent years in the construction of gas-burners, resulting from the researches of Frankland, Bowditch, Sugg, Silber, the London Gas Referees, and others ; but from many causes, chiefly, perhaps, for want of information on the subject among the general public, these improved burners have come but very slowly into use. The gas-fitters, to whom the choice of burners is usually left, often know as little about the subject as any one, and thus a wretchedly bad kind of burner is in many cases used which burns the gas so as to destroy a great portion of its light-giving power. In the present paper no attempt is made to describe even a tithe of the multiplicity of burners which have been invented. The object is simply to describe the results of an examination I have recently made of a number of burners taken off fittings in various parts of Newcastle, and to show how unfit these burners are to develop the light-producing properties of gas as compared with good burners, which may be had quite as easily as the bad ones.

Gas-burners may be divided into two great classes : first, Argands, such as give a ring of light and require glass chimneys ; second, flat-flame burners, which may be subdivided into whatare known as "batwings" and "fishtails," so called from the shape of the flames they produce.

In the experiments I have made, the gas used was of the same quality throughout the whole of the tests. It gave a light equal to 14.1 standard sperm candles when burnt at the rate of 5 cubic feet per hour in the standard Argand burner, known as the Sugg-Letheby burner. Before about seven or eight years ago this was the best burner known, and as it was in use at the time when the Newcastle and Gateshead Gas Company obtained their Act of Parliament, it is still retained as the standard by which the gas is tested. It is but fair to state here that the quality of the gas was unusually low when the experiments were made, the gas usually being equal to about fifteen standard candles. It may be explained for the benefit of the uninitiated that the standard sperm candle with which the gas is compared is one defined in the Act of Parliament as a "sperm candle of six to the pound, burning at the rate of 120 grains per hour."

I will first of all give the results of the testing of Argand burners. The Argand burner when properly constructed is the one best adapted for obtaining the greatest amount of light from common coal-gas. The air-supply, upon which so much depends, is most perfectly under control in such burners. Argand burners are certainly more expensive in their first cost, and perhaps are more troublesome to keep in order than flat-flame burners, owing to the occasional breakage of chimneys and other causes, but it will be seen that the amount of light they can produce in comparison with the latter is very great, and would soon compensate for their extra cost and the extra trouble of keeping in order, especially in private houses. They require the gas to be supplied to them at a uniform pressure, otherwise they are liable to smoke when the pressure is increased, and more gas passes through than they can burn. They should, therefore, always be used with regulators for regulating the pressure of the gas. These may be conveniently placed near the supply-meter.

In each of the following tables the first column shows the actual amount of gas consumed per hour in cubic feet during the experiments ; the second gives the illuminating power of the gas consumed expressed in standard sperm candles ; the third gives the illuminating power calculated per five cubic feet of gas :

ARGAND BURNERS.

Kind of burner.	Cubic feet of gas used per hour.	Illuminating power in candles.	Illuminating power per 5 cubic feet of gas per hour.
Sugg-Letheby Standard	5.0	14.10	14.10
Sugg's "London Argand"....	5.0	15.90	15.90
Sugg's "Improved London Argand"......	4.5	16.08	17.86
Silber's Argand............	5.0	17.80	17.80
Common Argand............	5.0	11.20	11.20
" "	7.0	17.80	12.70

The common Argand here mentioned was one similar to a great number used in shop-windows in Newcastle. It will be seen that with the Sugg's Improved London Argand and Silber's Argand as much light is produced when burning five feet of gas as is produced when burning seven feet of gas in the common Argand, thus showing a saving of 40 per cent over the last-named burner.

Flat-flame burners do not consume the gas so as to give as much light from a given quantity of gas as Argands. This is perhaps chiefly owing to the circumstance that it is necessary to make the gas issue from the burner under a certain amount of pressure, in order to produce the required shape of flame, and this pressure causes a portion of the gas to mix with too much air, so that it becomes over-burnt, as in the Bunsen burner. The best flat-flame burners are those in which this pressure is reduced to the minimum amount found necessary, and such burners generally have some contrivance for checking the pressure of gas supplied at the mains. But although flat-flame burners are not so economical as Argands in their consumption of gas, yet they possess other advantages which probably will always cause them to be extensively used. The first cost of the burner is very trifling, no chimneys are required, they are not so liable to smoke under varying pressures of gas as Argands, and they are easily lighted and attended to.

It is in this class of burner that the most extraordinary differences in quality for burning gas so as to produce light have been found. The following table shows the results of my tests of various new batwing and fishtail burners which can be had in Newcastle. Some of the burners were tried with different consumptions of gas.

NEW BATWING AND FISHTAIL BURNERS.

Kind of burner.	Cubic feet of gas used per hour.	Illuminating power in candles.	Illuminating power per 5 cubic feet of gas per hour.
Bray's No. 4 Fishtail..........	4.0	5.02	6.28
Same Burner............	5.0	5.80	5.80
Bray's No. 6 Fishtail..........	5.0	9.00	9.00
Bray's No. 8 Fishtail..........	5.0	11.80	11.80
Same Burner............	7.0	14.21	10.15
Brönner's No. 4 Batwing......	4.0	10.10	12.62
Same Burner............	5.0	11.60	11.60
Sugg's No. 4 Batwing.........	4.0	8.40	10.50
Same Burner............	5.0	10.90	10.90
Batwing, with narrow slit.....	5.0	8.60	8.60
Batwing used in street lamps..	5.0	11.60	11.60
Fishtail, with small platinum disk in flame............	5.0	10.20	10.20
No. 5 Fishtail, metal top......	5.0	7.50	7.50

It is difficult to get exact uniformity in the same kind of burner of each manufacturer, and the above burners may be inferior to others of the same kind. They were, however, selected at random. The results show that the best Argand burners produce upwards of one third more light from the gas than the best of the flat-flame burners, so that, taking light-producing properties alone into consideration, there is an advantage to this extent in favor of Argand burners. Bray's, Brönner's, and Sugg's are all good burners. It will be seen that Bray's No. 8 fishtail is much better adapted for burning the kind of gas experimented with than the No. 4 and No. 6 fishtail of the same maker.

The next table gives the results of my trials of various burners recently taken from fittings in houses in several parts of Newcastle.

BURNERS IN USE IN NEWCASTLE.

Kind of burner.	Cubic feet of gas used per hour.	Illuminating power in candles.	Illuminating power per 5 cubic feet of gas per hour.
Batwing, metal top...........	5.0	9.26	9.26
" " " double slit.	5.0	8.90	8.90
Fishtail, No. 3, metal top.....	3.5	4.10	5.85
" " steatite top...	3.7	4.40	6.00
" "	4.0	3.00	3.75
" No. 4, steatite top...	4.9	5.20	5.31
" No. 5, " " ...	5.0	7.80	7.80

It thus appears that burners are in use in Newcastle which give a light equal to only 3¾ candles, when burning the same quantity and quality of gas as, when burnt in a good Argand, will give a light equal to 17¾ candles, or, if burnt in a good burner of its own class, will give a light equal to 12½ candles, and such burners are very extensively used in Newcastle. Is it, then, a matter of wonder that we occasionally hear complaints of the bad quality of Newcastle gas? By the substitution of good burners for these wretched ones, from three to five times the amount of light will be produced from the same amount of gas ; or, if the light of the present burners is sufficient, the same amount of light can be obtained from one third or one fifth the amount of gas. In the latter case, besides the saving in cost of gas, there is also the additional advantage of having the vitiation of the air in the room by sulphur compounds and carbonic acid from the burning gas reduced to the same extent.

It is in the hope that public attention will be called to this matter, and the wasteful misuse of gas prevented, that these results are now published.

NEW METHOD FOR THE QUANTITATIVE ANALYSIS OF SILVER.

THE method recently proposed by M. J. Volhard is based upon the circumstance that soluble sulphocyanide combinations with acid silver solutions form a white curd-like precipitate of sulphocyanide of silver. The same precipitate of sulphocyanide of silver is also obtained when silver solution is in the presence of the red solution of sulphocyanide of iron, the color of the latter disappearing instantaneously under the change. If, therefore, a solution of sulphocyanide of potassium or sulphocyanide of ammonium is added, drop by drop, to an acid silver solution, to which some sulphate of iron has also been added, every drop of the sulphocyanide salt solution creates a blood-red cloud, which, however, disappears upon the solution being shaken, the mixture assuming a pure milk-white color. It is only when all the silver has been precipitated as sulphocyanide of silver that the color of the iron and cyanide remains. If it is known how much sulphocyanide salt is necessary for the precipitation of a certain amount of silver, then it is easy to ascertain the exact quantity of silver contained in a solution.

This method is capable of being very generally employed, for it permits of bodies—such as chlorine, bromine, and iodine—being quickly and surely determined by precipitating them with silver solution of known strength, the excess of the added silver being titrated back again by means of a solution of sulphocyanide salts. Especially for the determination of the above elements in organic combination is the new process of Volhard to be recommended. The method has many advantages over Mohr's process, in which bichromate of potash is the indicator.

1. It is carried out with an acid solution, while with Mohr's process a neutral fluid is necessary, thus curtailing at once its utility.

2. The combination—the color of which serves as an indicator—is soluble, so that the retroaction is more easily known.

3. The salt serving as indicator (the sulphate of iron solution) is itself uncolored, and can therefore be added in larger quantities.

To make his titrating fluid, Volhard employs sulphocyanide of ammonium. As this salt is too hygroscopic, in order to weigh it in particular quantities the solution is put into a silver solution, obtained by dissolving 10 grammes of pure silver in nitric acid, and diluting to 1000 cubic centimetres. In another vessel a quantity of sulphocyanide of ammonium is dissolved in water, so that 8 grammes are contained in every litre of water. Ten cubic centimetres of the silver solution are put into a beaker, and to it are added 5 cub. cents. of a pure solution of sulphate of iron (a litre containing 50 grammes) together with 150 to 200 cub. cents. of water. From a buvette the sulphocyanide solution is gradually added, agitating the while, until the fluid has attained a feeble red tone. Assuming that for 10 cub. cents. of silver solution 9.6 cub. cents. of sulphocyanide solution have been used, 960 cub. cents. of the latter is diluted to 1000 cub. cents. One cub. cent. then shows 10 or 10.8 milligrammes.

Before use, this solution is again tested. With this object 1 gramme of pure silver is weighed, and this is dissolved in 8 to 10 cub. cents. of nitric acid ; this is heated upon a sand-bath until no further trace of nitrous acid fumes are given off, and to it are then added 5 cub. cents. of iron solution, the whole being diluted subsequently with 200 cub. cents. of water. On cooling, the sulphocyanide salt solution is added, while the liquid is kept agitated. With the last drop of the hundredth cubic centimetre the red color must have set in visibly and permanently.—*Dingler's Polytechnisches Journal.*

[Boston Journal of Commerce.]

WHERE THE PRECIOUS METALS GO.

WHERE do the precious metals go—two hundred and nineteen millions of dollars of which are annually produced—is a question easily asked, and one that is easily answered. "'Tis the clime of the East, the land of the sun"—that parallelogram of the earth's surface included between the Red Sea, the Himalaya Mountains, the China Sea, and the Indian Ocean, inhabited by more than one half of the human race, and among whom paper money is unknown—which is absorbing and has absorbed for centuries a large amount of the precious metals. Rome, before the Christian era, imported carpets from Babylon, spices from Ceylon, silk (a pound of which was equal to a pound of gold) from Egypt, and precious stones and aromatics from India. The balance of trade due to the East from the mistress of the world, in the time of Augustus, was four millions of dollars annually—a sum which must be regarded as enormous, taking into view that at that time the relative value of silver to gold was only as nine to one ; that the wages of labor and the prices of commodities were much lower than in our time ; and that England and France were Roman provinces and inhabited by savage races, who dwelt in huts and painted their bodies, as our North American Indians did, seventeen centuries later, when the Puritans landed at Plymouth and the Cavaliers at Jamestown ; when Germany was a land of forests, with a climate as cold as Canada in our time ; and when Russia was a land of bogs and morasses, with its surface very little raised above the level of the Mediterranean.

In our time all the countries of Europe, as well as the United States, are large consumers of tea, coffee, sugar, spices, silk, hides, tin, dyestuffs, and other products of the East, which have to be paid for largely in gold and silver. The imports of the United States from countries beyond the Cape of Good Hope amount to sixty-four millions of dollars annually, while the exports to the Orient amount to but twenty-four millions. Great Britain and the other countries of Europe import annually one hundred and sixty millions of dollars more than they export to the same quarter. The exports of gold and silver from the United States, during the last twenty-eight years amount to fourteen hundred millions of dollars, a sum greater than the amount of the precious metals in existence two centuries ago. The Arabians, Persians, Hindoos, Chinese and Japanese consume but little of the products of the Occident, while the products of the Orient are in great demand by the people of Europe and America. A French writer says that the Egyptians conceal twenty millions of dollars annually of the precious metals, and the Emperor of Morocco has filled seventeen large chambers with gold and silver. The passion for hoarding is shared by the subjects of those princes. Silver pulpits and sacred ornaments of gold are very common in churches, temples, pagodas, and tombs throughout the Eastern Hemisphere.

The solution of the problem of the disappearance of the precious metals from the countries where it is produced is, *that the Orient is the reservoir into which flows the gold and silver of the Occident*, a reservoir from which there is no reflux. It is with precious metals as it is with our sweetmeats—we can not have our cake and eat it too !

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