method adopted is the patented invention of Mr. C. J. Richardson, an engineer residing at Kensington. The plan under trial is simply to burn the petroleum through a porous material, which is placed in an iron chamber, dipped into a water vessel also of iron. The oil admitted into the chamber soddens the porous material, and rises by a sort of capillary attraction. The surface then catches fire and burns rapidly, as long as the oil is supplied. The effect of the flame is so great that with the small apparatus, which is only two feet superficial area and affixed to a boiler, the oil on Saturday was utilized so as to be equal for steam purposes to five tons of coals. A third advantage is obtained by the employment of the petroleum—namely, that no stokers are needed, and the boilers can be supplied with several fires one above another. The small grate used in the experiments was placed under a boiler of 17-horse power, and in two hours it raised the steam to 10 lbs pressure. The only objection seems to be the fear of explosive qualities, but these Mr. Richardson states he is prepared to guard against effectually.

Substitutes for Cranes and Hodmen in Paris.

From the Journal of the Society of Arts, No. 630.

The *Builder* states, that "some of the contractors re-building the demolished houses, and running up quickly new mansions, have hit upon an ingenious way of raising materials to the top of the scaffold. As the head of water at the Vilette is enough to command any of the houses in Paris, they have simply a pipe turned on from the main up to the top of the intended structure, and by that means can fill a bucket or large tub, which in descending draws up a plateau on which the materials are placed. The water, being turned into mortar, and otherwise made use of afterwards below, is not lost. Some of the materials are also hoisted by Lenoir's machine (by gas); there is one at work at the Rond Pont de Corcelles, close to the Avenue de Ternes. It seems to be, by timing a weight ascending a certain height, about $2\frac{1}{2}$ -horse power. The absence of a boiler in these engines is a strong argument in favor of employing them where steady slight power is required. At all events, if they are not endowed with the abundant force of a steam engine, yet in towns and confined streets, where only a moderate source of power is required to act in a small compass, noiselessly and without nuisance, we have seen that the required mechanical effect can be accomplished without risk of explosion, and consequent damage and loss of life, either to owners or their neighbors. That is something at all events."

Use of Petroleum as Steam Fuel in place of Coal. By B. H. PAUL.

From the London Chemical News, No. 263.

Some months ago considerable interest was excited by the announcement that very remarkable results had been obtained in America by the application of petroleum as fuel for the boilers of steam vessels,

and so much importance was attached to the subject, that a Commission was appointed by the Government of the Northern States to inquire into this application of petroleum.

The report published by the Commission, as the result of their labors, was calculated rather to excite curiosity than to afford satisfactory information, and they have not, so far as I am aware, made public any further data which would afford a means of arriving at an opinion on the subject.

The proposal to use petroleum as steam fuel in ships became, almost of course, a subject of consideration in this country, and an idea prevailed that this invention might possibly supersede in importance all the recent improvements connected with the naval or mercantile marine. It was anticipated that not only naval warfare, but even navigation itself, might be completely revolutionized by this invention. It was reasonable enough that a project put forward with such pretension as was the case in respect to the use of petroleum as fuel for steam vessels, should be considered in a country where every improvement relating to steam navigation is of high importance; but it is surprising that no one should have disabused the public mind of the erroneous impressions produced by the statements as to the use of petroleum as fuel; for to any one conversant with the composition and characters of petroleum, as compared with coal, this proposed application of it was obviously absurd.

Lately little has been heard of this project until some days ago a notice appeared in the *Times*, under the head of "Naval and Military Intelligence," that experiments are being conducted at the Woolwich Dockyard, with the view of testing the capability of petroleum to supersede coal and other fuel on ship-board, &c. In this notice it was stated that the oil was so utilized "as to be equal for steam purposes to five tons of coal!" How much of the oil was equal to five tons of coal was not stated, but it may be fairly supposed that any one unacquainted with the subject would infer that one ton of oil was meant.

Now, what are really the facts of the case as to the comparative advantages of petroleum and coal as fuel?

In the first place, one of the chief alleged advantages of petroleum over coal, was that it would lie in a small compass and make less demand upon space and tonnage than coal does. Since with petroleum in the place of coal, two-thirds of the space now required for fuel in a steam vessel would be saved, steamships might keep at sea three times as long as at present. Then, coal depots would be unnecessary for steam packets on the longest lines of ocean navigation; and since no stokers would be needed in using petroleum, a whole army of employees might be dispensed with.

Now, the specific gravity of coal is from 1.24 or 1.44 to 1.6, while that of petroleum is from 0.800 to 0.850, consequently the weight of a cubic foot of these materials would be, respectively, about as follows:—

	lbs.	lbs.	lbs.
Coal,	77.4	90	100
Petroleum,		50	53

But, since petroleum, being liquid, lies in a more compact manner than coal; in estimating the spaces occupied by these materials, allowance should be made for the interstices or empty spaces between the lumps of coal. Taking this as amounting to one-third of the whole bulk of a heap of coals—which is a liberal allowance—the contents of a cubic foot would be as follows:—

	lbs.	lbs.	lbs.
Coal,	52	60	70
Petroleum,	50	53	—

So that the spaces occupied by equal weights of coal and petroleum would be about as 1 is to 1·2 or 1·4.

Then, the relative heating power of equal weights of coal and petroleum would depend upon their respective chemical composition, which may be compared as follows for 100 parts:—

	Coal.	Petroleum.
Carbon,	83	85
Hydrogen,	5	15
Ash, &c.,	—	—
	100	100

Accordingly, the relative heating power of equal weights of coal and of petroleum would be in the following ratio:—

	Coal.	Petroleum.
Calorific power,	1·02	1·50

And the spaces occupied by quantities of petroleum and of coal, having equal heating power, would be in the ratio of 1 to 1·16.

This difference in favor of petroleum is in itself too small to admit of any advantage being gained in regard of stowage, and it is more than doubtful whether there be any other advantageous difference between petroleum and coal for fuel.

It must also be considered how far the difference between the prices of petroleum and coal would have the effect of neutralizing the above or any other advantage to be gained by the use of petroleum as fuel. The price of petroleum varies from 15*l.* to 20*l.* per ton, while that of coal used for steam vessels is under 1*l.* per ton at any part of the British coast, and even at the coaling stations in the East it does not exceed 2*l.* 10*s.* to 3*l.* 10*s.* per ton.

These considerations alone appear to me to decide the question as to the practicability of using petroleum as steam fuel under any possible circumstances, for even in the case most favorable for the comparison of petroleum with coal, the cost of equal quantities of heat produced from these materials would be in the ratio of 15*l.* to 4*l.*

In addition to this, the highly inflammable nature of petroleum must be considered. Its storage on board a ship would require the use of air-tight vessels, and even then there might be considerable risk of the production of explosive mixtures of the petroleum vapor and air. But what would be the condition of a vessel of war provided with petroleum as fuel, if a shot penetrated the vessel containing the petroleum, and allowed it to escape in proximity to the boiler fires?

Taking all these circumstances into consideration, I think there cannot be any doubt as to the entire fallacy of supposing that petroleum can be substituted for coal as fuel; and though this conclusion is sufficiently evident from the data I have adopted as to price, &c., it must also be remembered that the tendency is rather to a rise in the price of this commodity than otherwise.

On the Chemical History and Application of Gun-cotton. By Prof. ABEL, F.R.S., Chemist to the War Department.

From the London Chemical News, No. 235.

Continued from page 44.

Many attempts have been made from time to time to diminish the rapidity of explosion of gun-cotton, but the only one which has been attended by any success is that which, in General von Lenk's hands, has led to the development of a system of mechanical arrangement of gun-cotton as ingenious and simple as it is effective. By manufacturing the cotton into yarn of different thickness and degrees of compactness or firmness of twist, *before* its conversion into gun-cotton, this material is at once obtained in forms which not only burn with great regularity and much less rapidity, when used in the original condition, than the loose gun-cotton wool, but which also when employed in the form of reels, wound more or less compactly, or, by being converted into plaits or hollow ropes, may be made to burn gradually in a manner similar to gunpowder, or to flash into flame instantaneously, exerting an explosive action which very far exceeds that of the latter. The modifications in the nature and degree of explosive force exerted by gun-cotton which are essential for its application to military and industrial purposes as a substitute for powder, are therefore arrived at by means of very simple variations in the mechanical condition of the material. Thus, to obtain the gradual action essential for the employment of gun-cotton in cannon, cartridges are made up of coarse yarn, which is wound firmly around a hollow cylinder of wood, the dimensions of which are regulated by the size of the gun-chamber and the weight of the charge used; the best result is obtained by so arranging the latter that the cartridge entirely fills the space allotted to the charge in the gun. Similarly, small-arm cartridges are made of cylindrical plaits of fine yarn or thread, which are fitted compactly in layers, one over the other, upon a small cylinder or spindle of wood. In both of these arrangements the combustion of the charge can proceed only from the exterior surfaces towards the interior of the cartridge. On the other hand, the charges for shells, in which the most rapid explosion is most effective, and the priming for quick matches which are intended for firing several charges simultaneously and almost immediately upon the application of flame, consist of cylindrical, hollow, and moderately compact plaits (similar to lamp-wicks), made of gun-cotton thread or very fine yarn. These plaits are produced in pieces of any length, and, when employed as quick-match, are compactly enclosed in cases of water-proof canvass or other similar mate-