

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.

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, SEPTEMBER 15, 1883.

Contents.

(Constrated articles are marked with an asterisk.)

Table listing various articles such as 'Applegat gear for wagons', 'Index of inventions', 'Agricultural inventions', etc., with corresponding page numbers.

TABLE OF CONTENTS OF

THE SCIENTIFIC AMERICAN SUPPLEMENT

No. 402,

For the Week ending September 15, 1883.

Price 10 cents. For sale by all newsdealers.

Table listing sections of the supplement such as 'I. CHEMISTRY AND METALLURGY', 'II. ENGINEERING AND MECHANICS', 'III. TECHNOLOGY', etc., with page numbers.

PETROLEUM FOR LIGHT.

Two revolutions may fairly be considered to be the results of the introduction of petroleum as an agent in the advance of modern civilization. One of these is yet, to a certain extent in the future, undeveloped for the present, and we may study it by and by. The other is of daily experience; its import is indicated by the title above given.

A bright light in the home is so absolutely and intimately associated with cheerfulness and domestic enjoyment and with the bigger grade of social life which is the sure attendant of all intellectual advancement, that it becomes a difficult thing to overestimate the value of that which places such a light within the reach of those whose pecuniary resources are small. Of the wealthy we need not speak, but for the greater proportion of every community the means of brilliant illumination at small expense does more for health, for preservation of life, for happiness, for morality, for social elevation, than words can express.

And here is where petroleum has a mighty claim to our respect, and where, as stated, it has caused a revolution, and this revolution is one of our own day. Why have New Bedford, Nantucket, New London, and Sag Harbor ceased to have the importance which they formerly held? Forty years ago, when their whale ships arrived from the Indian Ocean, the Northwest, or the Arctic, their casks represented in their contents of whale oil or sperm oil a certain amount of light or lubrication, which was absolutely necessary for the comfort and the progress of communities.

Of the nature and origin of petroleum we may speak at another time, calling attention here only to the fact that it is the complete analogue in a liquid form of coal as a solid, particularly bituminous coal, which it closely resembles. It is called a hydrocarbon, meaning a combination of hydrogen and carbon. It is, however, a coupled series of hydrocarbons blended in one, and, what seems very singular to one not conversant with chemical working, these various hydrocarbons can be separated perfectly, simply by careful management of heat.

When crude petroleum, in a retort, is subjected to a very gentle heat, light vapors pass off which are exceedingly and dangerously inflammable and can be condensed to liquid form only with much difficulty. Cymogene first, and then rhigolene are formed, but have scarcely been turned to account as yet, except that rhigolene has been employed as a local anæsthetic, by means of its almost instantaneous evaporation. But when the liquid from the retort has reached a specific gravity of 95° B., it can be made available. The pipe is then transferred to another tank, the heat is increased, and the distillation is continued until the escaping liquid stands at 65°.

The heat is still further raised, the pipe goes to another tank, and continues till the gravity becomes 38°, and the color becomes somewhat yellowish. This is the universally known kerosene, and its specific gravity should be 51° to 55°.

But this is not the way in which kerosene was first made. This name was given to it by Abram Gesner of Prince Edward's Island in 1846, though the name was not generally adopted for a long time, and it came into very common use as coal oil, for it is obtained very readily by distilling any of the bituminous coals, and was made in large quantities by James Young of Glasgow as early as 1850, using Boghead cannel coal or Torbanehill mineral.

The first factory in this country was established in 1854, on Newtown Creek, near what is now the well known and notorious Hunter's Point, on Long Island, opposite New York. The work still continues actively there, new factories having been added, and the odors which they have steadily poured forth have been nauseous beyond description. We well know the efforts which have been made to abate the nuisance.

As the production was very profitable, works were erected in great numbers, all along the coal regions of Kentucky, Ohio, Virginia, etc., as well as on the coast. In 1860 the amount of coal oil yielded by the coast distilleries alone was 200,000 barrels. But while these works were thus in the full tide of success they were suddenly brought to the very verge of ruin. Petroleum had begun to pour upon the market in enormous quantities, and it was found that kerosene, identical with the coal oil, could be distilled from it much more cheaply than from the coal. The fright was extreme, but it was of short duration, for the ingenuity of the distillers proved itself competent to meet the difficulty. They modified their apparatus with but small expense, so as to use the new material instead of the old; the name coal oil

was speedily dropped, and in its place kerosene became a household word.

From the statements here made it is easy to see that the desire for gain may readily lead unprincipled men to risk the lives of their fellow beings most fearfully. If a distiller of petroleum will but turn the pipe from his retort into the kerosene tank a very few degrees before the liquid has reached the proper point, say 68° to 70°, he greatly increases the yield and the profit. Kerosene is what he wishes to sell, and he has now in his tank, of what he calls kerosene, a much larger quantity than should be there, simply because it has received so many gallons that ought to have gone into the naphtha tank. Such a liquid will burn of course, and it has the odor of kerosene, but it is most fearfully explosive. Gunpowder may be handled in the midst of matches, lighted cigars, etc., etc., with far greater safety. The great frequency of horrible accidents is due mainly to this cause. The use of kerosene of proper specific gravity is free from danger, with any average degree of carefulness. Whether any legislative enactments will ever cure the evil, so long as men are selfish and reckless, seems doubtful. But even with this risk the advantages of kerosene as an illuminator are so many that it will hold its ground.

We are in receipt of a note from "a subscriber," signing himself W. M. L., who incloses a slip cut from the Philadelphia Ledger of August 23, on "The Recent Lamp Explosion." He asks for explanation. The paper states that, as they understand, "the flame was driven down into the lamp (which was a very strong one) by the movements of Mrs. Muller. . . . The oil itself is said to have been of good quality," and the inference is therefore that the unfortunate Mrs. Muller owed her death to gross carelessness on her own part. It may be that this is true, but there is no proof of it.

If the oil had been what it professed to be—kerosene—there is little doubt that she might be at this moment in life and health, and if it were possible some one ought to be held responsible for her death, that one being the manufacturer, who to increase the contents of this kerosene tank turned the discharge pipe from his retort into it while the gravity was too low, say 70° or perhaps even a greater figure still, and thus put into the market the dangerous mixture of naphtha and kerosene which Mrs. Muller's lamp contained, and whose like is so constantly bought by those whose necessities or whose parsimony causes them to use cheap kerosene.

It is worth while to repeat here, "the use of kerosene of proper specific gravity is free from danger with any average degree of carefulness." The explosions of lamps do not occur from its employment. The lamps themselves are seldom to blame, but it should be enforced upon the minds and attention of the community, by every means in our power, that it is fully as safe to handle a rattlesnake, or to fool with a bottle of nitroglycerine, as to burn kerosene containing much of the lighter oil. One may escape death in either case, but he does not deserve any such good fortune.

We have no disposition to assert that kerosene of the most perfect quality may not explode, and cause fearful havoc. When Bridget begins to pour it on the coals to make them burn quicker, there is quite a possibility that she may stop pouring of a sudden, and the kerosene not be culpable. We saw a young man pour powder that way once from his flask, thinking he could close the spring when it began to flash. He was not quick enough, but it was very good powder.

EXPORTS OF MANUFACTURES.

Although the present foreign demand for an article of American manufacture may not amount to one per cent of the home consumption, it is well known that most of our manufacturers make their lowest prices for such export trade. No one belittles the importance of our great yearly exports of grain, cotton, and provisions, but a keener and more personal interest is at once manifested when any increase of shipments of manufactured goods can be noted. The foreign markets for our agricultural products depends largely upon the more or less favoring seasons, here and abroad, but these have nothing to do with shaping the keen competition under which our mills and workshops, our capitalists and mechanics, are reaching out to obtain a larger portion of the world's trade in manufactured articles. It is especially gratifying, therefore, to find, from recent reports of the Bureau of Statistics, that while the total exports for the last fiscal year are valued at more than seventy million dollars in excess of those for the preceding twelve months, a large part of this increase is made up of manufactures.

At the Millers' Convention in Cincinnati, two years ago, it was urged by many in that trade from abroad that, unless English and Continental millers modified their processes and improved their mills, American millers would in the future give them a closer competition than ever before. Well, the exports of wheat flour the last fiscal year, to July, 1883, amounted to 9,205,664 barrels, valued at \$54,824,459, against 5,915,686 barrels, valued at \$36,375,055, for the preceding twelve months. These figures show that the foreign millers who came over at that time to investigate the state of their industry here had most excellent grounds for their apprehensions.

In iron and steel and their manufactures the exports do not show a large increase, but that there is a positive growth, with a large diminution in our imports in this line, is at once a source of gratification to the home and disappointment to the foreign trade. With the recent great activity in railroad building it had been expected that we