Scientific American.

ESTABLISHED 1845.

MUNN & CO., Editors and Proprietors.

PUBLISHED WEEKLY AT
NO. 37 PARK ROW, NEW YORK.

O. D. MUNN. A. E. BEACH.

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NEW YORK, SATURDAY, AUGUST 20, 1881.

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THE SCIENTIFIC AMERICAN SUPPLEMENT

No. 294,

For the Week ending August 20, 1881.

Price 10 cents. For sale by all newsdealers.

NON-EXPLOSIVE KEROSENE.

Very frequently of late we have received from correspondents, East and West, samples of "stuff" sold them by peddlers with the assurance that when a little of these preparations are mixed with the poorest burning oil the latter is rendered *perfectly safe*. Of course one of the chief inducements to use these compositions is the assurance that with them a much cheaper oil of equal illuminating power can be used safely.

This fraud is a very dangerous one, and perhaps the best way to stop it is by the diffusion of a little practical information respecting these oils.

In the first place, there is nothing that can be added to or mixed with poor kerosene oil that will in the least affect its dangerous qualities or make it any safer to use in lamps. The danger with such oils arises solely from the presence in them of light, easily volatilized, and very inflammable hydrocarbons, such as naphtha, the vapor of which, when mixed with air, explodes on contact with flame.

Kerosene and naphtha or benzine are derived by a process of distillation from the same substance—petroleum. The lighter oils—gasoline, naphtha, benzine, etc.—are first volatilized and condensed. As the products distill over they are tested from time to time with a hydrometer, and when it is found that the stream of distilled oil marks about 58° (Baume's hydrometer), what follows is turned into another tank until it is found that the gravity of the oil coming over has risen to about 40°, then the stream is deflected into another tank. The oil distilled between 58° and 38° is called kerosene or burning oil.

In this process about 15 per cent of the light oils are produced, and as there is comparatively little demand for them they are very cheap. Naphtha costs from 2 to 5 cents a gallon, while good kerosene costs from 20 to 25 cents. As great competition exists among the refiners there is a strong inducement to turn the heavier portions of the naphtha into the kerosene tank, so as to get for it the price of kerosene or to cheapen the latter. They change the direction of the stream from the still when it reaches 65° to 63° B., instead of waiting until it reaches 58°; and thus the volatile inflammable naphtha or benzine is allowed to run into the kerosene, rendering the whole of the latter dangerous. It has been shown that one per cent of naphtha will lower the flashing point of kerosene ten degrees, while with twenty per cent of naphtha the same oil will flash at eight degrees (Fah.) above the freezing point of water. It is, therefore, the cupidity of the refiner that leads him to run as much benzine as possible into the kerosene regardless of the consequences.

The specific gravity is not a safe guide respecting the character of such oils, as a poor dangerous oil may be heavier than a safe oil. Astral oil illustrates this. While it does not flash below 125° Fah., its gravity is 49° B. Poor kerosene flashes at 86° Fah., but has a gravity of 47° B.

Kerosene when properly refined is nearly colorless by transmitted light and slightly fluorescent by reflected light. Its density should be about 43° B. At ordinary temperatures it should extinguish a match as readily as water without becoming inflamed or *flashing*, and when heated it should not evolve an inflammable vapor below 110° Fah., and should not take fire below 125° to 140° Fah.

As the temperature in a burning lamp rarely exceeds 100° Fah., such an oil would be safe. It would produce no vapors to mix with the air in the lamp and make an explosive mixture, and if the lamp were overturned or broken the oil would not take fire.

The standard which has generally been adopted by law as a safe one fixes the flashing point at 100° Fah., or higher.

Professor Chandler, President of the New York City Board of Health, says: "Out of 736 samples of kerosene oil tested by me, only 28 were really safe, all the rest evolving inflammable vapor below 100° Fah." In his paper on the temperature of oil in lamps (*American Chemist*, August, 1872, p. 43) Dr. Chandler has shown that in some cases the temperature of their contents often rises above 100° Fah.

STATE TAXATION OF PATENTED ARTICLES.

We publish, in another column, an interesting decision by the Supreme Court of the United States, in which the question of the right of a State to enforce its local tax or license laws as against the sale of patented articles is once more considered and adjudicated. The defendant having refused to pay a county tax in Henrico County, Va., was indicted and found guilty. One of the points in the defense was that the sales related to patented articles, and that no State had a right to hinder such sales by taxation.

On appeal, the United States Supreme Court decides, in this case (and it has so held in other cases), that venders of patented goods must, like other people, conform to the State laws. The patent laws, it is true, confer on patentees the exclusive right to sell their inventions and discoveries, but this does not apply to tangible property or goods. The patentee may sell rights, licenses, and privileges of all kinds under his patent, and no State has the right to interpose any law, tax, or penalty to hinder or prevent such selling. This patented right relates to the invention or discovery, and is an incorporeal right which the State cannot interfere with. But whatever rights are secured to inventors must be enjoyed in subordination to the general authority of the State over all property within its limits. Hence the State may tax all sales of goods, whether they are patented or not. No tax, however, can be imposed upon a patent, or on any sales relating to rights thereunder.

The Supreme Court also held, in the case above referred to, that all State laws that discriminate in favor of citizens resident in such State, and against citizens of other States, are invalid. The State of Virginia cannot exempt its own citizens from license taxes, and impose them upon citizens of New York when they visit Virginia. To do so would be to regulate commerce, which, under the Constitution, is a national, not a State, right.

BUTTER COLORING.

It is a fact not generally known that much—it might be said nearly all—of the butter offered for sale in our large cities owes its "rich golden color" to artificial additions. The dairyman, as well as the butter dealer, has found that butter of a *good color* commands a readier sale than pale butter, and as a color is so easily and cheaply procured the temptation to improve (or, at least, to equalize) the natural tint of the commodity is not to be resisted. As long as the coloring matters used are harmless there can be no valid objection urged against the practice, and we have no reason to believe that anything really pernicious has thus been introduced into our food—at least of late years.

The coloring matters commonly employed are annatto and turmeric, or extracts of these; but there are also a number of butter-coloring compounds or mixtures sold for this purpose. For some of these it is claimed that they will not only impart the desired color to butter, but will keep it sweet and *fresh* for an indefinite time. The following are a few of these coloring compounds in use at present. Rorick's compound is prepared as follows:

The materials for 1,000 pounds of butter are:

Lard, butter, or olive oil	6	pounds.
Annatto	6	ounces.
Turmeric	1	ounce.
Salt	10	ounces.
Niter	¾	ounce.
Bromochloralum	3½	ounces.
Water	q. s.	

The lard, butter, or oil is put into a pan and heated in a water bath. The annatto and turmeric are then stirred into a thin paste with water, and this is gradually added to the fatty or oily matters kept at a temperature of about 110 Fah. The salt and niter are next stirred in, and the mixture heated to boiling. The heating is continued for from twelve to twenty-four hours, or until the color of the mixture becomes dark enough. The bromochloralum is then introduced and the mass is agitated until cold, when it is put up in sealed cans.

Bogart's preparation is prepared as follows:

The materials employed are:

Annattoine	5 ounces.
Turmeric (pulverized)	6 "
Saffron	1 ounce.
Lard oil	1 pint.
Butter	5 pounds.

The butter is first melted in a pan over the water bath and strained through a fine linen cloth. The saffron is made into a half pint tincture, and, together with the turmeric and annattoine, is gradually stirred into the hot butter and oil and boiled and stirred for about fifteen minutes. It is then strained through a cloth as before and stirred until cool.

Dake's butter coloring is prepared by heating a quantity of fresh butter for some time with annatto, by which means the coloring matter of the butter is extracted, and straining the colored oil and stirring it until cold.

THE TAILS OF COMETS.

Camille Flammarion, in a paper read before the French Academy of Sciences, on the recent comet, says:

In my observations on this comet I have devoted myself principally to an examination of its physical aspect. This examination appears to lead to conclusions which are different from the opinions generally adopted as to the nature of cometary tails. . . . The perfect transparency of these trains of light leads us to think that they are *not material*, that they are not gases driven back into space by a repulsive solar force, but that they are an excitation—electric or otherwise—of ether produced by the mysterious star, on the side opposite from the sun, we might almost say in the line of its shadow!

On the 24th of December, 1811, Piazzi observed at Palermo, through the tail of the celebrated comet of that year, the stars P.XX., 149, and P.XX., 197, which, instead of being more or less obscured, were seen to be *more luminous*. . . . Apropos of these unexplained physical phenomena, let us dwell for a moment on the assuredly extraordinary circumstance which occurred last year, and which was only the renewal of one of the same kind observed already in 1843. On the 28th of January, 1880, at 36 minutes past 11 o'clock in the morning, the great comet discovered in the Southern hemisphere passed to its perhelion at 150,000 miles only from the solar surface. In adopting the figure 90,000 miles as the diameter of the head—the figure generally adopted also for the comet of 1843 (which, moreover, appears to be definitely the same as that of 1880), we see that from surface to surface there was only 108,000 miles. The proximity was more surprising still on the 27th of February, 1843. The two celestial bodies brushed each other at 33,000 miles only—that is to say, the comet traversed the solar atmosphere at a height less than that of the corona, and even of that of the protuberances, several of which have been ascertained to measure 200,000 miles in height. Now at these two epochs the comet was accompanied by a narrow and rectilinear train, which it car-