carbon and the proper flux) be formed into these ball or masses; or the balls thus formed may be used in combination with ores in puddling, melting, or smelting.

He claims that by thus combining, with the ore, carbon and the proper kind and quantity of flux in the deoxidizing and carbonizing of ores, he overcomes obstacles which have hitherto been considered insuperable.

The balls are composed of seventy-five parts of iron ore: twenty parts carbon; three parts slaked lime; one part nitrate soda; and one part molasses. The ore, carbon, and lime are mixed intimately together, and the molasses and nitrate of soda dissolved in water enough to form the whole into a mass, which is then formed into balls and dried in the sun. This is about an average proportion, which, as before said, varies with different ores. The object is to avoid the melting point in carbonizing, but to go as near it as possible. He thus charges the ore as highly with carbon as possible, before it reaches the melting point. For puddling, he uses say eighty parts burnt iron ore made very fine; sixteen parts carbon; two parts slaked lime: one fourth part nitrate soda; and one and three fourths parts of molasses: mixes the ore, carbon, and lime minutely, dissolves the molasses and nitrate soda in water enough to mix, and then forms the mass into balls and dries them. For melting iron ore, he uses seventy parts ground carbon; three fourths part lime; one fourth part nitrate of soda; twenty-eight parts finely ground ore; and one part molasses. For smelting iron ore, sixty-eight parts ground and burnt iron ore; twenty-five parts carbon; five parts lime; one part nitrate soda; and one part molasses.

Correspondence.

The Editors are not responsible for the opinions expressed by their Correspondents.

Psychic Force.

To the Editor of the Scientific American:

Under this head I will introduce to your notice an experiment, which is akin to or identical with the power possessed by Mr. Home, and which experiment can be tried by any person for himself in less than five minutes.

A slip of thin writing paper, one and a half inches in length and a quarter of an inch broad, is creased in its middle, lengthwise and crosswise. This makes a dipping of the two ends, by which it may be poised on a needle point. The needle is set perpendicularly in a piece of cork, this forming a stand or support.

Now hold the hand, curved to the form of the quarter arc of a circle, near to the outer circle to be described by the paper arrow, and this will move circularly, not always immediately, for sometimes you may have to wait several minutes. For some persons, it will revolve over a hundred times per minute. In most instances it revolves towards the tips of the fingers, but not always. By putting the other hand near, in such manner as to point the fingers in the same circular direction the motion is generally increased. *Voila!* Try it and study its mystery!

"Heat!" is the first exclamation of many; but if it were caused by an upward current of air, the direction of revolution would be determined by the pitch of the ends of the arrow. Experiment has proved that pitching the ends propellerwise has no effect; and reversing the pitch does not change the direction of motion.

Gentlemen of the other side, I charge that if I were to announce that very few persons could do the above, you would cry "deception," "delusion," "weak minded," etc. But, the experiment being within the reach of all, there will be no such rejoinders as Professor Crookes has been annoyed with. In this experiment, the requirements pointed out by the Editors of the SCIENTIFIC AMERICAN are also met, and it may prove to be an anticipation of the delicate apparatus to be devised by Professor Crookes, showing that all persons are more or less possessed of this power.

J. A. SOLLIDAY.

Philadelphia, Pa.

[We tried this experiment, which our correspondent affirms will always succeed, but we had not enough psychic force to make the paper turn, except when we blew it. Perhaps some of our readers are better endowed.—EDS.

Railroad Gages.

To the Editor of the Scientific American:

I have felt for some time that the thanks of the engineering profession are due to the SCIENTIFIC AMERICAN, for the timely and efficient effort it has made to anticipate and prevent the error into which capitalists are likely to be led on the subject of railway gages reduced below the ordinary 4 feet 8½ track. I am glad to see that an engineer of Colonel Seymour's experience has spoken emphatically on this subject.

The necessity of uniformity in such a country as ours ought to supersede any ordinary questions of detail; and it would be a very great advantage to the railway interest of the United States if our engineers would agree, with one consent, to hold to the gage which has come to us from the old country, and which practically meets the problem of railway operation as well as can be desired. In fact, it would be well if this gage question, like that of standard weights and measures, could be made a matter of Congressional law, so as to relieve us from the continued confusions and embarrassments resulting from the want of a common standard. The arguments advanced in favor of a narrower gage are fallacious, as the arguments in favor of an increase have proved to be by much experience and very great outlay; and while there are times when engineers and scientific authorities need to advance far beyond the current of popular sympathy, there are other occasions when a conservative and guarded course is equally essential; and a popular paper deserves commendation and endorsement as much in one case as in the other.

SAMUEL MCELROY

Brooklyn, N. Y.

[For the Scientific American.]

ON SPECIFIC HEAT.

BY P. H. VANDER WEYDE.

The adoption of a unit of heat (explained on page 356, of the last number of the SCIENTIFIC AMERICAN), has given occasion to the correct investigation of different classes of phenomena, formerly not well understood; one of these is the peculiar property, of different substances, of requiring different amounts of heat in order to be heated to the same temperature. These amounts differ whether we take the equal quantities of the different substances by weight or by volume. They are of course measured by the accepted standard; the unit and the numbers representing these amounts (accepting that of water as 1) are called the specific heat of the substance, even as the weight of equal volumes of different bodies (accepting water as 1) is called the specific weight. Thus it was found that the amount of heat sufficient to raise the temperature of one pound of water a certain number of degrees was equal to the amount required to raise to the same temperature not less than thirty pounds of mercury, a mass of mercury more than twice the volume of a pound of water, because mercury is only 13·5 times heavier. It was further found that 31 lbs. of gold, 17 of silver, 10·5 of copper, 8·75 of iron, and 5 of sulphur, contained respectively as much heat as 1 lb. of water; or, in other words, required the same amount of heat to raise their temperatures to the same degree. We must, then, necessarily conclude that, at the same temperature, water contains 30 times as much heat as mercury, 31 times as much as gold, 17 times as much as silver, 10·5 times as much as copper, 8·75 times as much as iron, and 5 times as much as sulphur.

Consequently it is easy to deduce from this, when dividing 1,000 by the above numbers, that when water contains 1,000 units, mercury will contain $1,000 \div 30 = 33$, gold $1,000 \div 31 = 32$, silver $1,000 \div 17 = 57$, copper $1,000 \div 10·5 = 95$, iron $1,000 \div 8·75 = 1·14$, and sulphur $1,000 \div 5 = 200$; or, by taking water $= 1$, their numbers become, respectively, for mercury 0·033, gold 0·032, silver 0·057, copper 0·095, iron 0·11, and sulphur 0·2. These numbers, then, are called the specific heat of the substances.

Different methods may be employed to determine this specific heat. One is the melting of ice by a certain amount of the substance (after having heated the latter to a certain definite degree of heat), and to compare the amount of ice thus melted with that melted by an equal weight of water, heated to the same temperature as the substance in question. Of course peculiar precautions are necessary in order to prevent the ice from being melted by exterior causes other than the heat of the heated body under investigation. Another method is that of mixture. It consists in raising the substance to a certain definite temperature, and then throwing it into a vessel containing an equal weight of water at another definite low temperature. The amount of heat communicated to the water will be proportional to the specific heat of the substance. Suppose, for instance, we mix one pound of water at a temperature of 156°, with another pound of water at a temperature of 32°, we shall find that the temperature of the mixture will be the mean, or 94°. But when we mix one lb. of mercury of 156° of temperature with one lb. of water at 32°, the temperature of the mixture will only be 36°. The water, therefore, will have gained only 4 units of heat, in compensation for the 120° lost by the mercury. It is evident from this that the amount of heat required to raise the temperature of one lb. of mercury four degrees, is equal to one thirtieth of that required to effect the same result on water; or, in other words, one thirtieth of the adopted unit of heat. This experiment becomes still more striking if we take equal quantities in bulk of both these substances. Suppose we take a pint of water of 32°, and a pint of mercury of 156°, and mix them; the temperature of the mixture, in place of being the mean or 94°, as is the case when mixing equal volumes of water, will only be 69°. The water has gained only 37°, in compensation for 87° lost by the mercury. It is clear from this, that the amount of heat required to raise the temperature of one pint of mercury 37°, is equal to about two and one third of that required to produce the same effect on a pint of water, notwithstanding that the pint of mercury is more than thirteen and one half times heavier than the pint of water; in fact, three pints of water contain as much heat as seven pints of mercury, notwithstanding the latter surpasses the first some thirty times in weight.

The heavier metals have almost all very nearly the same specific heat as mercury. Thus, lead=0·031; iridium, 0·032; osmium, 0·031; platinum and gold, 0·032; thallium, 0·034; bismuth, 0·031; tungsten, 0·033. However, in another class, the specific heats are nearly double the above numbers; thus palladium=0·059; rhodium, 0·053; silver, 0·057; tin, 0·056; cadmium, 0·057. While, again, in another class, they are triple, or more than triple the first. Thus copper=0·095, zinc, 0·096; cobalt, 0·1; nickel, 0·11; iron, 0·114. The light metals have the largest specific heat, but always far inferior to that of water, and most of them nearly equal to that of sulphur. Thus aluminum=0·21; magnesium, 0·25; sodium, 0·20; potassium, 0·16. The two latter are so light that they float on water, while the lightest of all metals, lithium, has the greatest specific heat, namely 0·94, almost that of water. In fact water has a greater specific heat than any other substance, perhaps a few solutions excepted. For instance, a solution of cane sugar has a specific heat of nearly 1·1.

This shows what an immense store of heat may be contained in the waters of our planet, especially the ocean, which covers about three fourths of its surface. If, then, we take into account that, for equal weights, the specific heat of air and gases is about one fourth that of water, and that our atmosphere has only the weight of a layer of water, at most, of 34 feet, it is clear that its heat is only equivalent to that of a layer of water of 34÷4, or 8½ feet high. This depth of water, therefore, is capable of storing up as much heat as the whole atmosphere; and, in giving off its heat, is able to communicate half its excess of temperature to the air, retaining the other half. Suppose, for instance, a certain portion of the Atlantic ocean to have a temperature of 80°, while the atmosphere over it is 20°; eight and one half feet depth of water will then be capable of heating the air 30°, bringing it to 50°, while the water itself descends 30°, also reaching 50°. No wonder, therefore, that the Gulf Stream, which continually is pouring the warm water from the tropics against the northwestern coast of Europe and its islands, modifies the climate of this part of the world to such a degree as to make it much warmer than the regions in the same latitude on the continent of eastern Europe, Asia, or America. When we fully consider that water is about 800 times heavier than air at the ordinary pressure, it is clear that one cubic foot of water contains as much heat as 800×4, or 3,200 cubic feet of air, or one cubic inch of water nearly as much as two cubic feet of air.

In applying these facts to the heating of buildings, we must not, however, forget that the cold walls and objects in buildings require much more heat than the air (they have a greater specific heat), and therefore we cannot succeed in heating a room before we have brought all the objects in contact with the air to the same temperature. Applying this on a large scale again to the Gulf Stream, it is clear that west winds blowing over the same are heated to a moderate temperature, and will very soon lose this heat when passing, in winter, over the cold or perhaps frozen ground of the British Islands, France, Belgium, Holland, and the western parts of Germany. In giving them a portion of their heat they will have lost most of it before reaching Russia; wherefore the influence of the Gulf Stream does not extend beyond the lands of western Europe, which enjoy the sole benefit of the same.

New York.

SYRACUSE---ITS MECHANICAL INDUSTRIES.

A correspondent, in the New York *Daily Times*, gives a lengthy account of the mercantile and manufacturing industries of Syracuse, N. Y., from which we make the following extracts. In describing John Greenway's brewery, the writer says:

In this Syracuse brewery, looking, as it does, like some great orphan asylum or other State institution, the manufacture of beer is carried on, on so large a scale and with such mechanical precision as in itself to create more than a gastronomical interest. The first point is the wing of the building used for malting purposes. No less than twelve floors, each ninety-one by sixty-five feet, are used for the laying out of the malt for sprouting, after it has remained for forty-eight hours in the thirty-one steeping tubs, which hold 225 bushels apiece. The malt is in every stage of progress—some just taken from the water, some again almost ready for the drying kilns, where it is taken seven days after it leaves the tubs. There are two kilns to each floor. The kilns are heated by enormous furnaces, with twenty-four flues, in the basement. The flooring of the kiln is of iron, and the temperature, even on the top floor, is kept up to 90° Fahrenheit.

Malt is only made during eight months of the year, but in that time Mr. Greenway generally makes from 225,000 to 250,000 bushels. When the malt is properly dried it is transferred on a "carrier" to the storing bins below which hold about 45,000 bushels. These "carriers" are very ingenious contrivances. They run the whole length of the malt house and granaries, 335 feet, and communicate with the elevators and hoppers.

A "carrier" is a narrow endless sheet of cloth, about two feet in width and bagging slightly on the middle, which runs backward and forward on rollers moving on a staging four feet from the ground, and either discharges the malt into the hoppers, or carries the raw barley from the elevators to the malting rooms. It will carry 1,000 bushels an hour. The granaries consist of three floors, 162 feet long and 65 feet wide; two of them being 14 feet, and the third 11 feet high. They have a storage capacity of 175,000 bushels of barley. The hop room is 65 by 40 feet. Its contents vary in quantity, according to requirements and market values; but 350,000 pounds is about the average annual consumption.

"The two huge vats, in which the malt, hops and water are converted into beer, hold 300 barrels each. The fluid in them is boiled by a steam worm which covers the bottom and is fed from the boilers in the basement. All the beer is boiled by steam. One engine of forty-five horse power suffices for boiling the beer and heating the building in winter time. It consumes 700 tuns of bituminous coal in the course of the year. The coal bunkers of the establishment hold 300 tuns.

"An admirable contrivance, the patent of a Frenchman named Baudelot, is used for cooling the beer before it is run into the fermenting vats. The boiling beer is forced up to the floor above into a horizontal pipe seven feet from the ground. From this pipe it issues with great force from innumerable little jets, and dashes down on a succession of highly polished wooden bars about an inch in thickness and four inches across, placed like the laths of sun shutters when they are turned so as to admit the light. These bars are hollow, and are filled with constantly flowing iced water.

The bars being polished and their edges rounded off, the beer always runs underneath and drops on the middle of the next one. Consequently, though very hot when it leaves the jets, it is quite cool when it reaches the trough at the bottom from which it is conducted through copper pipes to the fermenting vats. This apparatus will cool 120 barrels in an hour. By the way, there are nearly twenty miles of copper piping in the building.

"The foam caused by the fermentation of the beer, after the yeast has been mixed with it, assumes fantastic and even very beautiful shapes. Sometimes it resembles undulating slopes of smooth fresh snow; sometimes it works into masses like drifts of snow, and, again, it will assume the rugged, riven, appearance of a Swiss glacier. And, to add to the simile, there are constant avalanches of the foam in consequence of the continual escape of small quantities of the car bonic acid gas which sustains it.

"Six or eight inches above the suface of the foam, the gas is so powerful as to produce asphyxia in a very few seconds. Brewers have often lost their lives by carelessly inhaling it. Over the tun room, as it is called, there is an immense ice house, one of Brainerd's patent refrigerators, 150 feet by 11 feet, and 14 feet high. By a simple arrangement the cold strikes down, and in the hottest summer weather the beer is kept perfectly cool. The store rooms, three in number, hold together 8,000 barrels of beer. Last year the brewery sent out 50,000 barrels of beer and 12,000 barrels of lager beer. It is a common occurrence for the firm to pay $300 or $400 in one day to the Government for stamps. The ale from this brewery is shipped to all parts of the State, more especially the central and western divisions.

"Adjoining Mr. Greenway's great brewery are the Syracuse Flour Mills, owned by J. W. Barker & Co. The mill, which is built of red brick, is 140 feet by 80 feet, and has five stories and a basement. It is run almost entirely by water power, though it is provided with an auxiliary engine of 100 horse power. Under an old lease, granted twenty-five or thirty years ago, the proprietors are empowered to use the surplus water of the Erie Canal for driving their machinery. A stone wall, built into the bank of the canal, at the hight established by law, prevents the use of the water when the canal is low. The engine has been in use for one month this fall, in consequence of the extensive dryness of the season, but previously it had only been used in the aggregate six weeks during the five years which have passed since its erection. The water, after driving the wheel passes through the mill and runs away into the Onondaga Creek. The granaries of the mill have a storage capacity of 80,000 bushels of wheat, and the nine run of stones grind about 1,400 bushels a day.

"The wheat is passed from the granaries to the grind stones on a "carrier" similar to that in use in Mr. Greenway's brewery. The flour falls from the stones into receptacles below, from which it is carried by elevators to the cleaning and winnowing floors. There it is passed through four revolving cylinders, one within the other, made of very fine hair sieve cloth. These cylinders are erected at a slight incline, so that the flour and impurities are constantly passing out of them; the flour to the stores over the packing room, the impurities to the waste room.

The flour is barreled by a very simple contrivance, called the "packer." From the stores above, a large pipe runs down to within about four feet of the ground, the bottom of which will just fit the top of a barrel. The barrel after being weighed, is placed on an iron stool and raised by machinery to the pipe. The filling machinery is then set in motion. A small governor, which can be regulated to any weight, detaches the barrel, by letting the stool fall till the bottom of the barrel is level with the floor, as soon as the required weight of flour is in it. At the same time it closes the mouth of the supply pipe. The barrels of flour are at once shipped, as the firm have always as many orders on hand as they can fill. They generally ship about four hundred barrels a day, and averaging ten months running throughout the year, sell from forty thousand to forty-five thousand barrels a year."

REPORT OF EXPERIMENTS FOR TESTING THE RELATIVE VALUE OF LUBRICATING OILS.

BY A. H. VAN CLEVE.

An experimental shaft with journals seven inches long, six inches diameter, was carefully fitted to brass bearings, supported by cast iron frames secured to a suitable foundation. A spur wheel attached to the center of the experimental shaft was geared to a pinion wheel, on the center of a driving shaft, with its bearings also attached to the cast iron frames.

A set of scale beams, arranged to apply any required pressure (within their capacity) to the lower half of the brass bearings, were also accurately fitted to the cast iron frames and foundation. The experimental shaft was driven by a five horse power oscillating engine, at a given number of revolutions per minute, on each experiment.

The velocity was determined by a counter attached to the end of the shaft. The brass bearings of the experimental shaft were kept at an average of 96° Fahr., which was determined by thermometers, inserted through them to within three eighths inch of the journals. An oil cup was placed over each bearing, graduated to fractional parts of a gill. A thermometer, to determine the temperature of the oil when applied, was placed in each cup. The experiments proved that the consumption of oil varied with its temperature when applied. The quantity of oil applied per minute was varied at intervals, as was required to keep the bearings as near 100° Fahr. as possible, as abrasion of the metals took place when it rose above that point. The total consumption of oil, at the close of each experiment, was averaged with the number of hours occupied in making the experiment. The pressure upon the journals was varied, for each kind of oil, as was necessary to preserve the uniform temperature of 96° Fahr., at the required revolutions of the shaft per minute on each experiment.

Hence, the number of square feet of the journal's surface travelled per minute, the pounds pressure upon them, and the quantity of oil applied, determined the lubricating value of the oil. The method of applying the pressure by the scale beams accurately indicated the power consumed by the engine to keep the shaft in motion during the experiments with each kind of oil.

A second series of experiments was made. (See Table No. 2.)

A shaft, with journals 6 inches long and 2¾ inches diameter, was fitted in place of the 6 inches diameter and driven at a corresponding number of revolutions per minute, for the purpose of testing the value of car box oils.

The experiments on each shaft were conducted with the same care, with corresponding results.

RESULTS.

The accompanying Table (No. 1.) exhibits the results of several tests, from which it will be seen that winter sperm oil, from three houses, sustained the heaviest pressure, and the best of them was taken as the initial of comparison for all others, and their per cent of lubricating value determined by it. The tests of mineral oils and mixtures of animal and fish oils with them would not sustain an equal pressure with the sperm, when equal quantities of the oil were applied, without rapidly increasing the temperature of the journals, and producing an abrasion of their surfaces.

The experiments, as shown by Table (No. 2.), on car box oils, with a shaft having bearings 2¾ inches diameter, by 6 inches long, also proved that when the pressure on the bearings was made equal with winter sperm, it required from 100 to 400 per cent increase of oil, to keep the temperature of the journals below 100° Fahr. In no instance could the pressure on the car shaft be raised to 8,000 pounds (with mineral oils), it being the average pressure on an axle of a loaded coal car. Hence, it is to be inferred that the expenditure of locomotive power, and the cost of repairs on all loaded trains, must be in ratio with the quality of lubricating material applied.

Experiments were made at varied velocities, (see Table No. 3.) with the same oils. The results proved that as the velocity was reduced the pressure could be increased, and the relative consumption of oil, applied at equal temperatures, was decreased in almost equal ratio.

The experiments were continued during a period of fourteen months, on the oils purchased for the Camden & Amboy Railroad Company's use; the following results are deemed sufficient for illustration:

TABLE No. 1.

With Locomotive Axle Bearings, 6 in. diameter, 7 in. long.

KIND OF OIL, PURCHASED OF VARIOUS DEALERS.	Revolutions of shaft per min.	Pressure on journals—pounds.	Temperature of bearings—Fahrenheit.	Applied per hour gills.	Per cent of lubricating value less than winter sperm.	OIL. TEMPERATURE FAHRENHEIT. Began to thicken.	Too thick to run.	Congealed at.	[illegible]
Winter Sperm	[illegible]	[illegible]	96°	[illegible]	1.00	28°	26°	[illegible]	[illegible]
Winter Sperm	[illegible]	[illegible]	98°	.15	.04	[illegible]	[illegible]	[illegible]	[illegible]
Winter Sperm	128	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Engine Oil	[illegible]	[illegible]	[illegible]	.18	.12	31°	[illegible]	[illegible]	[illegible]
Engine Oil	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	18°	[illegible]	[illegible]
½ Winter Sperm, ½ Lard	[illegible]	[illegible]	97°	.80	[illegible]	...	...	...	[illegible]
⅓ Winter Sperm, ⅔ Lard	[illegible]	[illegible]	[illegible]	[illegible]	.31	...	...	...	[illegible]
⅔ Winter Sperm, ⅓ Lard	132	[illegible]	[illegible]	.75	.30	...	...	...	[illegible]
Engine Oil	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	...	...	...	[illegible]
[illegible] Sperm	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	...	...	...	[illegible]
Lard Oil	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	...	...	...	[illegible]
Engine Oil	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	...	...	...	[illegible]
Engine Oil	[illegible]	[illegible]	[illegible]	[illegible]	.71	...	...	...	[illegible]
Engine Oil	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	...	...	...	[illegible]
Engine Oil No. 2	126	[illegible]	[illegible]	[illegible]	.81	...	...	...	[illegible]
Engine Oil	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	...	...	...	[illegible]
Refined [illegible]	127	[illegible]	[illegible]	[illegible]	[illegible]	...	...	...	[illegible]

TABLE No. 2.

With Car Axle Bearings, 2¾ in. diameter, 6 in. long.

	Winter Sperm	[illegible]	[illegible]	95°	.25	.09	28°	[illegible]	[illegible]	3.18
	Car Box Oil	[illegible]	[illegible]	[illegible]	.17	.35	17°	[illegible]	[illegible]	2.08
MINERAL	Car Box Oil	225	[illegible]	[illegible]	.15	.40	31°	[illegible]	[illegible]	1.91
	Car Box Oil No. 1	241	[illegible]	[illegible]	.15	.44	20°	[illegible]	[illegible]	1.75
	Car Box Oil No. 2	[illegible]	[illegible]	[illegible]	.15	.43	13°	[illegible]	...	1.81
	Car Box Oil No. 3	[illegible]	[illegible]	[illegible]	.15	.43	16°	[illegible]	[illegible]	1.79
	Car Box Oil No. 4	[illegible]	[illegible]	[illegible]	[illegible]	.66	28°	[illegible]	[illegible]	1.09
	Car Box Oil No. 5	[illegible]	[illegible]	[illegible]	[illegible]	.45	15°	[illegible]	[illegible]	1.76

TABLE No. 3.

With Locomotive Axle, at different velocities.

Winter Sperm	130	7000	97°	.40	....	...	...	...	...
Winter Sperm	100	7200	91°	.26	....	...	...	...	...
Winter Sperm	70	8000	94°	.18	....	...	...	...	...
Winter Sperm	60	9800	94°	.11	....	...	...	...	...
Winter Sperm	130	7000	98°	.36	....	...	...	...	...
Winter Sperm	100	7500	96°	.25	....	...	...	...	...
Winter Sperm	70	8000	91°	.19	....	...	...	...	...
Winter Sperm	60	9500	90°	.10	....	...	...	...	...
Engine Oil	130	6500	96°	.24	....	...	...	...	...
Engine Oil	100	7500	96°	.18	....	...	...	...	...
Engine Oil	70	8000	92°	.14	....	...	...	...	...
Engine Oil	60	9500	87°	.05	....	...	...	...	...
Lard Oil	130	[illegible]	98°	.31	....	...	...	...	...
Lard Oil	100	5000	95°	.18	....	...	...	...	...
Lard Oil	70	[illegible]	93°	.12	....	...	...	...	...

Rogers' Fire Kindlers--A Curious Invention.

Mr. Noah Rogers, of Thomasville, Georgia, has invented an automatic fire kindler, which is a curiosity in patented inventions. It is a machine so constructed as to enable the fire to be kindled by any one in another part of the house, and without getting out of bed.

A CORRESPONDENT of the *English Mechanic* suggests two new uses for india rubber. One is for springs for locks, especially on gates and in other places exposed to the weather; the other is for proportional measuring, and the mode of application for this purpose will be obvious to our readers.

Scientific Lectures to the New York Young Men's Christian Association.

The second of the above named series was delivered on Tuesday, November 28th, by Professor Doremus, the subject under consideration being "Fire and its Treatment." In the course of the lecture, Professor Doremus said:

Fire is the most awful exhibition given to man of the potency of the Creator, its power, either for good or evil, being incalculable. Various have been the theories held at different times as to the nature of heat. Lord Bacon maintained it was a mode of motion; the same view was held by Sir Isaac Newton, and in our own time the theory has been revived by a number of eminent chemists, chief among them Mr. John Tyndall who has written a book in defence of its truth. Fire had been considered by the ancients to be one of the elements; but this is not maintained at the present day, and we are in a certain sense at sea as to its proper place in creation.

We frequently read of instances where the leaves of trees, rustled by the blast, ignite and produce terrible conflagrations, such as have lately occurred in Wisconsin and Michigan, where whole forests were destroyed from this simple cause. On the same principle a body, traveling with great velocity, coming in contact with an opposing force, produces fire—as, for instance, a projectile striking against the side of a ship will send forth sparks of flame. The popular theories, which will be intelligible to all, relative to the production of this element are easily explained. It is by chemical means that we are daily mastering all the difficulties of science, and among them this principle of fire. If carbon or charcoal be exposed to the air it can easily ignite, and in the same way soft. In one year the Metropolitan Gas Company lost $125,000 by the burning of their soft coal when exposed to the air and in the same time twenty-eight of the coal ships which left Liverpool were supposed from the same cause to have been lost. Another great cause of fire is electricity, which has been fearfully illustrated by the destruction of Chicago. The air is surcharged with the electric force, and in such weather as we have at present this can be easily proved. If a person who walks a distance a day like this comes into a warm room, and rubs his feet for a length of time on a carpet or rug, in a short time the electricity will penetrate to the very tips of his fingers, and a match applied to them will ignite a flame.

This theory explains such phenomena as we read about in the papers in connection with the destruction of Chicago. People who lived long distances from where the fire was raging, who had no idea of moving to a place of refuge, suddenly discovered their houses on fire in a manner that seemed inexplicable to them. The truth of the theory is easily explained. Great fires, such as that one, create a strong current of electric air, which travels over great distances, frequently firing a city in places widely apart. The knowledge of this principle should create a counter element to prevent such disasters, and it is believed chemistry is able, with its comparatively limited knowledge, to suggest one. Apart from this, some valuable hints are being thrown out by men of science relative to the building of our cities. The long narrow streets are, it is said, very dangerous in the presence of a fire, short, broad streets on the European plan being much safer and less exposed to the action of the flames. Some improvements might be made in our Fire Departments. It has been suggested that, instead of water being solely depended upon as an extinguisher, a reservoir should be provided in all our larger cities, filled with either carbonic or sulphurous acid, which would be much more efficacious than water if pipes were connected with the reservoirs, leading to our large establishments. In case of a fire breaking out at any time, the mere action of turning on a valve and filling the burning apartment with the gas would extinguish the flames. The same method could be employed on ships at sea, and the disasters that are now so frequent could be easily prevented and controlled.

To Filter Alcohol.

The following method of filtering alcohol or its solutions is said, by the *Druggist's Circular*, to be very satisfactory, and to be used extensively in North Germany, where it constitutes one of the secrets of the trade. Clean, unsized paper (Swedish filtering paper is the best), is to be torn into shreds and stirred into the liquid to be clarified. The whole is then to be strained through a flannel bag, when the resulting liquid will be found to possess the utmost clearness and limpidity. A filter may also be made by spreading thin paper pulp evenly upon stretched flannel or woolen cloth. When dry, the cloth so coated will be found to give better results than the felts, etc., commonly employed as filters.

PROFANITY never did any man the least good. No man is richer, or happier, or wiser for it. It commends no one to any society. It is disgusting to the refined, abominable to the good, insulting to those with whom we associate, degrading to the mind, unprofitable, needless and injurious to society.

PUBLIC LIBRARY AT MONTREAL.—We learn with much pleasure that the Messrs. de St. Sulpice intend to open, at Montreal, a library where students can consult, gratuitously, works of art and science which are difficult to procure. Students in medicine and law especially, who are considerably hindered in their studies for want of books, will appreciate this liberality.—*Journal de L'Instruction Publique.*

GREATNESS lies not in being strong, but in the right use of strength.