

Scientific American.

MUNN & CO., Editors and Proprietors.

PUBLISHED WEEKLY AT

NO. 37 PARK ROW (PARK BUILDING) NEW YORK.

O. D. MUNN.

A. E. BEACH.

The American News Co., Agents, 121 Nassau street, New York. The New York News Co., 8 Spruce street, New York. A. Asher & Co., 20 Unter den Linden, Berlin, Prussia, are Agents of the German States. Messrs. Sampson Low, Son & Marston, Crown Building, 185 Fleet street, London, are the Agents to receive European subscriptions. Orders sent to them will be promptly attended to.

VOL. XXV., NO. 24 . . [NEW SERIES.] . . Twenty-sixth Year.

NEW YORK, SATURDAY, DECEMBER 9, 1871.

Contents:

(Illustrated articles are marked with an asterisk.)

Table listing various articles such as 'A Curious Invention', 'Applications for the Extension of Patents', 'Business and Personal', etc., with corresponding page numbers.

SOMETHING ABOUT LUBRICATORS.

What is a lubricator? A common reply to this question would be "anything that has the power of reducing friction." But how these things act to reduce friction is a matter upon which we have no absolute knowledge, though there are some facts whereupon to base theories.

The hypothesis is that the particles of liquids and fluids are spherical, and so smooth and hard as never to wear by attrition. This conception is about the only one the mind can make of bodies in which the particles are capable of moving with perfect freedom throughout the mass and among each other.

Viscosity of liquids is attributed to the cohesion of molecules, rather than to interlocking through irregularities in form. The latter will not satisfactorily account for all properties of viscous liquids. A quantity of ordinary fine lead shot approximates feebly the character of a similar quantity of liquid.

These shot could be used as a lubricator, and the investigation of how they would act to reduce friction will give a clue to the probable way in which all lubricators act.

In the first place, being infinitely hard and smooth, the surfaces of the spheres cannot in the least interlock. They, therefore, slide over each other with the greatest facility. Placing a layer of these spheres between two plane material surfaces and moving one surface, we should see each of the shot rolling along under its burden, thus changing sliding friction to rolling friction, and notably reducing the power required to move the given surface.

Placing the shot in the same way between an ordinary journal and its bearing, we should find difficulty in keeping them in place; but could they be retained, there would still be the same conversion of sliding into rolling friction. The tendency of the shot to gravitate to the lowest point in the bearing, would gradually force out all of them except a single line or row, which would then sustain the weight of the journal and would so far indent the metal as to cease rolling.

If now we could supply some bond of union between the shot, sufficiently strong to overcome in great measure their tendency to gravitate, and could also supply a bond of attraction between them and the journal, without detracting materially from their power to flow about among each other, the journal would carry them along in its revolution against the action of gravity, and so long as the shot would remain

unchanged in character, the journal would remain lubricated. The attraction of cohesion and adhesion are just such bonds, and it is because oils possess these attractions in higher degree than water and some other liquids that the former are better adapted to lubrication than the latter. There is no better lubricator than water when it is convenient to keep it constantly supplied to bearing surfaces. As examples we may refer to Girard's Palier Glissant, illustrated and described on page 6, Vol. XXII, of this journal, and to the water bearing of Shaw's propeller pump, illustrated and described on page 118, current volume. In these applications of water to lubrication, the water is forced between the bearing surfaces by hydrostatic pressure.

We see then that, for general use, lubricators must possess a certain amount of cohesive and adhesive attraction. But they must also have the power to retain their cohesion and fluidity under the action of moderate heat, heavy pressure, and contact with metals and air. The oxygen of the air attacks many kinds of oils, rendering some acid and others resinous; and moreover some oils of mineral extraction are contaminated with acids, used in their rectification, which attack metallic surfaces, the oxides of the metals thus produced increasing friction mechanically. The oxides of metals have the power of saponifying vegetable and animal oils, and no doubt this combination often takes place when oils of this kind are used on rusty bearings.

The soaps formed by the union of the saponifiable parts of oils with metallic oxides are hard and insoluble, and are, therefore, much less perfect lubricators than the oils themselves. Some oils, more particularly those extracted from petroleum, are volatile, and evaporate as soon as journals become slightly heated. Oils possessing these defects are unfit for purposes of general lubrication.

Probably nothing else has ever been discovered that possesses in so high a degree all the properties desirable in a lubricator as good pure sperm oil. There have been, however, some close approximations to it in oils extracted from petroleum. Many of the latter are, however, very inferior. Some excellent lubricating oils are also obtained from various seeds. The olive and the castor bean furnish oils very good for lubrication. Olive oil is, however, too expensive for general application to this purpose.

But as no amount of theory can take the place of actual test in mechanical science, we are glad to notice in this connection some recent and important experiments made by Mr. A. H. Van Cleve, General Purchasing Agent for the Camden and Amboy Railroad, relative to the value of different lubricating oils. A full report of these experiments will be found in another column, and we call our readers' attention to it as being perhaps as important a contribution to our knowledge upon this subject as has yet been published.

Of late graphite has been prepared so pure, and has been reduced to so impalpable a powder as to enable it to enter as a competitor with oils for purposes of lubrication. It is probable that the action of this substance on bearings is not analogous to that of oil in the conversion of sliding into rolling friction, but that it acts beneficially because its coefficient of friction on metals and wood is so much smaller than that of metals on metals or metals on wood.

As yet its value as a lubricator is not generally admitted, although we have seen the strongest testimonials in favor of an article called plumbago grease, manufactured by a house in this city.

The "metalline," about which such incredible stories were told a year or two ago, and about which we hear nothing lately, was prepared in part from graphite. It is possible that this substance (graphite) in a perfectly pure state, or mixed with other substances, may eventually take its place among standard lubricators in general use for machinery; but it has yet to earn its reputation.

TO SMOKE OR NOT TO SMOKE.

The use of tobacco is an evil, or it is not an evil. In the enormous and increasing consumption of this plant it has become a question of very great importance what effect upon the general standard of health is produced by it. The agitation of this subject has been increased during the last two years, and pamphlets, essays, and lectures have developed in full strength the arguments for and against tobacco using. As smoking is the most popular and most powerful method by which the stimulant effect of the plant is obtained, it is principally upon this habit that the battle is waged.

We have from time to time presented some of the arguments on both sides of the question, our object being to assist in arriving at truth in so important a matter; and though our confirmed taste for smoking and the natural desire to find it a harmless practice have led us to peruse, with peculiar care, all that has been said in its favor, we avow that neither reading nor experience has convinced us that the general use of tobacco is other than an unmitigated evil.

The Dublin University Magazine for September of the present year contains by far the most comprehensive review of the subject that has met our notice, and it is the purpose of this article to place some of the facts, stated in this paper and gleaned from the experience and observation of a very large number of eminent physiologists and pathologists, before the American public in a more prominent manner than they would otherwise appear.

Every page of this remarkable paper is so replete with references that from it might almost be compiled a bibliography of the history, uses, and abuses of "the weed."

The first thing that forces itself upon our attention is the enormous consumption of tobacco. The Food Journal states that as much money is spent upon tobacco in England as upon daily bread, yet England undoubtedly consumes less

of this narcotic, in proportion to its population, than Germany or the United States. The consumption in England has very nearly doubled in twenty years. The annual consumption in Asia, Europe, America, and Australia, as computed by the eminent German statistician Ausland from the most reliable data obtainable, is not less than 970,000,000 pounds. This affords food for comment, but we will confine ourselves to facts and authorities.

M. Barral, who made the official report on specimens of tobacco exhibited at the Paris Exposition, in his surprise at the footings of his estimates of annual production, remarks: "The enormous figures which have passed before the reader's eye testify to the facility with which people fall into excessive expense for the gratification of a pleasure which has for its principal aim to kill time and to stupefy the mind."

The active principles of tobacco are nicotine, a concrete oil called tobacco camphor, and an empyreumatic oil. The two last are active poisons, but not so deadly as the first, which, according to Taylor, is one of the most virulent poisons known. One drop of it kills a rabbit in three minutes and a half. We need not quote other authorities on this point, as all agree with Taylor as to the character of these substances.

The disease called locomotor ataxia, which is a general paralysis of the nerves, is a disease that was unknown forty years ago. Now it has become quite common. Martin ascribes its origin and prevalence to the use of tobacco.

Dr. Richardson, himself a smoker, says: "Smoking produces disturbances—(a) in the blood, causing undue fluidity, and change in the red corpuscles; (b) in the stomach, giving rise to debility, nausea, and, in extreme cases, sickness; (c) on the heart, producing debility of that organ and irregular action; (d) on the organs of sense, causing, in the extreme degree, dilatation of the pupils of the eye, confusion of vision, bright lines, luminous or cobweb specks, and long retention of images on the retina; with other and analogous symptoms affecting the ear, namely, inability clearly to define sounds, and the annoyance of a sharp, ringing sound, like a whistle or a bell; (e) on the brain, suspending the waste of that organ, and oppressing it if it be duly nourished, but soothing it if it be exhausted; (f) on the nervous filaments and sympathetic or organic nerves, leading to deficient power in them, and to over secretion in those surfaces—glands—over which the nerves exert a controlling force; (g) on the mucous membrane of the mouth, causing enlargement and soreness of the tonsils—smoker's sore throat—redness, dryness, and occasional peeling off of the membrane, and either unnatural firmness and contraction, or sponginess of the gums; (h) on the bronchial surface of the lungs when that is already irritable, sustaining the irritation and increasing the cough."

This authority, however, claims that the diseases caused by tobacco are functional, not organic or specific. This does not matter much, except as encouragement to those who desire to recover from ill health resulting from smoking.

M. Decaisne recognizes a functional disease of the heart (narcotism of the heart) as caused by tobacco, distinct symptoms of which were observed by him in twenty-seven out of thirty-eight, boys aged from nine to fifteen, who smoked more or less.

It is a fact well established that before adult age the use of tobacco produces more serious disturbance than later in life.

M. Beau notices eight cases of angina pectoris caused by the use of tobacco.

Professor Lizars records several cases of cancer of the tongue and lips caused by the use of the pipe. The writer has known one such instance, and never wishes to see another example of such terrible suffering resulting from a worse than useless habit.

Dr. Taylor says those who suffer from functional disorders are ready "to attribute the derangement to any other cause than the real one."

Experiments made by Dr. Druhan seem to indicate that tobacco poison in an overdose may produce effects which render even small doses dangerous ever after.

Dr. Corson corroborates the opinion of M. Beau as to angina pectoris.

But we will make no further citations. If tobacco has any applications useful to mankind, we are satisfied that smoking, chewing, and snuffing are not of them. We may use tobacco to kill the insects which infest our rosebushes and conservatories; but, if we will continue to poison ourselves with it, let us make no pretences about it. We do it to gratify a depraved appetite from which we are irresolute to break loose. Let us neither believe nor pretend to believe that it is a blessing. If tobacco poisons our bodies, let it not also corrupt our morals and make hypocrites of us.

THE CONDITION OF MECHANICS AND LABORERS IN ENGLAND.

The condition of the working classes in England has become so low and degraded that the attention of thoughtful men of all shades of opinion is attracted to it; and it is a serious question to know what remedy to apply to save a vast population from sinking to a depth of corruption and misery unparalleled in the history of modern civilization.

A plan has been proposed by Mr. Scott Russell, the architect of the Crystal Palace, the Great Eastern and other large works, to form two Committees, "a Council of skilled workmen," and "a Council of legislators," to whom shall be referred the discussion of the whole question and the suggestion of proper remedies.

Mr. Russell says: "While there is no finer breed of working men in the world than the British skilled workman, there