The lumbering industry now turns most of its waste products to useful purposes. The principal one of these wastes is sawdust, and this troublesome material now yields many valuable articles. One of the comparatively recent enterprises in this direction is the distillation of sawdust resulting in acetic acid, wood naphtha, wood alcohol, gas, oil, charcoal, and tar, the last yielding the bases for certain aniline colors. The sawdust may be burned in special furnaces or mixed with other material to form fuel. It is made into artificial wood, used in the manufacture of explosives, of heat-insulating material, in plaster, and largely in paper making. In the paper industry, too, many substances, wastes in the past, are usefully employed to-day. The recovery of the sulphite liquor from wood-cellulose factories has been the subject of many researches and inventions; and while numbers of these are ingenious and partially successful, much still remains to be done in this field. The paper manufacture now utilizes hundreds of thousands of tons of old newspapers, old stock, waste paper, etc., which would otherwise be practically valueless.

The utilization of wastes on an enormous scale, but of which the general public knows very little, occurs in the woolen industry. The principal articles of waste are woolen rags and wool grease. The first are reconverted into wool, and used again and again in the manufacture of cloth in an endless untraceable circle. The wool grease is employed in many industries and yields oils, fats, acids, potassium salts, and other elements of recognized value in arts and manufacturing. It is estimated that the enormous quantity of nearly 3,000,000 pounds of potassium carbonate are saved annually from the wool-wash waters of the mills and scouring establishments of France and Belgium. Waste soap-suds from textile factories yield many valuable substances, such as lubricating oils, fats, acids, and soaps. In one German establishment the suds are precipitated with lime, the coagulum is collected, pressed into bricks, dried, and heated in gas retorts. A gas is obtained which has three times the illuminating power of coal gas, and which in quantity is nearly double what is required to light the entire plant.

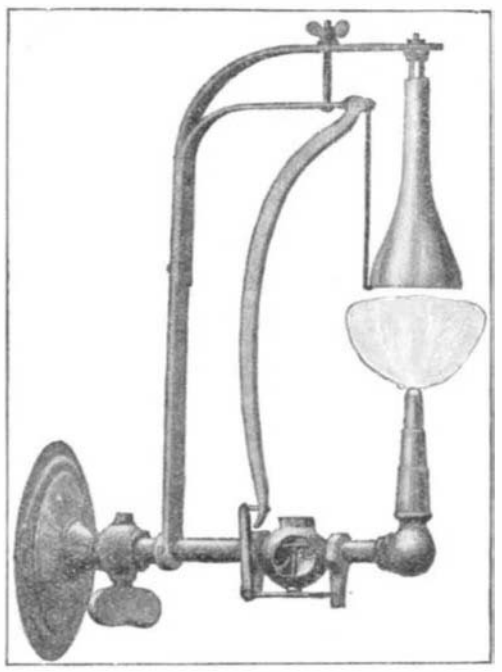
The cotton-seed oil industry can hardly to-day be considered the utilization of a by-product, though such was its origin, for at the present the annual value of the products derived from it is many millions of dollars. The fine cotton fiber still adhering to the seed after ginning, and known as linters, is used largely in the making of mattresses, pillows, felt hats, etc. The hulls of the seeds are used as cattle food, as are also the residues of the meats after the oil has been pressed from them. The pressed meats are also used as a fertilizer. The oil is used in the manufacture of lard compounds, salad and packing oils, soaps and washing powders, and is generally recognized to-day as a high-class food product.

Among other industries in which former by-products have become of the greatest value are those of dyeing, in which the manufacture of synthetic indigo is perhaps the highest attainment yet reached in this field, silk working, starch making, soap making, and brewing. The disposition of the garbage of cities, in the past often presenting much difficulty to the municipalities and frequently even a menace to public health, is remarkably successful from a sanitary as well as an industrial standpoint. From it are obtained valuable greases, fuels, and fertilizers, which often more than pay for the entire cost of operation. An interesting and valuable development is the production of coatings and sizings for paper, water-proof glues, paints, substitutes for hard rubber, horn, and ivory, from the casein, albumen, and milk sugar of skimmed milk. The list of examples of by-product utilization would not be complete without the mention of the use of corn pith for naval purposes, the manufacture of artificial stone from broken glass and from ashes, sash weights from tin scrap, cattle food from brewery residue, new rubber from old, glycerine from distillation washes, and the valuable corn oil as a by-product from breweries, distilleries, and starch works. Remarkable as is this brief account of waste utilization—and but a portion of the later advances have been touched upon—a great deal still remains to be accomplished in many branches of science and industry, and the future undoubtedly will see such an accomplishment, for there is nothing without an economic value for some purpose, if not in the industry in which it first appears, in some other where it can be turned to account.

It is a noteworthy fact in proof of the progress made by the German iron industry that the number of the workmen has not risen in proportion to the increase of the production. In 1895 the production amounted to 5,500,000 tons, and the workmen numbered 24,059; in 1904 the production had risen to 10,000,000 tons, and the number of the workmen only to 35,284. In 1895 the quantity produced per head of workmen employed amounted to 227 tons, in 1904 it had risen to 283 tons; that is to say, the number of workmen increased during the decade by 47 per cent, but the quantity produced increased by 84 per cent.

AUTOMATIC DEVICE FOR TURNING OFF THE GAS.

While the public has been pretty well educated to the dangers of "blowing out the gas," accidents from this cause are still of not infrequent occurrence. Now, however, it is seldom that the gas is deliberately blown out, but the flame is often extinguished accidentally by a strong draft, or the gas may be temporarily cut off for the purpose of repairing the mains, and then turned on again without due warning to sleeping inmates. In order to obviate such dangers, Mr. Iver C. Peterson, of 759 38th Street, Brooklyn, N. Y., has invented a controlling device for gas burners, which operates to shut off the flow of gas when the gas flame is extinguished. As shown in the accompanying engraving, the device comprises a standard, secured to the gas bracket, and supporting a bell-shaped thermostat directly over the burner. The standard also carries a spring arm, to which a bell-crank lever is pivoted. One arm of the lever is very short, and is connected by a hooked wire to the lower edge of the thermostat. The other arm is very long, and extends downward to the gas bracket. In addition to the usual valve, the fixture is provided with an auxiliary valve of the poppet type. The stem of this valve rests on a hinged plate, and the latter carries an arm which engages the longer arm of the bell-crank lever. Normally, the plate is tilted downward, permitting the valve to remain closed. When lighting the gas, the main valve is first opened, and then the hinged plate is raised to open the auxiliary valve. The plate is held up for a moment or two, or until the thermostat is expanded by the heat sufficiently to draw down the shorter bell-crank arm and swing back the longer arm, thereby holding the plate in its upper position. Now, should the gas flame be extinguished, the thermostat would contract, permitting the bell-crank lever to return to its normal position and allowing the plate to drop, whereupon the poppet valve would close, cutting off the flow of gas.



AUTOMATIC DEVICE FOR TURNING OFF THE GAS.

The Third Race for the Vanderbilt Cup.

As a result of a protest made by the makers of the Frayer-Miller racer (which was running splendidly in sixth place when the elimination race of September 22 was called off) this American air-cooled machine has been placed upon the team instead of the Pope-Toledo car, which was running fourth at the finish, but was in so crippled a condition that it would probably have been unable to complete its final round ahead of the Christie and Frayer-Miller cars. As the Haynes car (which gave an excellent demonstration of steady, smooth running) is too low-powered a machine to stand any chance with the foreign racers of double its power, its owners, showing their good sportsmanship, will doubtless withdraw it and allow its place to be taken by a more powerful car. Possibly the second Locomobile racer, which has been held in reserve, will be substituted for the Haynes machine, in view of the fine showing of the first racer in the elimination race. This would seem to be the most rational change, provided a suitable driver could be found for the second racer, as it is as powerful and carefully constructed a car as its mate, which showed the greatest speed of any car in the trial race.

As we go to press, the following is the list of eighteen cars that are expected to start in the third Vanderbilt Cup race at 6 A. M. October 6. The start and finish of the race will be at the grand stand located on the Jericho turnpike about a mile east of Westbury. The race will be of the same length as was the elimination trial, viz., 297.1 miles, consisting of ten rounds of the 29.71-mile course.

No.	Car.	H. P.	Driver.	Entrant.	Nation.
1	Thomas.	115	Le Blon.	E. R. Thomas.	United States
2	Panhard.	120	Heath.	Panhard-Levassor.	France.
3	Mercedes.	120	Jenatzy.	Robert Graves.	Germany.
4	Fiat.	120	Lancia.	F. I. A. T.	Italy.
5	Frayer-Miller.	110	Lawwell.	W. J. Miller.	United States
6	Hotchkiss.	130	Shepard.	Hotchkiss Co.	France.
7	Mercedes.	120	Luytgen.	Geo. McK. Brown.	Germany.
8	Fiat.	120	Nazarro.	F. I. A. T.	Italy.
9	Locomobile.	110	Tracy.	S. T. Davis, Jr.	United States
10	Darracq.	100	Wagner.	A. Darracq.	France.
11	Mercedes.	120	Keene.	Foxhall Keene.	Germany.
12	Itala.	120	Cagno.	Itala Co.	Italy.
14	Haynes.	60	Harding.	John Haynes.	United States
15	Clement-Bayard	100	Clement.	Clement-Bayard.	France.
16	Fiat.	120	Weillschott	F. I. A. T.	Italy.
17	Christie.	50	Christie.	Walter Christie.	United States
18	De Dietrich.	120	Duray.	A. de Turckheim.	France.
19	Itala.	120	Fabry.	Itala Co.	Italy.

Automobile Notes.

An automobilist of great experience suggests that it is a good idea for the driver of a car to show his companion on the front seat how to switch off the ignition current in case the driver suddenly becomes incapacitated. By this simple operation, the car can quickly be stopped, and the damage it is liable to do if it runs wild will be reduced.

The subject of motor racing cannot be left without referring to the undoubted benefit which long-distance racing was to the motor industry. The keen contests which took place between maker and maker and between nation and nation, have resulted in its being discovered by constructors that cars can, by the use of the very best material, be constructed within weight limits which would not have been admitted as theoretically possible by consulting engineers ten years ago. Since 1901, however, there has been a feeling that the time would come when the racing of purely racing machines would cease to be of particular advantage in the design and construction of touring cars. The Automobile Club of Great Britain therefore started last year a new form of racing for what is called the Tourist Trophy, in which the cars have to be *bona-fide* touring cars, affording a certain amount of seating capacity, and carrying four passengers or their equivalent weight on chassis of not less than a certain weight. The speed of the cars is limited by the fuel allowance, the same quantity of fuel being given to all the competing cars. The car which completes the distance in the shortest time, that is, the car which can most efficiently transmit the power obtained from the motor to the road wheels and can cover the distance without running out of petrol and without delay, is the car which wins. It is thought by many experts that this new form of racing is likely to considerably improve the construction and design of touring cars, inasmuch as it compels makers to study the question of efficiency rather than to obtain speed out of their cars by means of engines which are unnecessarily large in order to overcome the inefficiency of transmission.

Vice-Consul Charles Karminski reports a formula fixed upon by the German government as a basis or gage for getting at the horse-power of gasoline or alcohol fed automobiles. He writes:

A memorial, subscribed by a large number of autocar builders and addressed to the imperial treasury department, acknowledges their unanimity on the point of accepting the following formula for determining the horse-power of autocars, viz.: N equals $0.3\ id^2s$, in which N signifies the horse-power to be ascertained; d, diameter of cylinder; i, number of cylinders, and s, stroke. The formula is based on an allowance of 3.8 kgs. to the sq. cm. (54 lbs. per sq. in.) as the mean pressure of the piston and 900 revolutions per minute, and has been pronounced satisfactory by the technical department of the imperial treasury. The "Mitteleuropäische Motorwagen-Verein" (Automobile Association of Central Europe) has agreed also to accept this formula, which, according to the imperial treasury, will be recognized by the administrators of taxes in the federal states until the respective supplementary clause has been added to the provisions of the imperial stamp law. The proposed formula is applicable, however, only to gaging the horse-power of autocars fed with gasoline or alcohol, in which connection it is left with the builder of or dealer in such cars to supply the buyer with an authenticated certificate from the factory, showing the horse-power of each car, arrived at by means of the formula in question.

Relative to ascertaining the horse-power of electric motors, investigations are now on foot, the result of which will be duly enunciated upon their termination. To determine the horse-power of the old types still in use, the numbers which in most cases builders place on the name plates of their cars will be considered as authoritative. Should the tax-payer in such cases, however, declare the horse-power of his car to be less, he will be expected to prove the actual horse-power by producing a satisfactory certificate from some competent authority