Latest Facts from Science, Mechanics and Invention

How Your Money Is Now Being Made to Last Longer

The Many Tests That Uncle Sam Is Constantly Using to Find More Durable Paper on Which to Print His Promises to Pay.

The Bundling Room in the Bureau of Engraving and Printing at Washington. Here Paper Money Is Bundled According to Denominations. A Distinctive Portrait is Placed on Each Denomination, and the Public Is Requested to "Go By the Portrait." George Washington's Portrait Appears on the One-Dollar Bills; Lincoln's on the Five and Hamilton's on the Ten-Dollar Notes.

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A Row of Presses in the Printing Room of the Bureau of Engraving Where New Currency Is Printed at the Rate of More than 13 Millions of Dollars Daily.

A Trimming Machine Which Cuts the Large Sheets of Paper Currency Into Separate Bills.

MONEY that lasts longer! Such is the sincere and earnest wish of every citizen in the land. The United States Government ardently desires the same thing for the average of about 13 million dollars of currency its money factory is making every day.

Take a dollar-bill, for example. It leads such a hard life that nine months sees the end of its existence. On the other hand, a ten-thousand-dollar bill may never wear out. Plenty of these big bills have been printed, but most persons have never seen one, to say nothing of possessing such a thing. It is estimated that the ten-thousand-dollar-bills now in existence are sufficient to meet the needs of the country for the next hundred years.

It is the bills of the smaller denominations, especially the dollar-bill, that is bothering Uncle Sam because of its very short life. The dollar-bill constitutes about 60 per cent of the currency in circulation. Folded, curled, crumpled and passed through hands in all stages of uncleanliness—no paper money has such a gruelling experience as the dollar-bill whose replacement keeps Uncle Sam's money factory busy. So in constant tests the government is seeking for a still more durable paper on which to print its promises to pay.

Scientists of the Bureau of Standards, therefore, have joined hands with the experts of the Bureau of Engraving and Printing to find a paper that will meet the acid test.

Not long ago the government reduced the size of its currency to prolong the life of the bills, as well as to effect other economies. The bills of smaller size wear longer because they can be put into a pocketbook of ordinary size without being folded. The American wallet, heretofore, has been the worst destroyer of paper money.

Another thing that Uncle Sam is trying to find to make his currency last longer is a more impervious coating which he can apply to his bills to protect them from the terrific abuse they receive.

The motor car has proved to be a source of destruction to paper money. Since about one person out of three in the United States drives an automobile millions of bills are daily used in buying fuel, oil and grease. This money is handled by thousands of service station men whose hands are covered with oil and grease which greatly damages all paper money.

Today the dollar-bill has to work so hard that it succumbs to a premature death, in spite of the fact that it is printed on the strongest linen paper to be had and fortified by a resin and animal glue compound developed by government chemists to prolong its days. Today the experts of the Bureau of Standards are busily engaged in making experiments with many other kinds of paper sizings, such as casein, cellulose, lacquers and different waxes.

The paper which the government uses in printing its currency is made from a pulp which is 75 per cent linen and 25 per cent cotton. Imported linen rags and domestic cotton rags, both waste products of the garment-making trades, are cooked in a solution of lime or caustic soda.

The durability of paper on which the government prints its currency is tested in various ways.

To determine the wearing qualities of the paper it is tested by an electrical device which continually rubs the paper back and forth until it is worn through. A counting attachment records the number of rubs the paper will stand.

Since creasing a bill is most destructive an electrical machine is used to test the folding strength of the paper. The bill being tested is put under tension and pressed over rollers until it "cracks," each folding of the paper being registered. Bills tested at standard humidity can stand 5,000 foldings before breaking.

Currency paper is also tested for its moisture-resisting powers. A satisfactory paper resists the passage of moisture for at least one minute. To make the moisture test, small pieces of the paper are placed in aluminum floats launched in shallow containers of water. In the bottom of each float is a hole over which the paper is fastened. A mixture of sugar and chemical dye is sprinkled over the paper which is then covered with glass. When the water finally soaks through the paper it dampens the mixture of the sugar and dye and a discoloration is produced.

The tensile strength of currency paper is found by stretching the samples on the yawning jaws of a device which actuates a pendulum to register the pull necessary to break the paper.

Since an average of six million pounds of paper money wear out every year and close to a billion worn-out bills are destroyed annually by the United States Treasury, it is at once understood why Uncle Sam is trying to make his money last longer.

George Washington's Odd Barn

The 16-Sided Barn Designed by George Washington for Use in Threshing Wheat by Treading It Out Under the Feet of Slaves or Horses.

BECAUSE George Washington is so famous as a military genius, a great statesman, as "the first American president" and "the father of his country," his versatility in other ways is little known, although he achieved notable success as an inventor and along architectural lines.

When Washington was 21 years old he began farming at Mount Vernon. He was a man of unusual efficiency and had little patience with crude farming implements.

Washington turned his talent for architecture to planning all the barns and other farm buildings which he erected on his Mount Vernon estate. One of these structures was a sixteen-sided brick barn.

In Washington's day wheat was threshed by throwing it on a hard-surfaced floor and having slaves or horses tread out the grains. This method was very unsatisfactory and it was costly, as some of the wheat was destroyed and the remainder mixed with dirt.

To solve this problem Washington devised a sixteen-sided barn which had a specially designed threshing floor filled with interstices or cracks. The wheat was spread over this surface and when trodden the grains fell through the cracks to another floor immediately beneath. In this way the grain was kept free of all dirt and fell on a perfectly clean surface.

Fungus That Forms Like a Bird's Nest

WHILE you are wandering through the woods Nature has many fascinating things to show you. Some of these things, however, and which are among the most interesting, she is not forcing on your attention. Unless you have a keen eye and an alert mind you will overlook some of the wonders of the woodlands.

You will admire, of course, the rocks and their peculiar formations; the moss that carpets the ground in a cool green, as well as the many varieties of flowers and ferns that beautify the surroundings.

Unless you extend your observations to include the fallen leaves one of the most interesting of all nature forms is very likely to escape your eyes. This group is a fascinating and varied form of growth which is called bird's nest fungus because of its shape. This fungus, which is known to scientists as "crucibulum vulgare," is found on the fallen leaves of trees and on decaying stems.

The Bird's Nest Fungus Which Grows on Fallen Leaves and Decaying Stems.

Some of these fungi appear only as little brown pouches. Others may be in a mature stage of development in which the top has burst and formed into a trumpet-shaped nest which is filled with tiny, glistening white eggs. They are not eggs, however, but spore cases which are fastened to the nest by tiny thread-like cords.

The name fungus, which is a Latin word meaning mushroom, is the botanical term given to all those lower cellular growths which develop from spores and have no chlorophyll, the green coloring matter contained in plants.

It is the lack of chlorophyll that restricts the mode of life of fungi. Because they cannot decompose the carbon dioxide of the air, these growths are forced to live on other plants.

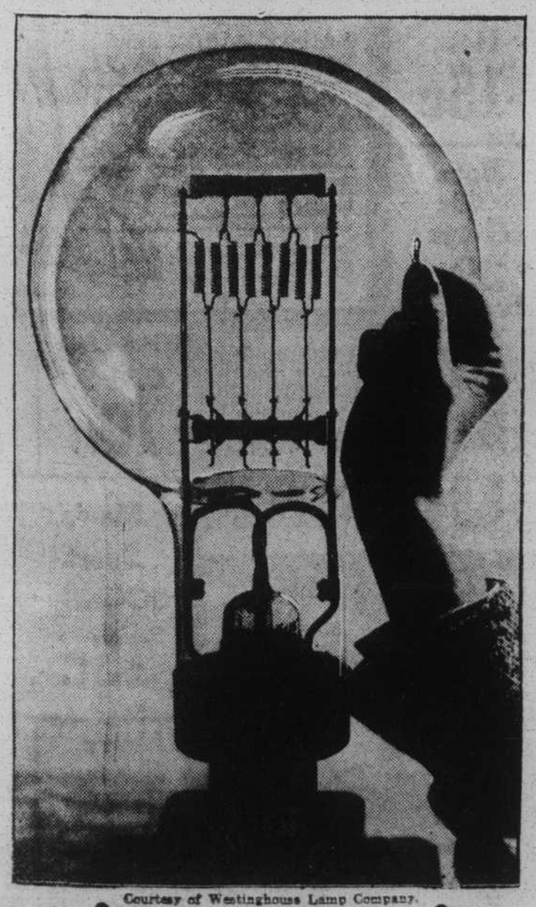
Freak Lamps for All Purposes

WHEN incandescent lamps were in their infancy a little over 50 years ago the variety of shapes and sizes could be numbered on the fingers of one hand. Today there are some 3,000 different kinds of lamps. Many of these have unusual applications and are manufactured only on special order, for which reason these "freaks" are seldom seen.

One of the most fascinating of these lamps is called the "grain of wheat" lamp because in size and shape it actually resembles a grain of wheat. It is the smallest lamp in commercial use today and consumes only one-fiftieth of one watt. With a consumption so small it could burn all day long for a year at a cost of only 10 cents, based on a country-wide average rate per kilowatt hour. These tiny "specks" of light are used in doctor's instruments for exploring the insides of human beings, such as the sinus regions of the head.

At the other extremity in the family of freak lamps is the 10,000-watt lamp, which has a glass bulb larger than a man's head. With an actual bulb diameter of 12 inches this lamp is 128 times larger than the "grain of wheat" lamp and consumes 50,000 times more wattage. The cost of operating such a lamp continuously for a year at the same average kilowatt-hour rate, would be $5,232.

This huge lamp is used principally in motion picture studios, but also has applications in airport lighting and frequently is used for special lighting occasions where the spectacular is desired.



Courtesy of Westinghouse Lamp Company.

The Largest and Smallest Members of the Incandescent Lamp Family, a 10,000-watt Lamp for Airports and Moving Picture Studios and the "Grain of Wheat" Lamp Used in Doctors' Instruments.

How Minerals Help Crops

THE addition of small quantities of the less common elements to the soil may lead the way to production of larger yields of crops per acre. Tests being made by leading agricultural scientists indicate that the growth and activities of soil micro-organisms or bacteria, upon which plant life largely depends, may be stimulated by the presence of traces of copper, zinc, boron, manganese and other elements. This branch of soil research is still in its early stages, but enough work has been performed to indicate that the use of these rare elements may be extensively used in agriculture to increase the bacterial activity of farm land.

Crop rotation has been known for thousands of years. Varro (B. C. 116) wrote that "a crop is not sown entirely for the crop which is obtained the same year, but partly for the effect to be produced in the following; because there are many plants which when cut down and left on the land, improve the soil."

During the past 25 years, interest in the bacterial life of the soil has been awakened and it is found that the number and kinds of bacteria or organisms in any given soil have a great influence upon the supply of plant food for crops. In general, the soil bacteria using oxygen have a more favorable effect upon the soil than those which grow without oxygen.

The chief elements needed for plant life are potassium, nitrogen and phosphorus, which are used by growing plants in larger amounts than the other elements. Magnesium, iron and sulphur also are important to plant growth, but they are required in very small amounts and are generally found in soils in sufficient amounts for crop production. Magnesium helps in the formation of chlorophyll, which substance utilizes the radiant energy of the sun to manufacture sugar and starch. Iron, although it does not enter into the chemical composition of chlorophyll, in some mysterious way has a great influence upon its formation. If the soil is deprived of iron, the plants quickly lose their chlorophyll.

Sulphur seems to have some relation to the development of nitrogen-fixing micro-organisms. On some lands where potatoes are raised extensively, the addition of magnesium has been found to be necessary for maximum production.

Why the Eyes of Some Persons Glisten

WHY do the eyes of some persons glisten? An explanation of this curious physical quality of certain eyes is given in a bulletin of the Better Vision Institute. In normal eyes the pigment absorbs much of the reflected rays of light, but in eyes deficient in pigment, especially albinos, a pink light is reflected, which makes them glisten. In many animals this glistening effect is heightened by the presence of a special reflecting membrane in the back of the eye, which imparts an iridescent appearance. Such a membrane makes the eye of the animal more sensitive in semi-darkness, and incidentally adds to the gleam of the eye.

Another interesting phenomena of optical science is that of recurrent vision, or flicker. When the dark surrounding space is illuminated by a bright flash, as lightning close at hand, the surrounding objects may be seen by the eye, not only once, but three or four times in rapid succession. This recurrent vision has attracted the attention of scientists and many interesting experiments have been conducted, especially in relation to colored objects.

The World's Biggest Bass Horn

TOOT! Toot! Here is what is claimed to be the largest bass horn in the world. It is made of copper, weighs 90 pounds and is just short of being six feet in height.

Aside from the claim that this horn is the largest one ever made, it has a history that, perhaps, makes it equally as famous as its size does.

This historic musical instrument was made in 1893 especially for John Philip Sousa, the bandmaster, and was to be played in his band at the Chicago World's Fair of 40 years ago held in celebration of the four hundredth anniversary of the discovery of America.

At the close of the Columbian Exposition Mr. Sousa presented the huge horn to Harry S. Hobson, who was at that time a composer of music at the fair.

Mr. Hobson today is living at Pasadena, California, where he is a realtor.

This Huge Horn, Which Was First Played at the Chicago World's Fair in 1893, Is Made of Copper, Weighs 90 Pounds and Is Almost Six Feet in Height.

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