

# Latest facts from Science, Mechanics and Invention

## Solving the SECRET of the ATOM'S Limitless POWER

WHEN scientists recently started a series of experiments to explore the atom, which is so minute that it is estimated that six millions of them can be gathered on the point of a needle, Sir Richard Gregory, a world-famous scientist, was led to prophesy that "the day is not far distant when science may place at the disposal of man forces so strong that a hostile army or an enemy city may be annihilated almost by the touch of a button."

The discovery of the secret of the atom's limitless power might, indeed, bring the return of the fabled Golden Age. Man would need to work no longer, for he would have at his disposal the forces of the illimitable ether, one cubic inch of which contains sufficient energy to drive a giant liner across the Atlantic and back three times.

A few days' directive effort, and man would have an abundance of all material needs to supply his wants.

Alluring as is this prospect of a Golden Age from which poverty, disease, and material problems of existence would be banished, it has another side: a dark and sinister side.

Scientists believe that the heart of the invisible atom lies the salvation or the destruction of the world. Some investigators have gone so far as to express the opinion that in this up this which planet upon which man is plunging through space.

And others who take a less fantastic view see for certain in this inevitable discovery the ultimate annihilation of the human race.

Although an atom is invisible the fact that it can be heard was recently demonstrated at the University of Kansas. Dr. H. P. Cady, assisted by John Strong, both of the department of chemistry, not only caused atoms to make a noise audible to observers in the laboratory, but the sound was caught by the university's radio station, KFKU, and broadcast throughout the Central West.

Dr. Cady's experiments were made with a Leyden jar. The negative pole of the jar was connected with a fine point needle, set like a lightning rod in the center of the jar. Suspended to surround the negative point was brass cylinder connected with the positive pole.

"When the jar was charged the electricity passed across the space between the cylinder and the point until the difference in potential was reduced to 4,000 volts," Dr. Cady said in explanation of the experiment. "Then the resistance of the air stopped the discharge until a radio station substance was brought within a few inches of the upper opening of the brass cylinder and just above the phonograph needle.

"When the alpha particles from the radium entered the cylinder produced ions from the air, and these multiplied by collision until the electric current could pass again. By means of a three-stage amplifier this current, which multiplied between 10,000,000 and 100,000,000 times within the Leyden jar, was multiplied 70,000 times and this power produced in a loud speaker a tone like that of a small bell struck sharply and then muted or of a plucked violin string.

"When substances strongly radioactive were presented to the instrument a continuous rattle ensued, but for substances less radioactive the single atoms were separated enough to be counted easily."



A Composite Photo-Drawing Picturing the Possible Results of a Scientific Experiment to Loosen the Energy Sealed Up in an Atom, a Force So Terrible as to Be Annihilating in its Deadly Effects.

Dr. T. F. Wall, noted engineer of Sheffield University, recently experimented in an attempt to disrupt the atom and release its energy by means of an extremely powerful magnetic field. Some day, possibly at a terrible moment, the great current of electricity may be released through that simple motion. The result no man can prophesy.

A child could hold in the palm of his hand a metal brick containing enough explosive energy to blow up a million men! In an ordinary motor-truck could be carried enough concentrated energy to level half a nation!

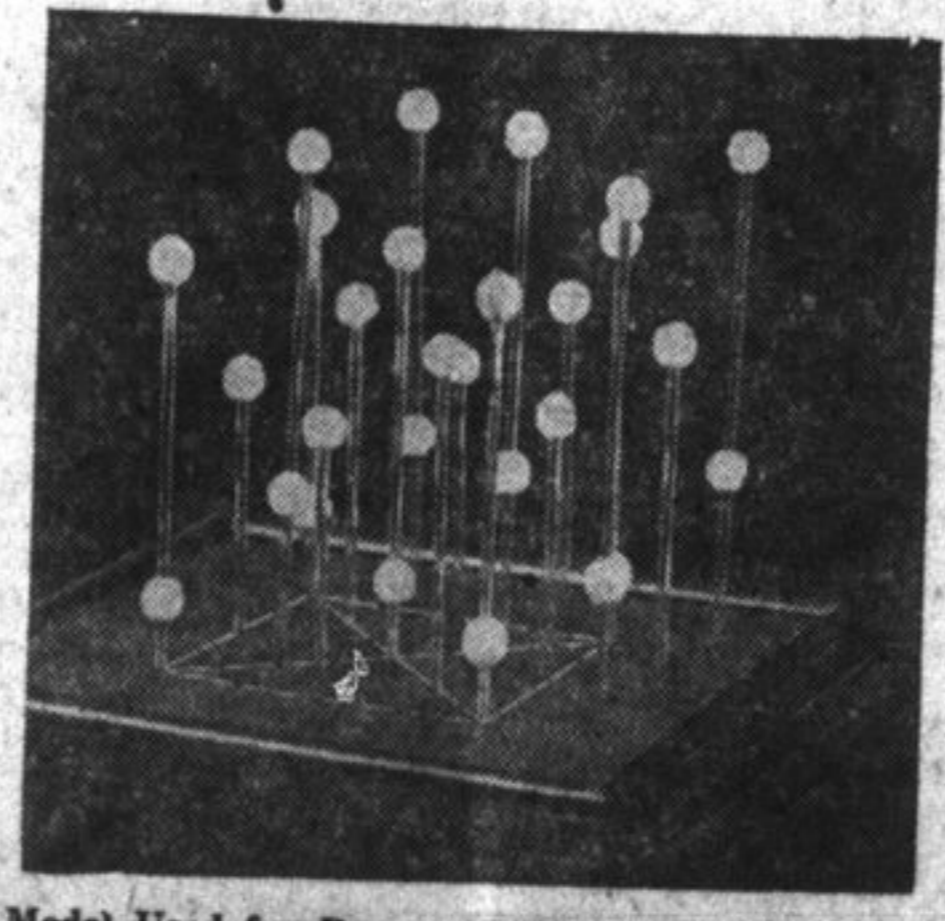
But this force, so tremendously destructive, could also be the greatest benefactor of mankind. It could run the machinery of the world indefinitely. There is energy enough in a chunk of mud to run an automobile for weeks!

The modern scientific view, as G. B. Seybold explains it in Popular Science monthly, is that everything, including man, is made up of atoms, each comprising a nucleus with a number of electrons whirling about it in fixed orbits, just as planets revolve about the sun, at a tremendous rate of speed, as great as 93,000 miles a second.

"No one ever has seen an atom, and no one ever will," declares Mr. Seybold, "for we see only by means of light, and the atom is so small that it escapes detection by the vibration of light waves. No microscope, no matter how powerful, ever can make the atom visible to man. If a drop of water were magnified to the size of the earth, an atom in the liquid would appear the size of a baseball.

"The nucleus is still smaller than an electron. Give the atom a diameter of one mile, and an electron in it would be as large as a dining-room table. Then place a pea in the center of the table. That represents the nucleus.

"The number of electrons in an atom and the



Model Used for Demonstrating the Structure of an Atom, Which, According to Scientists, Is So Small That Six Millions of Them Could Be Gathered on the Point of a Needle.

structure of its nucleus determine whether the substance is gold, iron, or some other element. In all except the simplest atom, that of hydrogen, the electrons revolve around the nucleus in successive rings. Those traveling in orbits nearest the nucleus revolve with the greatest speed.

"When any of these electrons are forced out of their pathways, dragged farther away from the nucleus, a great amount of energy is released. Some of the energy in motion that is lost when the electron jumps, and this lost energy is released in the form of waves. If the nucleus of an atom can be attacked and destroyed, the whole atom can be disrupted, causing the electrons to be shot out of their orbits."

This actually can be seen in the case of radium by a remarkable instrument that photographs what is happening in the interior of an atom. As particles flying from radium pass through a gas, they electrify atoms in their path, and small drops of moisture forming on these make a trail of mist, which can be photographed. Thus, though the atom itself will forever remain

invisible, its travels can be observed readily.

This photographic apparatus has revealed that a radium atom behaves just like any other atom for one or two thousand years—its electrons suddenly in fixed orbits around a nucleus—then that of the gas, helium. And in this process, when the particles are being shot off at high speed, the radium is being changed into lead. Transmutation of matter is taking place.

The high speed electrons in the atom, explains Dr. Wall, are like electric currents, and produce in the atom intense magnetic fields of such immense strength that hitherto it has been impossible to produce anything as great by artificial means. But, if it were possible to produce a magnetic field as powerful as those in the atom, and this field were impressed on the atom, he argues, the orbits of the electrons would be broken down, and some, or all, of its energy would be released.

Dr. Wall has obtained a magnetic field 20 times more intense than any ever known before, by winding several layers of thick insulated copper wire around a small tube of steel. This is former oil, and huge quantities of electricity are discharged through the oil-immersed copper.

The result is that an extremely powerful oscillating electric current flows in the coil for a small fraction of a second, producing a correspondingly intense magnetic field, which passes through the steel tube. For a minute fraction of a second, the apparatus is capable of permitting an equivalent to the coil. This intense magnetic field is impressed at regular intervals for days, weeks, and even months, on the material whose atomic structure it is desired to change.

## Glass That Can Be Easily Bent

GLASS that could be bent without breaking was known in the days of ancient Rome, according to one of the tales that has come down to this day. Tradition relates that an exiled architect, on his return to Rome, petitioned the Emperor Tiberius that he might be permitted to remain in his native land. He presented the Emperor with a glass cup, which the latter much admired. To insure further favor, the architect then asked the return of the cup and threw it upon the floor with much force, causing it to be dented but not broken. He restored the cup to its original condition by means of a hammer. The Emperor was amazed and inquired whether others knew the secret, and being assured that they did not, ordered the architect beheaded. Tiberius feared that if such knowledge should be imparted to others, they might make gold and silver worthless.

Thus the secret of bendable glass, according to this legend, was lost to the world and was destined to remain so until recently when Dr. Fritz Pollak and Dr. Kurt Ripper, of Vienna, announced their discovery of a new malleable glass that is said to be non-splintable, ten times clearer than ordinary glass, and easily bent.

Concerning this new glass, the weekly magazine, Motor, has this to say:

"Applied to motor-car windows and wind-screens the new material would have the transparency, whiteness and durability of glass, with a degree of flexibility that removes all dangers from splinters and jagged fractures.

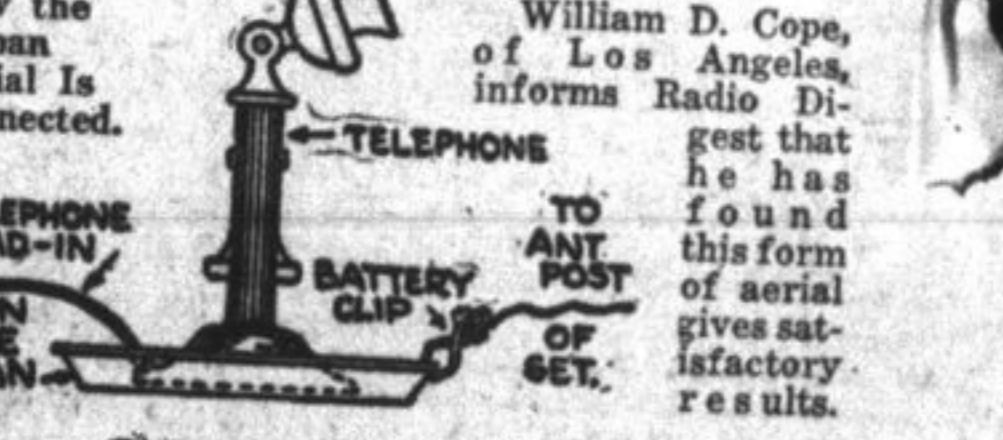
"It is an organic (non-mineral) substance. It is sufficiently hard to be safe from accidental scratching, yet flexible enough to bend under stress to a marked extent without fracture. It can be broken with the bare hands without risk, because the edges of the fracture are not sharp and jagged."

A ball of the substance, when dropped on the floor, will bounce better than a golf ball, according to a contributor to the Glass Container. It will absorb any kind of dye, and delicate vegetable dyes can be used to color it. It can be made into imitation meerschaum pipes, cigar-holders, fancy umbrella handles and door knobs. In many instances it can be used in place of rubber or vulcanite. Its uses as suitable material for automobile windshields seem apparent. One valuable property of this glass is that it will transmit the ultra-violet ray and, therefore, can be used as a shelter for patients requiring sun treatment—also for greenhouses.

## A Piepan Radio Aerial

THE only parts necessary to construct a serviceable indoor aerial are a pie pan, a portable telephone, battery clip and from ten to twenty feet of insulated copper wire. The battery clip should be clamped to the rim of the pan after a spot on the pan has been sanded, scraped or scuffed to secure a good contact.

The wire is attached to the clip and the other end is connected to the antenna binding post of the radio set. If the wire length is too high or tangle, it is broad, insert a folded piece of newspaper or piece of cardboard between the phone base and the pie pan.



How the Piepan Aerial is Connected. William D. Cope, of Los Angeles, informs Radio Digest that he has found this form of aerial gives satisfactory results.

## Radio Violin Is Musical Sensation

SENSATION is in store for music lovers, according to the prediction which Patrick Whelan makes in Popular Radio. This feat, Mr. Whelan explains, may now be accomplished by means of a compact unit which may be inserted inside of the violin and attached, by means of a wire, to a nearby receiving set. Both the receiver and the wire may be concealed.

Thus a broadcast program may be reproduced by the violin itself, which has been transformed into a practical reproducer, and a lone soloist enabled to play a concerto to the accompaniment of a full symphony orchestra.

Mr. Whelan thinks that this device offers to violin students who find the grind of daily practice a bit wearisome, the inestimable boon of an accompaniment, not only by the world's greatest artists, but by the world's greatest orchestras.

"This electrically operated instrument is not a toy," says Mr. Whelan, "but a real violin that has been augmented with a reproducing unit similar to that used in a loud speaker. The unit comprises a permanent magnet, two coils and armature affixed to a movable pin. It is mounted inside the violin after a portion of the back of the instrument has been temporarily removed and placed in position, as shown in the accompanying illustration."



How a Radio Loudspeaker Unit is Mounted Inside of a Violin. (a) The Bridge to Which is Fastened the Vibrating Pin (b), That is Energized by the Coils (c), and the Magnet (D).

## Arranging ODORS According to a Musical SCALE

VARIOUS attempts have been made to arrange perfumes in an order corresponding to the musical scale. This scale is called the "odophone." Those who have worked out the scale claim that perfumes cannot be perfectly blended unless they harmonize to this scale. In the scale the lower notes are represented by the heavy odors, such as vanilla. The higher notes are represented by such odors as peppermint and citronella.

The odophone scheme was originally intended to guide manufacturers in blending various odors. The Pathfinder explains. The manufacturer of perfumes, it is said, recognize only six elementary odors. The endless number of perfumes they

put on the market are made by combining these six ingredients in various proportions. The six odors they recognize are the spicy, flowery, fruity, resinous, foul and scorched.

The spicy odors are those found in pepper, cloves, nutmegs, etc. The flowery odors are those found in the rose, violet, etc. The fruity odors come from apples, oranges, etc. The resinous odors are those found in the pine needle, turpentine, etc. The foul odor comes from hydrogen sulphide, while the scorched odor comes from tarry substances. Science now makes all these odors synthetically, and they are, as a rule, much cheaper than those made from the originals.

## How TREES Make the Air COOL

EVERYONE knows that a house standing among trees is far cooler in Summer than one that stands bare and unprotected, but if asked the reason most people would answer, "Why, because trees give shade and keep off the sun."

This is only half an answer, for trees do very much more than give shade. They tend to lower the temperature in their neighborhood, for during the day they give out large quantities of moisture and so cool and purify the air.

A certain botanist, who has given much thought to the matter, estimates that a good-sized foliage tree, such as an elm, may produce a crop of no fewer than seven million leaves. The combined surface of all these leaves amounts to no less than 200,000 square feet. In other words, one tree may expose to the air nearly five acres of foliage, and during a hot Summer day the whole of this immense area of greenery is exhaling a cooling moisture.

From such figures as these it is easy to see the enormous value of trees around a house, and to realize how important they are in towns. Even in those favored localities where a really hot spell is an infrequent occurrence, the advantage of planting trees in streets is self-evident; in warmer countries trees in towns are not a luxury, but a necessity, and in most cities in America, as soon as a new residential street is planned, the first thing done is to plant a row of trees down each side.

In most Southern cities residential avenues are lined with fine trees, and houses in these tree-shaded streets bring rents much higher than those in streets which are not so planted.

If the theory of certain botanists is proved correct scientists can tell what kind of weather the ancients were having at this season 3,000 years ago. These men hold that it is possible to discover with the aid of simple arithmetic and a magnifying glass whether the day when Julius Caesar was assassinated was wet or fine, and whether Magna Charta was signed during a heat wave.

## "ZEBRULE" Is Curious CROSS-BREED

MAN has always crossed different species of domestic animals for his own convenience. The mule is a familiar instance, while all the different breeds of dogs probably come from a common stock.

Amazing experiments of the kind are frequent nowadays. In East Africa, for instance, the pony has been crossed with the zebra, producing an animal known as the zebrule, which is extremely powerful and fast and has the advantage of

standing the climate better than either the horse or the ordinary mule.

New types of dog are always being produced, and it is usual for the trapper of the North to mate a "hucky" bitch with a wolf to keep up the strain of untrifling sleigh dogs that still remain the best draft animals of the Great Northwest.

In their wild state animals seldom choose mates of other species than their own, but it now appears that the fox, introduced into Australia to check the plague of rabbits, has crossed with the dingoo, the Australian wild dog.

The knowledge of this cross has caused consternation among sheep farmers. The dingoo has also crossed with a mastiff which found its way ashore from a wreck, and the progeny is said to be increasing.

In Canada the wild buffalo has been crossed with Hereford cattle, producing a very hardy animal, the meat of which is said to be excellent. Recently a lion-tiger was presented to the London Zoo. The father is a lion, the mother a tiger, and the animal itself a handsome beast with the characteristics of both its parents.

## A "BOW" for Polishing FINGERNAILS

ANNA E. FREY, a Philadelphia woman, has invented a simple device for cleansing and polishing fingernails, consisting of a rectangular "bow" of wood or metal, strung with a twisted strand of absorbent cotton which passes through grooves along the outer sides of the legs of the instrument and is clamped in angular cuts at the corners where they join the back.



The "Bow" is Strung with a Twisted Strand of Absorbent Cotton Saturated with a Cleansing Fluid.

Thus, to replace used strand with a fresh one, it is necessary merely to pull out the old one and "string" the bow newly, an affair of a moment.

The strand, held taut across the bow, can be conveniently used, when saturated with a cleansing or bleaching fluid, for removing extraneous matter from beneath the nails, without injury to delicate membrane or cuticle. By rubbing it back and forth over the outer surfaces of the nails, it serves efficiently as a buffer or polisher.