The Bee's Home Magazine Page

Mysteries of Nature and Science

What Becomes of the Energy Stored Up in a Coiled Spring if the Spring is Suddenly Untempered or Destroyed by a Coroding Acid?

By GARRETT P. SERVISS.

"The law of conservation of energy states that in any system of bodies energy may be differently distributed and appear and reappear in different kinds of work, but in all its changes there is neither loss nor gain in quantity. Then what becomes of energy in this experiment? Wind up a watch: the spring then holds potential energy. Heat the spring until the temper is taken out; then release it. It does not spring back as it would have done if released before heating. Where did the potential energy go which had been stored up in the spring by winding? Or eat up the coiled spring with nitric acid? What has become of its potential energy now? In using heat it will be noted that the same amount of heat is given off from the wound as from the unwound spring. Reader, Papillion, Neb."

Many a man of much scientific knowledge and acumen has puzzled his mind over your question. Recent discoveries have so shaken formerly accepted doctrines that even the validity of the great law of the conservation of energy has come to be doubted. However, putting aside theoretical considerations, this law appears to be so universally obeyed in all the operations of nature that we can experiment with (outside the phenomena of life or vital action) that the presumption is in its favor, and when we find something which seems to contradict it, we ought to be careful to exhaust every plausible explanation before concluding that the supposed law is no law.

Now what does this "law" assert? It asserts that the total energy contained in the universe is a constant quantity, and that, whatever particular forms it may assume, its sum remains absolutely the same. And what is energy? It is that quality or condition by or through which matter acts upon other matter so as to produce changes of state or position. In its many manifestations and transformations it appears in such forms as chemical energy, electrical energy, mechanical energy, all of which, under suitable conditions, are interchangeable, one for another.

Every kind of energy has two phases which we recognize—first, "kinetic energy," or energy in the act of producing motion or doing work, and, second, "potential energy," or energy which is capable of doing work, but is not actually doing anything, being stored up in some portion of matter and resting idle, like unexpended money in a lucky man's pocket.

To get potential energy, kinetic energy must be expended. Kinetic energy stands for work, and potential energy for capital, the product of work, and potential energy for capital, the product of work. But each produces the other, or makes the other's existence possible.

I take two cases for potential energy for illustration. First, that of a stone which is lifted a certain distance above the ground and suspended there by a cord. In lifting the stone kinetic energy was expended against the force of gravity, and this has now changed into potential energy, or "energy of position." Being separated from the earth, which attracts it, there is a pull upon the stone tending to bring it back to the ground. This pull is balanced by the tension of the cord. If you cut the cord instantly the potential energy begins to change back again into kinetic energy, and the stone drops, developing in the course of its fall as much kinetic energy as was originally expended in lifting it.

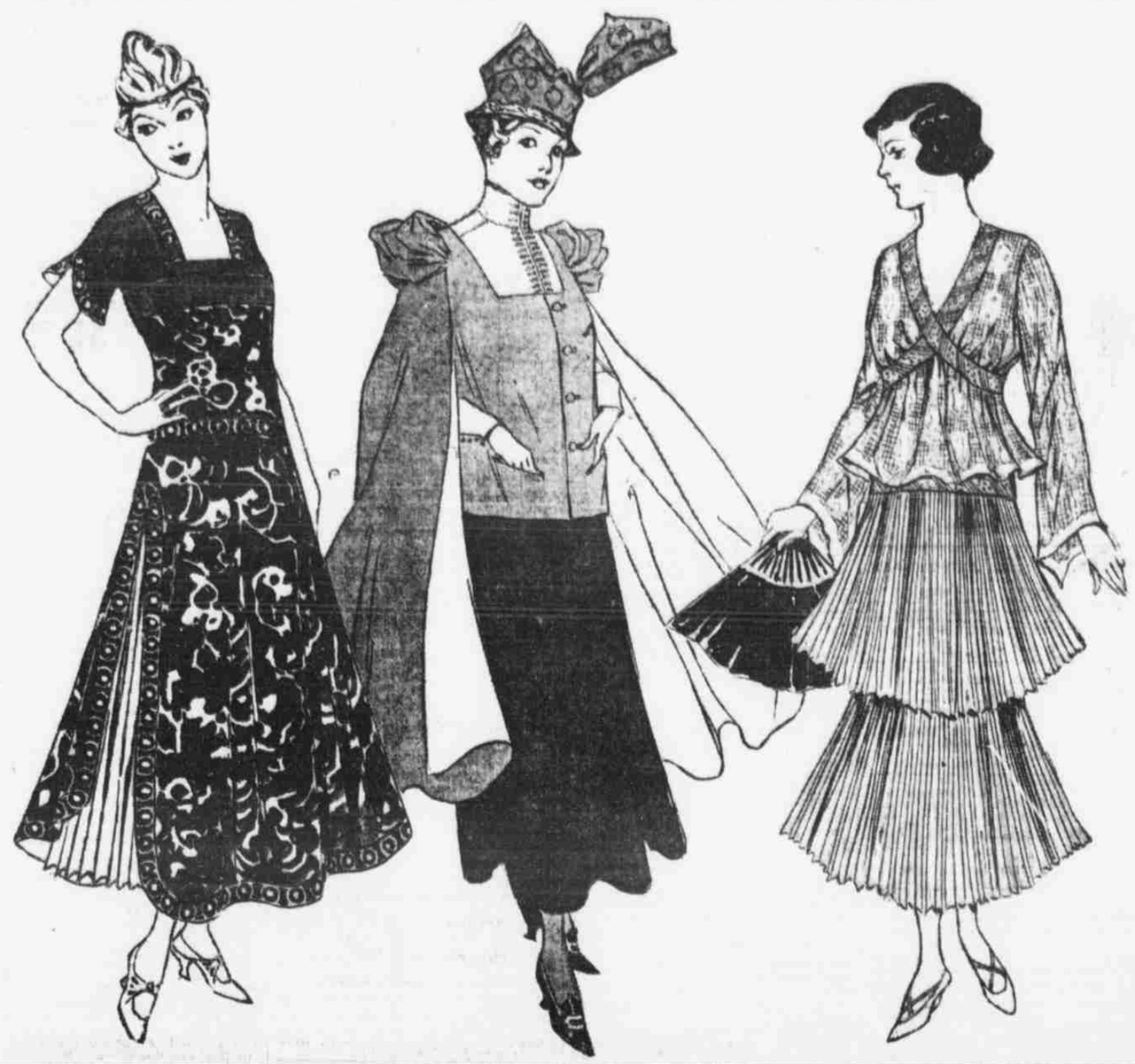
But suppose that instead of cutting the cord and releasing the stone you, by some means, suddenly destroy the stone. What becomes of the store of potential energy? Clearly, since you cannot destroy the substance of the stone, but can only destroy it as a stone, transforming it into dust, or smoke, or gas, the apparently lost energy has simply been divided up among the billions of microscopic particles that now represent the stone. The total of the kinetic energy developed by their descent to the earth, no matter how long it may take, will be equal to the amount of potential energy that the stone contained.

But let us take another instance, where the disappearance of energy seems more mysterious. This is your own case of a coiled spring. The kinetic energy expended in winding up the watch is stored as potential energy in the spring. Now untemper, or destroy, the spring; what becomes of the energy in this case? Can the ghost of a coiled spring exert force? If it is a scientific ghost it may, and in this way: Consider that the opposite surfaces of the flat coiled spring are in opposite states of strain, the concave surface being compressed and the convex surface elongated. It is conceivable that when the spring is immersed in the acid the two-fold strain to which its molecules are subjected may give rise to electric currents, which pass away into the ether, and the sum of whose kinetic energy is equal to the potential energy that the spring held. This, to be sure, is a hypothetical explanation, but it is based upon known physical principles. If you simply untemper the spring by the application of heat, all that you now destroy is that state of the molecules which resulted from the strain, but here again it is conceivable that the destroyed "strain" may have been taken up by the ether in some form of electric energy.

In a word, it must not be assumed that the only way the potential energy in the coiled spring can be used is in driving the wheels of the watch. If the spring, or the state of strain in the spring is destroyed the energy may reappear in the form of heat, or electricity, or some other kind of working force not yet recognized by our science. In its new form it may pass away into the ether without being detected. Careful experiments in this field would possess absorbing interest.

The Best Models from Paris

Republished by Special Arrangement with Harper's Bazar.



Though Callot retains the long straight lines in her evening frocks, she does add fullness to her skirts by a plaited underskirt similar to this one of green plaited satin. The overdress of black satin is embroidered in green and the upper part of the corsage is of black satin.

One of the most surprising models was a combination of cape and coat of mustard-colored velours de laine lined with peacock blue satin veiled by chiffon in the same tone. Camille Roger tucks two small red roses into the dark blue taffeta bow of her hat.

In fact, Callot even shows plaited skirts of unmistakable fullness on several of her most popular evening models. To be sure the material is a filmy tulle. In this dinner frock she has added a bodice of filet lace girdled in Grecian fashion by bands of pearl and gold embroidery.

Mysetry of the Universe

By EDGAR LUCIEN LARKIN.

On one of the arches of the San Francisco exposition appears this inscription: "The Universe: An Infinite Sphere, the Center Everywhere, the Circumference Nowhere."

A letter from a San Francisco seeker of knowledge asks me for an explanation of the inscription.

Nothing is known of the universe save the portion within range of the largest telespectroscope, which reveals the chemical composition of every sun sending light of sufficient quantity to be analyzed; within range of the largest telecamera, which photographs all suns bright enough to send light able to imprint excessively minute points and dots on the sensitive plates—about 20,000,000 so far photographed; and within range of high mathematics, which argues the existence of invisible matter enough to make several billions of suns like those now photographed.

Pascal is the originator of the sentence inscribed over the portal at the fair. He came near discovering the calculus before Newton and Liebnitz. Had he done so, and kept on exploring its mighty powers, he would have made the sign of infinity, the symbol of infinity, looking like a figure 8 turned over on its side.

The inscription of twelve words of sixty-nine letters need not be written; all can be condensed into one character or symbol. It means unthinkable and that there is no use in thus wasting time. This sign has saved time enough, no doubt, to make a century. None knows whether space is infinite, because we cannot think of the infinite; nor whether space is a sphere; or whether the congeries of billions of suns occupy a spherical part of space. So much for infinity. None is able to think of a billion suns, nor a hundred million—both infinite—not even a master. No one can ever commence to think of the far greater quantity of dark and invisible matter now known to exist, and to be the cause of unthinkable speeds of "runaway" suns, flying under the attraction of this giant mass at velocities of 30 to 250 miles per second. And it is finite.

Q.—"A vessel connected to an air pump has an opening three inches in diameter. If I place my hand over it and with a perfect vacuum how much force in pounds would be required to pull hand away?"—A. B. Tryon, Needles, Cal.

A.—Area of circle three inches in diameter is 7.0686 square inches. Pressure of normal air at sea level, when mercury column in barometer stands at thirty inches, is 14.7822 pounds per square inch. Therefore, pressure on 7.0686 square inches is the product of these two numbers, or 104,456 pounds. But a perfect vacuum is impossible, and normal air at thirty exact inches is next to impossible in ordinary practice. So call it about 100 pounds.

Q.—"How do physicians weigh air?"—Same.

A.—The simplest method is to weigh a container when full of air—normal—and again—when empty. Technical methods cannot be here explained without drawings or cuts.

"What is the weight of air?"—Same.

A.—Air in a normal state weighs .31011 grains per cubic inch, or 535.68 grains per cubic foot.

Read It Here—See It at the Movies.

The Goddess

The most Incredible Motion Picture Serial and Story ever created.

INTRODUCING
EARLE WILLIAMS
as Tommy Barclay
ANITA STEWART
as The Goddess
Written by
Gouverneur Morris
(One of the Most Notable Figures in American Literature)
Dramatized Into a Photo-Play by
CHARLES W. GODDARD,
Author of
"The Perils of Pauline"
"The Exploits of Elaine"

(Copyright, 1915, by Star Company.)

SYNOPSIS OF PREVIOUS CHAPTER.

After the tragic death of John Amesbury, his prostrated wife, one of America's greatest beauties, dies. At her death Prof. Stilliter, an agent of the interests, kidnaps the beautiful 3-year-old baby girl and brings her up in a paradise where she sees no man, but thinks she is taught by angels, who instruct her for her mission to reform the world. At the age of 18 she is suddenly thrust into the world, where agents of the interests are ready to find her. By an accident the hero sees her first and hides with her in the Adirondacks.

SECOND INSTALLMENT.

When dinner was over, Tommy sat on and ate nuts, while Barclay drank coffee and smoked a cigar. At 9 o'clock the little boy went to bed. It was natural that he should feel a little sad and lonely with the unfamiliarity of everything, and that he should have one dream after another.

But they were all about the little Amesbury girl.

He had been told that she had gone to heaven, and it was of her in heaven that he dreamed. He had never read Dante or Milton, and the ideas that he had about heaven were not very elaborate. He had picked them up here and there from people with very little imagination.

The heaven that he dreamed about wasn't a very big place. There was no part of it indeed that could not have been contained within the arch of a theater, if he derived his ideas of it from anything that he had really seen, it was from a comic opera, in which there had been acrobatic men in green tights and spangles, great arches painted to look as if they were made of gold encrusted with jewels, lovely winged maidens in diaphanous white clothes, who, suspended from the waist by long wires, flapped butterfly wings and appeared to fly. The heaven of which he had dreamed was like this, with many other things mixed in. There was a dog or two; there was at least one red Indian with wings and many streets paved with gold trees all made of gold and silver and green enamel and jewelry. There were many curious domestic touches. Right out in the middle of a golden street he saw the little Amesburg girl, sitting in a little wooden chair at a little wooden table and giving a tea party to a fairy no bigger than your thumb. Again he saw her robed in white, playing most enviably upon a golden harp, and then she was playing in a garden and had her lap all full of jewels, and when she was tired of these she simply got up and they all fell to the ground in a wonderful bright shower, and she simply left them there, and then he saw her in a sort of celestial schoolroom. The blackboard had a wonderful carved and gilded frame, just like the Van Dyke portrait over the mantel in Mr. Barclay's dining room. The little Amesbury girl had a silver desk and a gold inkstand and a pen made of ivory, and when she got tired of writing she simply let go of the pen-handle and it went on writing all by itself. There was no word in English or in all the languages spoken in heaven which that pen couldn't spell. It never got hairs in it and it never inked anybodys thumb and forefinger. The school teacher was in the most beautiful and charming angel imaginable. She had wings like a dove. The piece of chalk she drew with did not squeak, and she smiled so beautifully that you simply couldn't help understanding whats he was driving at. She was drawing a beautiful man. The upper part of it was heaven. She made a cross in heaven, and said in a bright, sweet voice: "That is where we are, Celestia; that is where we are having our lessons." The middle part of the map was the earth; it was most New York City and woods England, Germany and Austria looked like two eagles, back to back; France was a little girl in a striped petticoat, sitting on a very high stool and beating a drum; the whole was surrounded with a great broad blue sash of ocean, in which all sorts of ships seemed to move, so cleverly had the angel school teacher drawn them, or such was the magic of her chalk on the blackboard. To represent what was underneath the earth she used a ruby-colored chalk, and sometimes when she made a particularly broad line a little smoke appeared to rise from it.

This dream went away, and Tommy saw the little Amesbury girl once more in the garden playing with the jewels. Suddenly she rose and threw all the jewels impatiently aside, and then she ran into the house and looked under her pillow and, low and behold! there she found the very doll that Tommy had given her, and then she looked so happy and contented that Tommy even in his sleep, knew that when he waked he wouldn't be as sad about her as he had been.

(To Be Continued Tomorrow.)

Little Bobbie's Pa

By WILLIAM F. KIRK.

When Pa caim home last nite he had a bird cage with him & in the cage thare was four littel chickens. Now doant begin asking questuns, he sed to Ma & me, until I have these littel things in jest the right part of the room, ware thay can get lite & heat enuff.

Who toald you thay was canaries? sed Ma. You wud beleeve anything any man tells you if the man has anything to sell.

I have not sed that thay are canaries, sed Pa. Doant talk out o' yure turn. I know perfeckly well what these are. Thay are littel chickens, Pa sed. Two of them is Plimuth Rocks & two of them is Minorkys. Thay are vary kind & inteligent breeds, sed Pa, & I feel sure that I can reer the four of these into useful henhood.

For goodness saik, sed Ma, you can't raise poultry in a flat, & in a bird cage at that.

That remains to be seen, sed Pa. I am firmly of the opinion that I can. Certingly it is worth the trial. I am going to care for these helpless littel things myself, every day morning & nite. Neether you nor little Bobbie will be asked to put yureselfs out in the least. I am going to watch thare habits, sed Pa, & try to learn what thare tastes are, so that I can keep them happy & contented till thay get to be useful hens, laying four eggs a day for us, two for me, one for you & one for littel Bobbie. I think this experience of mine, sed Pa, is going to go far toward solving the high cost of living.

I think you are losing yure massive intelleck, that is what I think, sed Ma. I nevver herd of such a foolish noshun. If you try to keep them chickens in this steam heated flat, sed Ma, thay will not live. You mite as well try raising them in that goldfish globe, sed Ma.

You can talk all you want to, sed Pa, but after these two Plimuth Rocks & two minorkeys has grown up, every time one of them lays a egg she will look at you kind of reeproachful on account of the harsh words here tonite. You leeve this undertaking to me.

Who in the world told you that chickens cud be raised indoors, in a bird cage? sed Ma.

I tell you it is a idee of my own, sed Pa. As long as we cannot move out into the country to live for sum time to cum, I am deetermined to go in for poultry raising on a small scale rite here at home. Thare is no reeson in the wurld why it can't be done. & after I have proven the success of my theory, sed Pa, I am going to give it to the wurld, so that every poor fambly with lives in a flat can have at leest two or three hens to keep them supplied with eggs. Then my naim will be immortal, sed Pa, & will ring down the corydors of time. Now I am going to bed, beekaus I am tired tonite. Goodnite, deer ones sed Pa.

After Pa had gone to bed Ma sed to me Bobbie, wen you grow up, doant join any clubs if you marry. Yure deer father has been too long at the club tonite, I can see that plainly.

& this morning Ma made Pa talk the chickings rite back ware he got them. Pa sed he wud if he cud reemember ware he got them, & he promised Ma that he wud be hoam erly tonite.

In-Shoots.

Women should remember that the scant garment always encourages the immoral man.

When we can love the men who read gas and electric meters we are real Christians.

At a critical period, of course, it is better to have your head than your feet cool.

It is easier to convince a man in an argument than it is to make him admit it.

None is so blind as the fellow who can see nothing attractive in the peek-a-boo shirt waist.

Some invalids seek every tonic save work.