



## **The Einstein See-Saw**

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**About Breuer:**

Miles John Breuer, (1889 – 1947) a U.S. doctor by trade, is better known to science fiction aficionados as a writer for many pulp magazines, including *Amazing Stories* and *Argosy*. His best known works are his story "The Gostak and the Doshes," and his collaborative work with Jack Williamson, including *The Birth of a New Republic*. John Clute described his work as crudely written, but intelligent and noted for new ideas.

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## I. The Einstein See-Saw

Tony Costello leaned glumly over his neat, glass-topped desk, on which a few papers lay arranged in orderly piles. Tony was very blue and discouraged. The foundations of a pleasant and profitable existence had been cut right out from under him. Gone were the days in which the big racket boss, Scarneck Ed, generously rewarded the exercise of Tony's brilliant talents as an engineer in redesigning cars to give higher speed for bootlegging purposes, in devising automatic electric apparatus for handling and concealing liquor, in designing beam-directed radios for secret communication among the gangs. Yes, mused Tony, it had been profitable.

Six months ago the Citizens' Committee had stepped in. Now the police department was reorganized; Scarneck Ed Podkowski was in jail, and his corps of trusty lieutenants were either behind the bars with him or scattered far and wide in flight. Tony, always a free spender, had nothing left but the marvelous laboratory and workshop that Scarneck Ed had built him, and his freedom. For the police could find nothing legal against Tony. They had been compelled to let him alone, though they were keeping a close watch on him. Tony's brow was as dark as the mahogany of his desk. He did not know just how to go about making an honest living.

With a hand that seemed limp with discouragement, he reached into his pocket for his cigarette-case. As he drew it out, the lackadaisical fingers failed to hold it firmly enough, and it clattered to the floor behind his chair. With the weary slowness of despondence, he dragged himself to his feet and went behind his chair to pick up the cigarette-case. But, before he bent over it, and while he was looking fully and directly at it, his desk suddenly vanished. One moment it was there, a huge ornament of mahogany and glass; the next moment there was nothing.

Tony suddenly went rigid and stared at the empty space where his desk had stood. He put his hand to his forehead, wondering if his financial troubles were affecting his reason. By that time, another desk stood in the place.

Tony ran over this strange circumstance mentally. His mental processes were active beneath, though dazed on the surface. His desk had stood there. While looking fully at it, all his senses intact, he had seen it vanish, and for a moment there had been nothing in its place. While he stared directly at the empty space from which the desk had disappeared,

another desk had materialized there, like a flash. Perhaps, there had been a sort of jar, a tremor, of the floor and of the air, of everything. But the point was that his own desk, at which he had been working one moment, had suddenly vanished, and at the next moment another desk had appeared in its place.

And what a desk! The one that now stood there was smaller than his own palatial one, and shabbier. A raw, unpleasant golden-oak, much scratched and scuffed. Its top was heaped and piled full of books and papers. In the middle of it stood a photograph of a girl, framed in red leather. Irresistibly, the sunny beauty of the face, the bright eyes, the firm little chin, the tall forehead topped by a shining mass of light curly hair, drew Tony's first glance. For a few moments his eyes rested delightedly on the picture.

In a moment, however, Tony noticed that the books and papers on the desk were of a scientific character; and such is the nature of professional interest, that for the time he forgot his astonishment at how the desk had got there, in his absorption in the things heaped on top of it.

Perhaps it isn't fair to give the impression that the desk was in disorder. It was merely busy; just as though someone who had been deeply engaged in working had for the moment stepped away. There was a row of books across the back edge, and Tony leaned over eagerly to glance at the titles.

"'Theory of Parallels,' Lobatchevsky; 'Transformation of Complex Functions,' Riemann; 'Tensors and Geodesics,' Gauss," Tony read. "Hm—old stuff. But here's modern dope along the same line. 'Tensors,' by Christoffel; 'Absolute Differential Calculus,' by Ricci and Levi Civita. And Schrödinger and Eddington and D'Abro. Looks like somebody's interested in Relativity. Hm!"

He bent over, his constantly increasing interest showing in the attitude of his body; he turned over papers and opened notebooks crowded full of handwritten figures. Last of all he noted the batch of manuscript directly in front of him in the middle of the front edge of the desk. It was typewritten, with corrections and interlineations all over it in purple ink.

A title, "The Parallel Transformations of Equations for Matter, Energy, and Tensors," had been crossed out with purple ink, and "The Intimate Relation between Matter and Tensors" substituted. Tony bent over it and read. He was so fascinated that it did not even occur to him to speculate on the happy circumstance that the mysteriously appearing desk had brought its own scientific explanation with it. The title of the paper told

him that its sheets would elucidate the apparently supernatural phenomenon, and all he did was to plunge breathlessly ahead in his eager reading. The article was short, about seven typewritten sheets. He took out his pencil and followed through the mathematical equations readily. Tony's mind was a brilliant, even though an erring one.

Under the first article lay a second one. One glance at the title caused Tony to stiffen. Then he picked up the typewritten script and carried it across the big room of his laboratory, as far away from the desk as he could get. He put the girl's photograph in his pocket. Then he took heaps and armfuls of papers, books and notes and carried them from the desk to a bench in the far corner. For, as soon as he had read the title, "A Preliminary Report of Experimental Work in the Physical Manipulation of Tensors," a sudden icy panic gripped his heart lest the desk and its papers suddenly disappear before he had finished reading to the end of the fascinating explanation.

We might add that it did not. For many weeks the desk remained standing in Tony's shop and laboratory, and he had the opportunity to study its contents thoroughly. But it took him only a few hours to grasp its secret, to add his own brilliant conception to it, and to form his great resolve. Once more Tony faced the world hopefully and enthusiastically.

## II. The Vanishing Valuables

The police understood Tony's share in the exploits of Scarneck Ed thoroughly, and, chagrined at their failure to produce proof that would hold in court, they maintained a close and constant watch on that gifted gentleman long after crime matters in the city seemed to have been cleaned up and forgotten. For one thing, they still had hopes that something would turn up to enable them to round off their work and lock him up with his former pals; for another, they did not fully trust his future behavior. Nevertheless, for three or four months it seemed as though Tony had genuinely reformed. He lived in and for his laboratory and shop. All day the scouts could see him laboring therein, and far into the night he bent over benches and machines under shaded lights. Then, some other astonishing occurrences distracted their attention from Tony to other fields.

One morning Mr. Ambrose Parakeet, private jewel broker, walked briskly out of the elevator on the fourteenth floor of the North American Building and unlocked the door of his office. He flung it open and started in, but stopped as if shot, uttered a queer, hoarse gurgle, and staggered against the door-casing. In a moment he recovered and began to shout:

"Help! Help! Robbers!"

Before long, several people had gathered. He stood there, gasping, pointing with his hand into the room. The eagerly peering onlookers could see that beside his desk stood an empty crate. It was somewhat old and weatherbeaten and looked as though it might have come from a buffet or a bookcase. He stood there and pointed at it and gasped, and the gathering crowd in the corridor wondered what sort of strange mental malady he had been seized with. The elevator girl, with trained promptness had at once summoned the manager of the building, who elbowed his way through the crowd and stood beside Mr. Parakeet.

"There! There! Look! Where is it?" Mr. Parakeet was gasping slowly and gazing round in a circle. He was a little gray man of about sixty, and seemed utterly dazed and overcome.

"What's wrong, Mr. Parakeet?" asked the building manager. "I didn't know you had your safe moved out."

"But, no!" panted the bewildered old man. "I didn't. It's gone. Just gone. Last night at five o'clock I locked the office, and it was there, and everything was straight. What did you do? Who took it?"

The building manager conducted the poor old man into the office, shut the door, and asked the crowd to disperse. He sat Mr. Parakeet down into the most comfortable chair he could find, and then barked snappily into the telephone a few times. Then he sat and stared about him, stopping occasionally to reassure the old man and ask him to be patient until things could be investigated.

The building manager was an efficient man and knew his building and his tenants. He knew, as thoroughly as he knew his own office, that Mr. Parakeet had a medium-sized A. V. & L. Co.'s safe weighing about three tons, that could not be carried up the elevator when Mr. Parakeet had moved in, and had been hoisted into the window with block and tackle. He knew that it was physically impossible for the safe to go down any of the elevators, and knew that none of the operators would dare move any kind of a safe without his permission. Nevertheless, with the aid of a police-sergeant, his night-shift, and the night-watchmen of his building and adjacent ones, it was definitely established that nothing had been moved in or out of the North American Building during the preceding twenty-four hours, either by elevator or through a window to the sidewalk.

The newspapers took up the mystery with a shout. The prostrating loss suffered by Mr. Parakeet, amounting to over a hundred thousand dollars, added no little sensation to the story. A huge safe, disappearing into thin air, without a trace, and in its place an old wooden crate! What a mouthful for the scareheads! For several days newspapers kept up items about it, dwindling in size and strategic importance of position; for nothing further was ever found. Every bit of investigation, including that by scientific men from the University of Chicago, was futile; not a trace, not a suggestion did it yield.

Six days later the tall scareheads leaped out again: "Another Safe Disappears! Absolutely No Trace! Some time during the night, the six-foot steel safe of the Simonson Loan Company vanished into thin air. In the morning a dilapidated iron oil-cask was found in its place. The safe was so large and heavy that it could not have been moved without a large truck, special hoisting apparatus, a crew of men, and some hours of time. The store was brightly lighted during the entire night, and two watchmen patrolled it regularly. They report that they saw and heard nothing unusual, and were very much amazed when shown the oil-cask standing where the safe had been the night before." The accounts in the various papers were substantially the same.

Newspaper readers throughout the city and its environs were very much intrigued. Such a thing was very exciting and mystifying; but it was so far out of touch with their own lives that it did not affect them very much at any time except when they were reading the paper or discussing it in conversation. The police were the ones who were doing the real worrying. And, when the following week two more safes disappeared, insurance companies began to take an interest in the matter; and everyone who had any considerable amount of valuables in store began to feel panicky.

The circumstances surrounding the disappearance of the last of the series, the fourth, were especially amazing. This was also a jewelry safe. Canzoni's is a popular firm that rents a quarter of a floor in a big department store, and does a large volume of moderate-priced business. The receipts are stored in a heavy portable safe in a corner of the silverware section until evening, when they are carried to the large vault of the big store. One Saturday afternoon after a particularly busy day, Mr. Shipley, Canzoni's manager, was watching the hands of the clock creep toward five-thirty. He leaned on a counter and watched the clerks putting away goods for the night; he glanced idly toward the safe which he intended to open in a few minutes. The doormen had already taken their stations to keep out further customers. Then he glanced back at the safe, and it wasn't there!

Mr. Shipley drew a deep breath. The safe disappearances he had read about flashed through his mind. But he didn't believe it. It couldn't be! Yet, there was the empty corner with the birch panels forming the back of the show-windows, and no safe. In a daze, he walked over to the corner, intending to feel about with his hands and make sure the safe was really gone. Before he got there, there flashed into sight in place of the safe, a barrel of dark wood; and in a moment there was a strong odor of vinegar.

Things spun around with Mr. Shipley for a few moments. He grasped a counter and looked wildly about him. Clerks were hurrying with the covering of counters; no one seemed to have noticed anything. He stood a moment, gritted his teeth, and breathed deeply, and soon was master of himself. He stood and waited until the last customer was gone, and then called several clerks and pointed to where the safe had stood.

Within the space of a month, thirteen safes and three million dollars worth of money or property had disappeared. The police were dazed and desperate, and business was in a panic. Scientific men were

appealed to, to help solve the riddle, but were helpless. Many of them agreed that though in theory such things were explainable, science was as yet far from any known means of bringing them about in actuality. Insurance companies spent fabulous sums on investigation, and, failing to get results, raised their premiums to impossible levels.

### III. The Lady of the Picture

Phil Hurren, often known as "Zip" Hurren, reporter on the *Examiner*, felt, on the day the managing editor called him into the sanctum, that fortune could smile on him no more brightly. There wasn't anything brighter.

"You stand well with the detective bureau," his boss had said; "and you've followed this safe-disappearing stuff pretty closely. You're relieved of everything else for the time being. Get on that business, and see that the public hears from the *Examiner*!"

Phil knew better than to say any more, for before he recovered from his surprise, the editor had turned his back, buried himself in his work on the desk, and forgotten that Phil was there. Nor did Phil waste any real time in rejoicing. That is why he was called "Zip." When things happened, whether it was luck or system, Phil was usually there. In sixty seconds more, Phil was in a taxicab, whirling toward police headquarters.

Luck or system, he didn't know, but he struck it again. The big wagon was just starting away from the station door when he arrived, crowded inside with bluecoats and plainclothes-men. The burly, red-faced man with chevrons on his sleeve, sitting beside the driver, saw Phil jump out, and motioned with his hand. Phil leaped up on the back step of the vehicle and hung on for dear life with his fingers through the wire grating as they careened through the streets. The men on the inside grinned at him; a number of them knew him and liked him. Gradually the door was opened and he crowded in. He found Sergeant Johnson and eyed him mutely.

"How the hell do you find these things out, I'd like to know," the sergeant exclaimed. "Are you a mind-reader?"

"I don't really know anything," Phil admitted with that humility which the police like on the part of newspaper men and seldom meet with. "Do you mind?"

"No objection," grunted the sergeant. "Been watching all the old crooks since these safes have been popping. Nothin' much on any of them, except this slippery wop, Tony Costello. No, we haven't caught him at anything. Seems to be keeping close and minding his own business. Working in his laboratory. Ought to make a good living if he turned honest; clever guy, he seems. But he's been too prosperous lately. Lots of machinery delivered to his place; we traced it to the manufacturers and find it cost thousands. Big deposits in his banks. But, no trace of his having sold anything or worked at anything outside his own place. So, we're

running over to surprise him and help him get the cobwebs out of his closets."

The raid on Tony Costello's shop and laboratory disclosed nothing whatever. They surrounded the place effectively and surprised Tony genuinely. But a thorough search of every nook and cranny revealed nothing whatever of a suspicious nature. There was merely a tremendous amount of apparatus and machinery that none of the raiding party understood anything about. Tony's person was also thoroughly searched, and the leather-framed photograph of the beautiful unknown girl was found.

"Who's this?" the sergeant demanded. "She don't look like anyone that might belong to your crowd."

"I don't know," Tony replied.

"Whad'ya mean, don't know?" The sergeant gave him a rough shake. "What'ya carryin' it for, then?"

"I had really forgotten that it was in my pocket," Tony replied calmly, at his ease. "I found it in a hotel room one day, and liked the looks of it."

"I know you're lying there," the sergeant said, "though I'm ready to believe that you don't know her. Too high up for you. Well, it looks suspicious and we'll take the picture."

"Boy!" gasped Phil. "What a girl she must be in person! Even the picture would stand out among a thousand. May I have the picture, Sergeant?"

"You can come and get a copy of it to-morrow. We'll have it copied and see if we can trace the subject of it. That might tell us something."

The following morning Phil was at Police Headquarters to pick up further information, and to get a copy of the girl's photograph. Like the police, he could not keep his mind off the idea that there was some association between the crooked engineer and the disappearance of the safes. It seemed to fit too well. The scientific nature of the phenomena, Tony Costello's well known reputation for scientific brilliance, and his recent affluence; what else could it mean? In some way, Tony was getting at these safes. But how? And how prove it? Most exhaustive searches failed to reveal any traces of the safes anywhere. If any fragment of one of them had appeared in New York or San Francisco, the news would have come at once, such was the sensation all over the country that the series of disappearances had caused. Tony's calm insolence during the raid, his attitude of waiting patiently till the police should have had their fun and

have it over with so that he might be left at peace again, showed that he must be guilty, for anyone else would have protested and felt deeply injured and insulted. He seemed to be enjoying their discomfiture, and absolutely confident of his own safety.

"There's got to be some way of getting him," Phil mused; and he mused almost absent-mindedly, for he was gazing at the photograph of the girl. For many minutes he looked at it, and then put it silently into his pocket.

Five o'clock in the evening of that same day came the news of another safe disappearance. Phil got his tip over the phone, and in fifteen minutes was at the scene. It was too much like the others to go into detail about; a six-foot portable safe had suddenly disappeared right in front of the eyes of the office staff of The Epicure, a huge restaurant and cafeteria that fed five thousand people three times a day. In its place stood a ragged, rusty old Ford coupe body. He went away from there, shaking his head.

Then suddenly in the midst of his dinner, he jumped up, and ran. An idea had leaped into his head.

"Right after one of these things pops is the time to take a peek at Tony," he said to himself, and immediately he was on the way.

But how to get his peep was not so easy a problem. When he alighted from his cab a block away from Tony's building, he was hesitant about approaching it. Tony knew him, and might see him first. Phil circled the brick building, keeping under cover or far enough away; all around it was a belt of thirty feet of lawn between the building and the sidewalk. Ought he have called the police and given them his idea? Or should he wait till darkness and see what he could do alone?

Then suddenly he saw her. Across the street, standing in the shelter of a delivery truck in front of an apartment, she was observing Tony's building intently. The aristocratic chin, the brightness of the eyes, the waves of her hair, and the general sunny expression! It could not be anyone else. Post haste he ran across the street.

"Pardon me!" he cried excitedly, lifting his hat and then digging hastily into his inner pocket. "I'm sure you must be the—"

"Well, the nerve!" the young woman said icily, and pointing her chin at the opposite horizon she walked haughtily away.

By that time Phil had dug out his picture and was running after her.

"Please," he said, "just a moment!" And he held the picture out in front of her face.

"Now, where in the world—?" She looked at him in puzzled and indignant inquiry, and then burst out laughing.

"It is you, isn't it?" Phil asked. "What are you laughing at?"

"Oh, you looked so abject. I'm sure your intentions must be good. Now tell me where you got my picture."

"Let us walk this way," suggested Phil, leading away from Tony's building.

And, as they walked, he told her the story. When he got through she stood and looked at him a long time in silence.

"You look square to me," she said. "You're working on my side already. Will you help me."

"I'll do anything—anything—" Phil said, and couldn't think of any other way of expressing his willingness, for the wonderful eyes bore radiantly upon him.

"First I must tell you my story," she began. "But before I can do so, you must promise me that it is to remain an absolute secret. You're a newspaper man—"

Phil gave his promise readily.

"My father is Professor Bloomsbury at the University of Chicago. He has been experimenting in mathematical physics, and I have been assisting him. He has succeeded in proving experimentally the concept of tensors. A tensor is a mathematical expression for the fact that space is smooth and flat, in three dimensions, only at an infinite distance from matter; in the neighborhood of a particle of matter, there is a pucker or a wrinkle in space. My father has found that by suddenly removing a portion of matter from out of space, the pucker flattens out. If the matter is heavy enough and its removal sudden enough, there is a violent disturbance of space. By planning all the steps carefully my father has succeeded in swinging a section of space on a pivot through an angle of 180 degrees, and causing two portions of space to change places through hyperspace, or as you might express it popularly, through the fourth dimension."

Phil held his hands to his head.

"It is not difficult," she went on smiling. "Loan me your pocket knife and a piece of paper from your notebook. If I cut out a rectangular piece of paper from this sheet and mount it on a pivot or shaft at A B, I can rotate it through 180 degrees, just like a child's teeter-totter, so that X will be where Y originally was. That is in two dimensions. Now, simply add

one dimension all the way round and you will have what daddy is doing with space. He does it by shoving fifty or a hundred pounds of lead right out of space; the sudden flattening out of the tensors causes a section of space to flop around, and two portions of space change places. The first time he tried it, his desk disappeared, and we've never seen it again. We've thought it was somewhere out in hyperspace; but this terrible story of yours about disappearing safes, and the fact that you have this picture, means that someone has got the desk."

"Surely you must have suspected that long ago, when the disappearances first began?" Phil suggested.

"I've just returned from Europe," said Miss Bloomsbury. "I was tremendously puzzled when I got my first newspapers in New York and read about the safes. Gradually I gathered all the news on the subject, and it seemed most reasonable to suspect this gangster engineer."

"Great minds and same channels," Phil smiled. "But your father. Why didn't he speak up when the safes began to pop?"

"Ha! ha!" she laughed a tinkly little laugh. "My father doesn't know what safes are for, nor who is President, nor that there has been a war. Mother and I take care of him, and he works on tensors. He has probably never heard about the safes."

"What were you going to do around here?" Phil asked, marveling at the courage of the girl who had come to look the situation over personally.

"I hadn't formed any definite plans. I just wanted to look about first."

"Well," said Phil, "as you will soon see by the papers, another safe has puffed out. It occurred to me that we might find out something by spying about here immediately after one of the disappearances. That's why I'm here. If you'll tell me where you live, or wait for me at some safe place, I'll come and report to you as soon as I find out anything."

"Oho! So that's the kind of a girl you think I am!" She laughed sunnily again. "No, Mr. Reporter. Either we reconnoiter together, or each on our own."

"Oh, together, by all means," said Phil so earnestly that she laughed again. "And since we'd better wait for darkness, let's have something to eat somewhere. I didn't finish my dinner."

Phil found Ione Bloomsbury in person to be even more wonderful than her photograph suggested. Obviously she had brains; it was apparent, too that she had breeding. Her cheerful view of the world was like a tonic for tired nerves; and withal, she had a gentle sort of courtesy in her

manner that may have been old-fashioned, but it was almost too much for Phil. Before the dinner was over, he would have laid his heart at her feet. It gave him a thrill that went to his head, to have her by his side, slipping along through the darkness toward Tony's building.

This building was a one-story brick affair with a vast amount of window space. From the sidewalk they could see faint lights glowing within, but could make out no further details. They therefore selected the darkest side of the building, and made their way hurriedly across the lawn. Here, they found, they could see the crowding apparatus within the one long room fairly well. They looked into one window after another, making a circuit around the building, until Phil suddenly clutched the girl's arm.

"Look!" he whispered. "Straight ahead and a little to the left!"

At the place he indicated stood a tall safe. Across the top of its door were painted in gold letters, the words: "The Epicure."

"That's the safe that went to-night," whispered Phil. "That's all we need to know. Now, quick to a telephone!"

"Oh," said a gentle, ironic voice behind them, "not so quick!"

They whirled around and found themselves looking into two automatic pistols, and behind them in the light of the street lamps, the sardonic smile of Tony Costello.

"Charmed at your kind interest in my playthings, I'm sure," he purred. "Only it leaves me in an embarrassing position. I'm not exactly sure what to do about it. Kindly step inside while I think."

Phil made a move sidewise along the wall.

"Stop!" barked Costello sharply. "Of course," his voice was quiet again, "that might be the simplest way out. I think I am within my legal rights if I shoot people who are trying to break into my property. Yet, that would be messy—not neat. Better step in. The window swings outward."

At the point of his pistols they clambered through the window, and he came in after them. He kept on talking, as though to himself, but loud enough for them to hear.

"Yes, we want some way out that is neater than that. Hm! Violence distresses me. Never liked Ed's rough methods. Yet, this is embarrassing."

He turned to them.

"What did you really want here? I see that you are the *Examiner's* reporter, and that you are the lady of the photograph. What did you come here for? Ah, yes, the safe. Well, go over and look at it."

As they hesitated, he stamped his foot and shrilled crankily:

"I mean it! Go, look at the safe! Is there anything else you want to know?"

"Yes," said Phil coolly, his self-control returning, "where are the other safes?"

"Oh. Anything to oblige. Last requests are a sort of point of honor, aren't they. Ought to grant them. Stand close to that safe!"

He backed away, his guns levelled at them. He laid down the right one, keeping the left one aimed, and moved some knobs on a dial and threw over a big switch. A muffled rumbling and whirring began somewhere; and then, slowly, a block of tables and apparatus ten feet square rose upward toward the ceiling. A section of the floor on which they stood came up, supported by columns, and now formed the roof of a room that had risen out of the floor. In it were four safes.

"Poor old Ed!" sighed Tony. "There was a time when he had a lot of good stuff put away down there. I've got six rooms like that. Well, the good old times are over."

He threw out the switch and the whole mass sank slowly and silently downward till the floor was level and there was no further sign of it. Then he backed away to another table, across the room from them, keeping his gun levelled.

"Too bad," he said. "I don't like to do these things. But—" he sighed deeply, "self-preservation. Now I'm going to flip you out, yes, *out*, into a strange region. I've never been there. I don't know if there is food or drink there. I hope so, for you'll never get back here."

Phil stiffened. He determined to leap and risk a shot. But he was too late. Tony's hand came down on a switch. There was a sudden, nauseating jar. The laboratory vanished.

There was only the safe, Ione Bloomsbury and himself, and a small circle of concrete floor extending to a dim little horizon a dozen feet away. Beyond that, nothing. Not blue, as the sky is. Not black, as dark, empty spaces are. It suggested black, because there was no impression of light or color on the eyes; but it wasn't black. It was nothingness.

## IV. Marooned in Hyperspace

"I suppose you realize what he has done?" Miss Bloomsbury inquired.

"Couldn't be too sure, but it looks like plenty. What's the equation for it?" Beneath his jocularly, Phil felt a tremendous sinking within him. It looked serious, despite the fact that he did not understand it at all.

"He has swung us out into hyperspace, or into the fourth dimension, as your newspaper readers might understand it, and has let us hang there. Remember our slip of paper. Suppose X and Y were swung out of the plane of the paper and allowed to remain at an angle with it. We are at an angle with space, out in hyperspace."

There was a period of bewilderment, almost panic, in which they both felt so physically weak that they had to sit down on the concrete and stare at each other mutely. But this passed and their natural courage soon reasserted itself. Their first thought was to take stock of what information they could get on their situation; and their first step was to venture as close as possible to the queer little horizon which lay almost at their very feet. It gave them a frightened feeling, as though they were standing high up on a precipice or tower.

To their surprise, the horizon receded as they walked toward it, always remaining about a dozen feet away from them. At first they walked on concrete and then came to a crumbly edge of it and found themselves stepping on hard, sandy earth. Later there was rock, sometimes granite-like, sometimes black and shiny. But what they saw underfoot was nothing, compared with the glimpses of things they got out in the surrounding emptiness. First there was a vast space in which a soft light shone, and in which there were countless spheres of various sizes, motionlessly suspended. The spheres seemed to be made of wood, a green, sap-filled, unseasoned wood. The scene was visible for a few seconds, and vanished suddenly as they walked on. This astonished them; so they stepped back a pace or two and saw it again; and as they moved on, it disappeared again.

Then there was a great stretch of water in which the backs of huge monsters rolled and from which a hot wind blew for a few instants until they passed on and the scene vanished. There was a short walk with nothing but emptiness, and then there appeared huge, oblique, cubistic looking rows of jagged rocks in wild, dizzy formations that didn't look possible; and farther on, after another interval of emptiness, a tangle of brown, ropey vines with black-green leaves on them, an immense space

filled with serpentine swinging loops and lengths of innumerable vines. Several loops projected so near them that they could have reached out and touched them had they wished.

"This is too much for me!" Phil gasped. "Have we gone crazy? Or did he kill us, and is this Purgatory?"

Ione smiled and shook her little head in which she had a goodly store of modern mathematics stored away.

"These must be glimpses of other 'spaces' besides our own space. If we could see in four dimensions we could see them all spread out before us. But we can only perceive in three dimensions; therefore, as we walk through hyperspace, past the different 'spaces' which are ranged about in it, we get a glimpse into such of them as are parallel with our own space. Can you understand that?"

"Oh, yes," groaned Phil. "It sounds just about like it looks. But, don't mind me. Go on, have your fun."

"I've been thinking about those wooden spheres," continued Ione. "I'm sure they must be sections of trees that are cut crosswise by our 'space;' they grow in three dimensions, but only two of them are our dimensions and a third is strange to us. We see only three-dimensional sections of them, which are spheres. There is more of them, that we cannot see, in another dimension."

"Yes, yes. Just as plain as the Jabberwock!"

"Look! There's a real Jabberwock!" exclaimed Ione.

On ahead of them they saw a number of creatures that seemed to be made of painted wooden balls in different colors, joined together.

"Tinkertoys!" exclaimed Phil. "Live ones! Big ones!"

The animals, though they looked for all the world as though they were made of painted wood, moved with jerky motions and clattered and snarled.

"There is probably more to *them* in another dimension," Ione said.

Suddenly one of the beasts approached them with a leap. There were two big eyes and two rows of teeth that came together with a snap, right on Phil's trouser-leg. He jerked himself away, sacrificing some square inches of trouser-leg, and, whirling around, kicked at the thing with all his force. It almost paralyzed his foot, for the animal seemed to be made of wood or bone. But it disappeared, and, as it did, both of them felt a queer, nauseating jolt. A few more minutes' walk brought them back to the safe without seeing any more spaces; and the sight of its black iron

bulk filled them with a home-like relief, which in a moment they recognized as a mockery.

"Are we on a sphere of some sort?" Phil asked.

"Probably on an irregular mass of matter," Ione replied, "part of which is Tony's concrete floor, and part of which comes out of some other dimension. This mass of matter is at one end of a long, bar-like portion of space, the middle of which is pivoted in our world, somewhere in Chicago, and both ends of which are free in hyperspace."

"Then," suggested Phil, "why can't we walk down to the axle on which it is balanced, and step out into Chicago?"

"Because there isn't any *matter* for us to walk on. We are not able to move about in space, in three dimensions, you know. We can only get around in two dimensions, on the surface of *matter*."

"Well, let's try another exploration trip at right angles to our first one. After all, these 'spaces' are an interesting show, and I want to see some more."

They started out in the selected direction, and after a short walk got a glimpse of a vast space dotted with stars and nebulae, with two bright moons sailing overhead. A few steps farther on was a wall of solid granite, near enough to touch with their hands. Again, there was an intensely active mass of weaving bright stripes and loops and circles, seeming to consist of light only, and making them dizzy in a few seconds. Ione wondered if it might not be something like an organic molecule on a large scale. Again, odd, queer, indescribable shapes and outlines would appear and disappear, obviously three-dimensional sections of multi-dimensional things, cut by space. Once they passed a place of intense cold and terrific noise and escaped destruction or lunacy only because it took them the merest instant to get past.

They arrived back at the safe, very much fatigued from the strain, their minds woefully confused. Hunger and thirst were beginning to thrust up their little reminders; and for the first time the terrors of their position, flung out into hyperspace on a small, barren piece of matter, began to seem real.

After a rest they started out again. As Phil had touched, in kicking it, a creature from another "space," perhaps they might find water and even food somewhere. They retraced their first steps to the spot where they had at first seen water. They found it again and were able to dip their hands into it. It was warm, and too salty to drink. They came to the place

with the creepers or vines, and Phil reached out and seized one of them. It was heavy, rubbery, and elastic, stretching readily as he pulled it.

"These little lurches that we feel must be the snapping back of the space-puckers as expressed by tensors," Ione remarked. "Every time matter goes in or out of space, the nature of space is altered."

"Well," observed Phil, releasing the vine, "I'd better be careful. If one of these things hauls me off here, our last bond with home is gone. I don't want to get lost in some other space."

As he released the vines they snapped back to their places, and the forest of them dimmed a little and reappeared.

They made the round again, dodging cautiously past the point where they had previously found the "Tinkertoy" animals, and succeeded in getting past their snapping teeth. But no promise of food or water did they find anywhere.

"Looks like we're sunk," observed Phil, as they dropped down on the concrete to rest, leaning their backs against the safe.

How time counted in hyperspace, neither Phil nor Ione could tell; Phil knew that his watch was running. He knew that it was ages and ages that he sat with his back against the safe, reviewing all the events of his put life, and thinking of this ignominious end to a lively career! He swore half aloud; then suddenly looked at Ione, ready to apologize. He found her weeping silently.

"I should never have let you come into the building with me," he stammered in confusion at her tears.

"Oh, what do I care what becomes of *me!*" she exclaimed angrily. "But who will take care of poor daddy? He doesn't even know when it's time to eat." And she burst into a fresh fit of weeping.

Phil bent his head in the dumbness of profound despair.

## V. The Reversible Equation

Despair, however, is a luxury. Necessity is a stimulus. With the parchings of thirst and the gnawings of hunger, the two young people ceased swearing and weeping. Phil got up and paced about and sat down again. Ione's tears stopped and dried, and she sat and thought.

In the back of her mind there had been forming a vague sort of an idea, which had signalled ahead of itself that there was hope. She sat there and desperately drove her reason to its utmost efforts, to find that idea and bring it to the surface of consciousness. Hand to hand fights with wild animals, battles between ships of the line, vicious duels between ace-aviators in the clouds are tense fights; but they cannot compare in anxious difficulty with the struggle to bring up an unformed idea out of the subconscious mind—especially when one knows that the idea is there, and that it must be found to save one's life.

"Ione!" exclaimed Phil. It was the first time he had used the name. "What is the matter? You are as tense as a—"

"Ah!" cried Ione, springing up. "Tense! Tensors! I have it!"

Phil gazed at her in alarm. She laughed; at first it was a strained laugh, but gradually it melted into her sunny one.

"No, I'm not crazy. I knew there was a way out, and I've been trying to reason it out. How simple. You remember the little jolts when you pulled at the vines and when you kicked the funny animal? Tensors. Matter and space are so closely interrelated that you can't move matter in or out of space without causing disturbance, recoils, and tremors in space. Those bits of matter were small, and produced only a slight disturbance. It takes about a hundred pounds of lead to swing this segment—"

"Oho! Got you!" exclaimed Phil. "Not so dumb! The safe!"

"Yes. The safe!" Ione cried.

"Throw it off and watch us swing, eh? What would happen?"

"I might calculate it if I knew the weight of the safe."

"No calculating when I'm around," Phil said. "It couldn't make things any worse. Try it first and calculate afterwards."

They got behind the safe and pushed, and their combined strength against it was about as effective as it would have been in moving the Peoples' Gas Building. They sat down again in despair.

"Suppose we *could* budge it," Ione said. "All we could do would be to push it around, this piece of matter we are on. That wouldn't help. We've

got to get it out of space. We can't push it hard enough to do that. It's got to be shot out suddenly—"

"And we haven't got a gun handy," Phil remarked droopingly.

"Not exactly a gun. A sort of sling—"

Phil leaped to his feet.

"A sling. Why! To be sure! The vines!"

Without another word, both of them got up and ran. They hastened in a direction opposite to the one they had at first taken on their trip of exploration, and this brought them first past the "space" of the Tinkertoy-like animals. As they went by, several of these beasts darted at them, one of them snapping at Ione's heels. She uttered a scream, causing Phil to turn about and kick right and left among them. He drove them back and escaped from them, rejoining Ione.

"Wait," he said, when they reached the vines. "Remember those wooden balls. If I could get a few to throw at those critters—"

In a moment they were off, and finally arrived at the point from which they first saw the balls. Odd it seemed, how they hung suspended in space, thousands of them, all sizes. Phil reached out and grasped one about the size of a baseball and drew it toward himself. He felt a dizzy lurch and heard Ione scream.

"Let go!" she screamed again.

When he suddenly realized what was going on, he found himself prostrate on the ground, with Ione across him, her arms about his knees.

"Do you realize," she panted, disentangling herself, "that you were pulling yourself out of this space into that one?"

"Thanks!" said Phil. "Never say die. More careful this time, and a smaller one."

He reached out and grasped a ball smaller than a golf-ball, and pulled carefully, keeping an eye upon Ione. There was resistance to his pull, but gradually the ball came. It seemed heavy. There was a crack as of breaking wood, and he fell backward, with a wave of nausea sweeping strongly over him. He gazed in amazement at a heavy wooden stick that he held in his hands. The only thing about it that suggested the ball for which he had reached was its diameter.

"Can't understand it, but appreciate it just the same," he said. He broke the stick in two, and had two excellent clubs.

"Simple," Ione replied. "The balls are cross-sections of these trees or sticks which grow in a 'space' at right angles to our own; and we only see their three-dimensional cross-sections."

"Yes," said Phil. "Cabbages and kings. I'm for you and the party."

A short walk brought them to the "space" of the vines. After testing the matter out carefully, they found that they could each pull two of them at a time. The vines stretched amazingly when they found those whose far ends were fixed firmly in the tangle, permitting them to carry their own ends along with them toward the safe. Phil wound his vines around his left arm and stuck one club through his belt. The other he got ready for the wooden animals.

He needed it. The size of the pack was doubled, and he rapped them till his hand was numb before he and Ione got by. Their vines drew out thin, but held until they were firmly tied about the safe. They went back after four more.

"I should judge," said Phil, "that by the time we get thirty or forty, the elastic pull will be strong enough to drag the safe back with them as they snap back home."

Trip after trip they made, fighting the wooden animals with their clubs each time. Their clothes were torn, and their legs bleeding; their throats were dry and lips cracked. The hard animals seemed to have a persistent, mechanical ferocity that was undismayed by hammering with the clubs and by repeated repulses. Phil could not seem to hurt them; he merely knocked them away. Finally, on the ninth trip, Ione collapsed when she reached the safe. As she fell, the elasticity of the vines began slowly to drag her back with them. Phil was forced to sit across her knees while he tied his own vines about the safe. Then he released her and added her vines to the great cable about the safe.

An overbold hard animal rattled up and snapped at her. Goaded to fury, Phil swung at it with his club and hurled it through the air. He could feel the lurch as it left his space and entered another. Then he pushed with his mightiest effort against the safe. It budged, and slid a few inches. He used his stick as a lever. It moved again, a little faster. Ione struggled to her feet and tried to help, but her efforts were ineffectual.

With one arm about her, Phil pried again under the safe, knowing that another trip after vines was out of question. Another animal snapped at their heels. For a while, it was kick backwards, then a shove at the safe. Each time the safe moved. The sight of its movement revived Ione, so that she was able to push also. Gradually it acquired a steady motion, pulled by the contraction of the vines; its progress soon became faster

and faster. Phil was about to follow it and give it another push, when Ione drew him back.

Suddenly they experienced a sinking sensation and a fearful vertigo. The snapping animals faded. Ahead of them was the forest of vines, and they saw the safe hurled into it, crashing, plunging into the tangled mass. The whole view crumpled and moved upwards like a swirl of leaves in a wind, and then vanished with a snap.

They were sick and dizzy, but tremendously curious to see everything. The water, the cubistic cliffs, the vast space full of balls, all curiously blurred, appeared in succession. There were blank spaces and then blurred sights of things which they did not recognize, never having seen them before. Then the dizziness and the nausea abated, and ahead of them was a vast yellow blue, a huge nebula, and in it were double-colored suns and ringed planets with swarms of moons; this glorious sight remained for many seconds, as they gazed at it in panting astonishment, half reclining on the concrete; and then it faded. Again the nausea came on; again the succession of blurred views. Eventually the myriad spheres, the water with the leviathans, the forest of vines, each succeeding scene grew more blurred. Their nausea was correspondingly increased, till they were forced to lie down on the ground from illness.

When their giddiness abated, there were blurring views again. There was an impression as though the speed of a train were decreasing as one looks out of the window. And how one view held for several seconds, a vast and wild mountain-range with glaciers and snow peaks by moonlight. When this faded gradually, the scenes began to flick by, more and more rapidly, and grew blurred. Phil and Ione were attacked by nausea until, again, they had to lie down. After that came the familiar succession: the wooden animals, the tangle of vines, the vast sea, the spheres, and more blurred scenes. Then came a pause, with the nebula and the glorious suns swinging into view once again.

"Oh, I understand!" Ione exclaimed; "We're swinging. The safe was so heavy that we swung too violently, too far, and back again—"

"And we keep going till it knocks us out, or till the old cat dies," added Phil.

However, they found that after a number of repetitions of the same program, their giddiness was becoming less; and instead of lying down in the middle of the swing, they could look about. Then it occurred to Phil to time the interval between the nebula and the mountain-range.

When the exact halfway point was determined, and after several more swings, they could see dimly the windows and machinery of Tony's laboratory flash by when they passed the middle.

"I don't mean to be a crepe-hanger, but how do you know we will stop at the right point?" Phil asked.

"I don't," replied Ione cheerfully. "But mathematics says so. A freely oscillating segment of space would naturally come to equilibrium in a position parallel to the rest of its own space, would it not?"

There came a swing when they did not reach the nebula on the one hand and the mountain-range on the other. After that, views dropped off from either end of the swing quite rapidly, and before many minutes, they looked into Tony's laboratory a large portion of the time. For many seconds the laboratory held; then it would gradually fade, and reappear again, only to fade into empty nothingness all around.

"The old cat's dead," Phil finally announced.

They sat and stared about them as the laboratory held steady and no further intervening periods of blankness intervened. They both sighed deeply and slumped over on the ground to rest.

"Bang! bang! bang!"

Some sort of hammering woke them up. They looked about them in a daze. It was broad daylight, and things looked queer in the laboratory. There was a smell of scorched rubber and hot oil. Great loops of wire sagged down from above. Several nondescript heaps stood about that might once have been machinery, but now suggested melting snow-men, all fused into heaps. At a table sprawled a queer, misshapen figure that suggested human origin. Both of its hands were burned to cinders to the elbows. Great holes were scorched into the clothes. But the face was recognizable. Tony's playthings had got him at last.

"Looks like something's happened in here!" Phil gasped, in amazement.

"I'll bet it has, too," Ione exclaimed. "This is the first time it occurred to me that our recoil from throwing the safe overboard and the oscillation of our space-segment must have created a tremendous electrical field in the tetra-ordinate apparatus. The reaction is reversible, you see. The field swings the space-segment, or the swinging of the space-segment creates the field. And the field was too much for Tony."

At this point the door fell under the blows of the police, and the raiding squad rushed into the room.

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