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OUR COVER ILLUSTRATION

Depicts an exciting episode from Otto Wili Gall's novel "The Shot Into Infinity."

Here we see the spaceship *Geryon* plunging towards the moon. The moon may be observed at the right-hand side, still a great distance away.

In the position shown, the spaceship is rushing ahead at a tremendous speed, yet it is possible for the adventurers to venture outside the spaceship in airtight and acid-insulated space-suits. The men are connected to the spaceship by lengths of thin telephone wires, by means of which they can converse with each other. Inasmuch as they are in the so-called "free-fall," there is no strain on the light telephone wires, which they also use to pull themselves back to the ship. They may also return to the ship by firing pistols, as is also shown, in the opposite direction to which they wish to travel.

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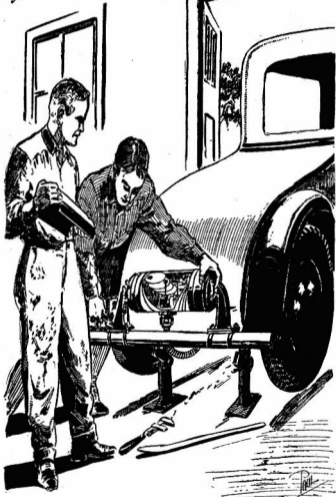
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The Gravitational Deflector

By H. D. PARKER



Here he proudly exhibited what looked like a black Ducoed Presto-Lite gas cylinder, except that heavy brackets extended from each end at right angles to its axis.

"IT'S curious, Charlie, but did you ever wonder why we never trace to a final conclusion the little incidents of our daily lives? You know if we did we might be able, with foresight and inductive logic, to trace the developments to their ultimate effect. When you look back at any incident you can see obviously an inevitable chain of circumstances. You must wonder sometimes why the human brain refuses to project the outcome when the original events occur."

Many a monologue along this line have I heard from my friend, Tom Lee. Lee's ideas were always interesting; often they were startling. Yet his theory coincided with Poe's in that he believed that to an intelligence to whom was open all the complexity of the algebraic processes, the ultimate resolution of any problem was possible; was possible, that is to say, given the time necessary for the required computation.

And lacking the time for the necessary computation of the outcome of a trivial event, Tom was taken away from me, from his work, and in fact from the pleasant world in which we had been companions for so many years.

Looking back, I realize that I should have foreseen the eventual catastrophe. It is now so clear that no other result could have been expected from the attempted manipulation of titanic forces.

The initial incident, and the remark thereby occasioned, which opened the tragic train of events, took place when Lee and I were motoring over the Mohawk Trail in New England. We were, at the time, running up one of the lesser hills soon after leaving the town of Charlemont. Traveling at a good rate of speed we rounded a turn to find ourselves right behind a monster truck, loaded with crushed rock. The truck had stopped to cool its motor, and, as is often the case with trucks, had chosen a position which made passing impossible.

"Tom," I said, after we had induced the driver out of the way, "It's a good thing we were going up hill or I could not have stopped without a

smash."

"Now that's what I call a real interestin' remark, Charlie," Lee replied. "It opens up deucedly interesting lines of thought that have previously escaped me."

Lee is one of these slow spoken Yankers, a real New Englander, with a trick of slipping in an English slang word, or expression, when conversing.

He is none of your quick spoken, incisive scientists, although his mind is lightning fast. (Odd how I still say "He is," for Thomas Lee is gone, and many a fellowship of scientists and delvers into the unknown mourns with me the loss of a man far ahead of his time in many ways, and a true friend.)

"Just what line of thoughts?" I asked.

"The possibilities suggested by your successfully stopping this car before it collided with the tail board of that truck," Lee replied.

Thus was the idea born. Like most new thoughts it was the result of a simple and natural incident

of a sufficiently striking nature to force attention.

We said little as we sped along. I remained quiet, for I knew Lee's moods, and realized that he was deep in some line of thought. It was not until we had passed over the Hoosac Tunnel and drawn up to enjoy the view

beside the great bronze Elk that looks forever over the mountain ranges that Lee began to give me a glimpse of what was in his mind.

"Now Charlie," he said, "One of the reasons that we get along so well together is that you are not a trained scientist. You have just enough scientific education to enable you to follow me, if I use reasonably simple expressions, instead of entering into technical argument with me."

"What then?" I asked.

"Simply this; you have a more than ordinary understanding of motor cars. In fact you are quite widely known as an automotive expert. That is the high hat way of saying that you are a little better than the high class factory inspector, tester, trouble shooter, designer, and internal combustion



HARRY D. PARKER

STORIES of a fourth dimension are always of great interest to us. Mathematicians can prove today that there is such a thing as a fourth dimension. The trouble with most fourth dimension stories, however, is that it is difficult to follow them and that the author as a rule, presupposes that the reader is well-versed in the higher dimensions, which, as a rule, he is not.

The author of the present story has given us some excellent examples and illustrations, which makes it comparatively easy for us to follow his reasoning, and we believe, incidentally, that he has helped a great deal to make the fourth dimension better understood by the average layman. And while, for practical purposes, it may be many centuries before we can actually demonstrate the fourth dimension, yet whatever is done to enlarge our fund of knowledge along this direction should be welcomed by everyone interested in science.

engineer, combined in one person. And you and I my lad, are going to develop an absolutely new brake."

"Very good, only I don't see how come," I replied. "Dozens of good minds have gone to jelly trying the same thing, and I've no great desire to do likewise."

"We won't do likewise," said he. "Why do they fail? Because they try to go forward without any steps. They stick to friction, to converting power into heat, or to pumping, using up energy in compressing operations. They lack the vision to cut away from the old ideas. We will harness an entirely different form of power than has ever been used for braking."

"A new form of power?" I exclaimed. "What new power?"

"Not a new power, Charlie, a different power," Tom said. "Consider now—what two forces are everywhere available upon this earth?"

"Why," I said, "Let's see—there's heat, and electricity, and—"

"Wait a minute," Lee cut in. "I said are everywhere available. Also I said forces. Now heat and electricity are limited in many ways in many places on this globe. And too, I beg to point out that there is a jolly lot of difference between energy and force."

"I give up," I replied. "Don't ask me riddles, tell me what you have in your mind."

"It's like this," Tom answered. "Energy,—that is, to say, paralleling your classification which I interrupted, such as light rays, stray electric currents, solar heat, and so on are not comparable with the two forces that I have in mind. These are the force of gravity, and centrifugal force from the rotation of the earth."

"But," I said, "there should be no centrifugal force at a given moment at either true pole,—and you said everywhere present, Tom."

"A touch. A distinct touch, old bean," laughed Tom. "You are right. Centrifugal force is, at a given instant, absent at each true pole. However, since it's gravity that I have in mind, no harm is done to the idea, as yet. Now consider, Charlie, we have a force of known power, everywhere present on this world, which with the crude exceptions of counterweights, inclined planes, and percussion devices, is largely unused. Now suppose we find a way to apply this force to the braking of motor cars and other vehicles, what then?"

"You will say, and properly, that this force tends to act along the lines of the earth's radii. But suppose we bend this force, as a light ray is bent by a mirror, or a prism. Having found our means for bending the lines of gravitational attraction, it can be regulated by varying the angle of bend, vertical being zero power, and horizontal being 100% effective. Do you follow me, Charlie?"

"Yes," I said. "All we have to do is devise a way to bend it. How simple."

"Now don't be sarcastic, old chap," Tom replied. "The principle is the thing. If the theory is sound,

it should not be too difficult to work out the details. Let's go on now. I'll think about it enroute and at Albany tonight I will do a little figuring."

The Plot Thickens

EARLY the following morning saw us enroute for Plattsburg. Beyond a few words at breakfast no reference had been made to the conversation of the day before. True, Lee had sat up half the night at his "figuring" but it was not until we were well on the way to Saratoga that he opened the subject.

"Charlie," Tom said suddenly, "I really worked hard last night and we have progressed. I have devised the method necessary for bending what I may call the lines of gravitational force. I have not worked out the mechanism necessary for doing this, as yet, but the method is fairly easy. All that is necessary is to interpose the fourth dimension. Or to state it in a different way, to pass the line of force through an area of the fourth dimension in which the bending control itself will be located."

"Of course," I replied, "I knew there was a catch in it. All we have to do is use the fourth dimension."

"Now do be serious, Charlie," Tom answered. "While the fourth dimension is not by any means fully explored, still we do know a lot more about it than the 'man in the street' realizes. As far as that goes, we know something about the next five additional dimensions, the ones that extend beyond the fourth, the E, F, G, H and I dimensions."

"Stop, Tom," I cried, "that's too much. I can't get this fourth dimension stuff clear, so for pity's sake don't addle me with some extra ones."

"Heaven knows I've tried to make the fourth dimension reasonably clear to you," Tom said. "I've talked cubicular extensions to you a dozen times. Try this tack for a change. It should help a lot in building up an image in your mind. Since you can't visualize it, I will now prove to you that you are, at this very moment, actually carrying in one of your pockets, not one but two beautiful examples of cross sections of fourth dimensional solids."

"That's too much; you can't do it, and you know you can't," I said. "And I'll just bet you one hundred good iron men, that you can't."

"I won't take your bet, Charlie," Tom replied. "It's not sporting to bet on a sure thing. But I'll show you. Let your mind trickle back to your school days. Consider the 'point' of your geometry lessons, as crudely represented by a dot. What is that dot but the cross section of a line? Now consider the 'line' in its turn. It is the cross section of a plane. A 'plane' is the cross section of a solid. That is to say the geometrical 'point' is the cross section of a one dimensional thing, a line, which has 'A' dimension only. The line is the cross section of a plane having two dimensions, 'A' and 'B.' The plane is the cross section of a solid having three dimensions, 'A', 'B', and 'C.' There-

fore the two little ivory dice in your lower right hand vest pocket, old thing, are true cross sections of a fourth dimensional, having 'A', 'B', 'C' and the difficult 'D' dimension."

"That's very neat," I said. "And I'm glad that I didn't have my bet taken up, but just how do you use the thing after it's tame?"

"For our needs, Charlie, we do this," was Lee's answer. "We know that the same basic laws apply to the A, B and C dimensionals, and we can therefore assume, until proved wrong, that they will apply and operate in the D dimension. We can therefore use the law of Harmonic Motion as a control for our angle variations. That, as you know, is to say that the velocity of a mass subjected to an initial impulse and free to move in space, whose resultant direction is changed, varies in proportion to the angle of such change in direction. You can follow that all right for it is a law which you recognize in gas engine design.

"Now we will effect our change in the direction of the force of gravity at a point in the D dimension, and will vary the angle of the change in direction to be proportionate to the velocity of the motor car."

"What you mean," I said, "If I understand you correctly, is, in simple English, that you will hitch the pull of gravity behind a car so that it will act in a horizontal direction opposite to the direction in which the car is traveling, and that, as the car slows up, you will change the angle of pull towards the vertical until, at the instant that the car stops, the force will be at its normal once more, following its usual 'up and down' path?"

"Exactly, Charlie," Lee agreed. "We will have a smooth stopping force that should bring a car to a standstill almost in an instant, from any speed, and, in addition, with absolutely no discomfort to the passengers, or disarrangement to the load, since there will be no forward momentum lag, as the contents of the vehicle will be acted on equally with the vehicle itself, by the bent pull of gravity."

"But," I asked, "If you can successfully bend the lines of gravitational attraction to stop a car by having the pull operate from behind, Tom, why can't you put one of the gadgets in front to pull the car, and so do away with the motor altogether?"

"Great Duke of Wellington," Lee ejaculated, "Charlie, my lad, you've hit it on the head. That's just another instance of two minds being better than one; especially when mine is the well known one-track brand and yours has the ability to wander all around an idea even though the idea is not always clearly understood.

"Already I can picture a light, graceful, vehicle, without the present day hood full of noisy, smelly machinery; free from the really crude mechanical devices for transmitting motor power to the rear axle, moving swiftly, quietly, safely over the highways. I say that knocks the idea of cars driven by motors, drawing their electric current from wireless power transmitters all flat. I know a chap who has been working for years to perfect a wireless

power transmitter for just that use. Won't he turn a beautiful pea-green; my hat."

"That's all right as a conception of the future," I replied. "What bothers me is how can such a device be made?"

Lee seemed not to hear me. At any rate his next remark did not enlighten me further regarding the actual method of construction that he proposed to follow in the fabrication of his force controller.

"And we will not only bend from the up and down normal pull to horizontal, Charlie, it will be easy to make a 180° distortion of the lines of force by using two instruments. We will work them in pairs like return reflection mirrors.

"Then we will have done it. We will have accomplished the long sought for neutralization of gravity. A mass subjected to a properly controlled force of this nature will be without weight.

"You know, Charlie, there are a few mighty big scientific minds who hold that some method for nullifying weight was known to the Ancients. The stones of the so-called Temple of the Sun at Baalbek could hardly be lifted by any mechanism known today. The general idea in that direction has been the introduction of a screen, opaque to gravitation, under the mass in question. H. G. Wells calls this hypothetical screen substance 'Cavorite' if my memory is not at fault. We on the other hand will be able to operate our force from above, which has decided advantages.

"When we reach Plattsburg, as you know, I am going over to my place at St. Albans Bay. I shall at once get to work to develop our D dimensional director for the lines of gravitational force. On your way down from Montreal you were planning to visit me. If I am ready before you come, I will wire you at the Mount Royal and you can come ahead of your schedule. I can assure you that it will be well worth it."

Ready for the Test

NO doubt you, the reader of this record, have detected the error in premise which was to bring about the final astounding result. How it escaped Lee I cannot understand. Perhaps, at the time, he realized in which direction danger lay and planned later to construct a protection for it, which plan was later overlooked in his eagerness to get results.

I, myself, should have spotted it instantly, I think, had I not for many years fallen into the habit of letting Lee do my thinking for me, while we were together. That is a natural fault for one usually accepts the statements of an expert without delving very deeply into a subject on which the other is a recognized authority. Tom never seemed to be wrong, and I had long ago fallen into the easy method of assuming that he was therefore always right.

About two weeks after we had parted at Plattsburgh I was speeding across the lake in Lee's express cruiser, enroute to his summer workshop on St. Albans Bay, as a result of a wire telling me that

he was ready to make the first actual test of his device, and that he needed my assistance.

"What I want you to do first, Charlie," he said, "is to figure out the best place to attach the thing to an automobile. That is part of your end of this attempt to make another theory into a reality.

"I have succeeded in making the control; I have named it the gravitational deflector, which will bend the lines of force through the D dimension all right, and a neat little thing it is too. Also I jolly well added an automatic compensator, which acts like a governor, and tilts the primary deflector back in proportion as the car loses momentum. Thus the application of the force remains in constant proportion to velocity. There is also a secondary deflector which can be geared to operate with the primary. This we will use in our experiments in propulsion, and in the neutralization of weight."

"How does it work?" was my very natural question.

"Well, Charlie," Lee replied. "Don't forget that we do not yet actually know if it will work. I have not tested it in any way, keeping that until you could be present. My computations all indicate that it will operate exactly as we have planned.

"You remember our last conversation about the A, B, C and D dimensions? Yes? Well you will recall that a line is the cross section of a plane. Now to make a plane into a line all that is necessary is to pass the plane through the C dimension. That is to say, tilt the plane through its C dimension arc of travel until it is edgewise to your eyes,—fore-shortening,—see?

"In the device that I have finished I use for each deflector a solid mounted on cubicular trunnions, which projections enable me to tilt the solid through its D dimension arc of travel. I am acting on the assumption reached by several minds that there is one of the laws known to the A, B, and C dimensions which does not act precisely in the same way in the D dimension, and that is the law of gravity. If this assumption is correct, the line of gravitational force can be reflected to a new direction from the fourth dimension.

"I think also that this solid could be arranged to become energized by motion. If so, when at rest it would have no power even though rotated entirely through the D space. This would be a better factor of safety, while operating for braking, than the tilting governor.

"There are, as I said, in reality, a pair of these deflectors, for what I want to do is to experiment with the development of our thoughts on forward motion and lifting. I have simply combined both instruments into one holder."

"How big is it, and what does it weigh?" I asked.

"The entire apparatus is in a cylindrical case," Tom replied. "It is 24 inches long, 10 inches in diameter, weighs five pounds three ounces, and must be mounted cross ways of the car, like a gasoline tank, on a plane that will give the best braking results. The point of location I am leaving to you, since I am sure that there is a 'best place' to set it,

and while we are all used to the feel of a car whose resistance to forward motion is taking place at and below the axle line, I want you to determine what will be best when we cut loose from that conception of applying braking force."

At Tom's summer place we went directly to his combined workshop and laboratory, as we had lunched while crossing Lake Champlain. Here he proudly exhibited what looked much like a black Ducoed Presto-Lite gas cylinder, except, that from each end, very heavy brackets extended, at right angles to its axis, for attaching the device to the rear of an automobile. There was also a wire cable lead for connection with the conventional foot brake pedal by means of which the deflector was to be actuated. One side of the cylinder was conspicuously marked "TOP".

What Happened to Tom

TOM informed me that his computations showed that the device concentrated the lines of force from an area larger than the dimensions of the cylinder, depending on the height that the deflector was above the ground, and on the mass towards which the lines of force were bent, acting much as a lens gathers and concentrates light rays. Its power was therefore to a certain extent free from the limitations of mass. Lee was sure that it would stop a locomotive almost instantly at any speed, if the full force were applied by deflecting the attraction of gravity the full 90° from the vertical.

For this reason I decided that such a pull could only be applied with safety to one part of the car, that is to say to the chassis frame. Accordingly, in an hour, I drilled the channels and had bolted the brackets to them. I led the operating cable to the foot brake pedal and attached it. The pedals I disconnected from the regular brake drum mechanism, since, as I pointed out to Tom, if the force of gravity refused to perform, the hand brake would suffice to stop his light roadster. At last everything was ready for the first test.

I have always been thankful that Tom's assistant, Lynn Roe, was present at the trial of the gravitational deflector. I have read more than one account of the uncomfortable predicament in which the sole survivor of an experiment has found himself through lack of testimony corroborating his own.

Tom insisted on driving alone. I am sure that he did this, not because he feared any mischance, for he was too sure of his figures, but because he wanted to be the first human being to feel the force of gravity operating from behind him as well as from below.

"I will go around the drive," Lee said, as he stepped on the starter, indicating the sweeping circular drive before his summer home, "gradually accelerating until I pass where you are standing. I presume that I will then be traveling at about 40 miles an hour. Just after passing you I will come to that line," and Tom indicated a length of white

tennis court marking tape that he and Roe had placed across the drive. "At that point I will operate the D dimensional device which should bring the car to a stop, smoothly and instantaneously. If I skid, the lawn on both sides of the drive at that point is smooth, free from trees, and as there are no roadside ditches, no harm should result. You and Roe must stay exactly where you are. Here goes."

And he was off.

I presume that the drive was some three hundred yards around, but it seemed to me ages (and Roe has since told me that he had the same feeling) before Tom made the circuit. As he straightened out at the end of the curve and came back down the straight section of the road towards us, I would estimate that he was going at about 50 miles an hour. He was smiling as he passed us and rushed on to the tape line, at which he had indicated that he would apply the power of the new brake. He reached the spot—and was gone!

Yes, that's exactly what I do mean. Gone. For one instant the speeding roadster was rushing along the drive. The next split second it had vanished. Gone, gone completely; utterly. The small dust cloud which had swirled along behind Lee's car as he came down the road drifted slowly off over the velvet lawn; but the roadster and Lee had disappeared as completely as though they had dissolved.

We have not seen either Lee, or his car, since. No result has come from the international search for the missing man of science. Roe and I rushed to the spot where the car had last been visible. The

tire marks showed clear (and without any indication of skid whatever) right up to the tape line, and then stopped.

Between the ends of the wheel marks the road was slightly hollowed as though some of the loose surface material had been removed with a rake. But that was absolutely all.

That is what I meant when I said that in retrospect one wonders why no thought was given to an outcome now so obvious to me, although I must admit that Roe does not agree with my conclusions.

His idea is that when Lee pressed down on the foot pedal thereby actuating his device that he, and the car, fell within what he terms a "shadow" area from the fourth dimension: that he actually entered the D dimension, car and all.

I do not agree, for still clearly I hear Tom's voice at the time that he propounded to me, "There are two forces." I am convinced that what actually occurred was this; when Lee tilted his infernal device he operated the desired deflection of the lines of gravity successfully, but that in so doing he neutralized the down pull in some way. Perhaps his secondary deflector became operative unintentionally. Perhaps the neutralization was the resultant of the angle of application of the distorted force lines. And the result from this, whatever the precise cause, was that Lee and his roadster shot from the surface of the earth at a tangent,—a living ball thrown into space, at a velocity of almost two and a half miles a second, by the titanic arm of centrifugal force.

THE END