

At War With the Invisible

By R. and G. WINTHROP

(CONCLUSION)

"WE must get hold of Professor Firman right away," I declared, finally. "He should understand this. Go tell your father, Ava, while I locate the professor."

With the pocket 'phone I reached Firman in a few moments. Late as it was, his laboratory at Columbia University still claimed him, his energetic brain busy with the problem that held the universe. To my

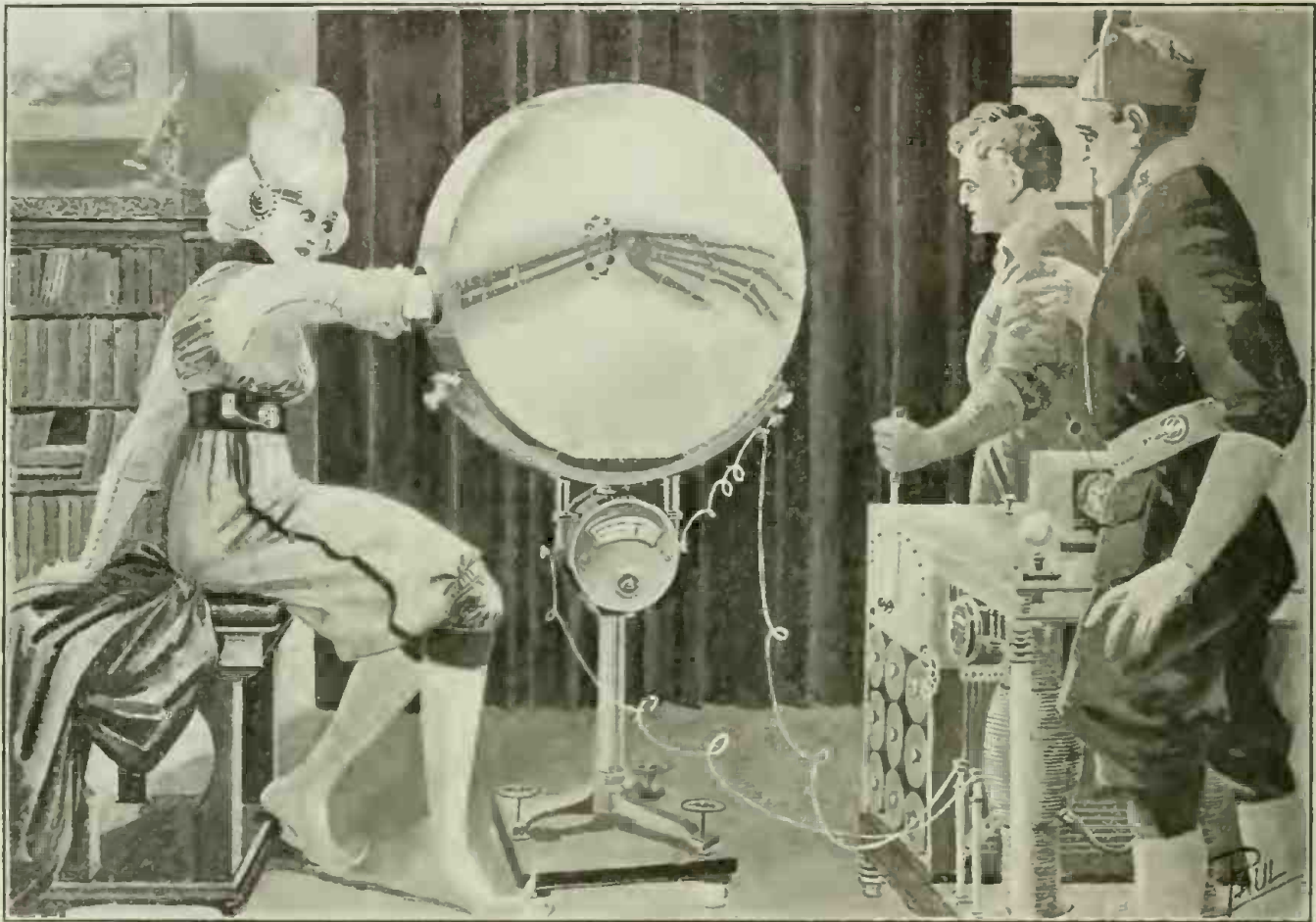
tremendous importance of what had occurred

Another obstacle presented itself when we reached Firman's laboratory. To secure the privacy he needed for his work he had double-barred all doors leading to his rooms, and, of course, had forgotten my promised visit as soon as the 'phone was out of his hand. But such trifles were not to stop me on this night.

in picturesque phrases how much longer the inefficient police were going to allow drunken aerists to go around smashing busy people's windows.

"It's all right, Firman," I assured him. "This isn't an accident. It's Elvan."

I was brimming over with suppressed excitement, hope and happiness. The sight of his strong face, its massive features outlined clearly in the moonlight, heightened



" . . . Arranging His Apparatus, Professor Firman Placed Ava's Arm Before the Helium-Planoscope Screen and Directed a Powerful Helium Ray Upon It. . . . An Outline of the Flesh and Bones Greatly Enlarged Was Visible, and Around the Wrist Was a Circlet of Tiny and Heretofore Invisible Bells."

demand that he come at once he turned a deaf ear. Nothing could take him from his work. Fervently I cursed his stubbornness, but the difficulty was a minor one. If the mountain would not come to us we could readily go to the mountain. Telling him to expect me in a few minutes, I hastily replaced my 'phone and turned to greet President Venasarol, who was approaching, his mouth open in bewilderment at the excited account his daughter was giving him of my discovery. I added a few words, grasped Ava's arm and hastened off with her, leaving the Honorable Peros still dazed and only half comprehending the

Leaving Ava to await my return on the roof, I sank slowly to the upper story of Schermerhorn Hall, where several lighted windows showed the presence of workers. I selected the largest window on the supposition that it must be Firman's, and brought the nose of the plane against it with just enough force to send the glass crashing to the floor inside the room. A high-pitched voice, lifted in bitterly complaining profanity, satisfied me that I had struck the right one. No one could swear like Firman!

In another moment he appeared at the opening, peering out angrily and inquiring

the feeling of confidence that had possessed me from the moment I saw Ava. Firman was the mental giant of this scientific age. With the help I could give him I knew we would solve the deadly riddle of invisible attack on our world and save it from destruction.

"Elvan!" his shrill voice—which always startled those who met him for the first time by its incongruity with his great bulk—rose still higher in surprise. "You! Well, what in hell do you want to smash my window for?"

"What in hell do you want to bar all your doors for?" I retorted. "I had to get

* This is a principle of physics not generally known. We cannot make a perfect mirror, but if we could, the mirror would be "invisible." Any object that is not primarily luminous in itself is seen by scattered reflection. If a surface was made so as to be perfectly reflecting, then all the light that fell upon it would be reflected, and this reflected light would reveal to the eye the source of the light before reflection. The reflecting surface itself would not be visible. This phenomenon is known technically as "specular reflection." The reason we see polished surfaces is because of the imperfect reflection from such objects, the light being reflected in various directions.

in somewhere. Don't waste time arguing, but hurry around and open the doors. I have something tremendously important to show you."

I could hear him muttering unfavorable comments on importunate friends in general and me in particular, as he left the window, while I hurried back to Ava. A few moments later the three of us were seated around a table piled high with instruments and jars of substances. Firman pushed them aside with an impatient gesture.

"All worthless," he replied, briefly, in answer to my inquiring glance. "Not a single clue."

I smiled at him with an encouragement hardly yet justified. "The clue is here," I said, and pointed to Ava's wrist.

As quickly as I could I gave him all the facts that we knew. Before I had finished he was already bending over Ava's arm, his black eyes sparkling with eagerness, his lips pursed beneath the large, aquiline nose that marked his ancestry. Deftly his fingers past over and around the invisible bracelet. Murmurs of surprise, commendation and pleasure came from him as his penetrating mind grasped the properties of the strange ornament. Finally he sat back, a peculiar smile of satisfaction lighting up his expressive face.

"Extraordinarily clever," he declared approvingly, "but simple." He paused. "Yes, simple—quite simple."

I bent over the invisible wonder with him. "What is it?" I asked.

"Nothing more than a system of mirrors." His hand toyed with the circlet on Ava's arm. "The inventor has merely made use of the principles of reflection and refraction of light. Each of these facets is a tiny mirror of some substance I don't know yet, but it must be something that reflects the light corpuscles with absolutely no diffused rays. That makes the mirror invisible in itself. (See note foot of page 818.) Furthermore he has joined these miniature reflectors to each other at such angles that a ray of light, striking upon any one, is bent from mirror to mirror until it emerges on the reverse side, at a point directly perpendicular to its point of entrance. Here is the idea, roughly—"

He drew a sheet of paper to him and rapidly sketched a circle with a series of points which he labeled *a, b, c, d, e, f, m, n, o, p, r, s*.

"You understand, of course, that I have indicated here merely the surface mirrors. Between each two of these is probably a series of double refraction surfaces to receive any rays that might otherwise be deflected to the observer's eye. But, generally speaking, this is what happens: The light from any object, as, for instance, the young lady's arm, strikes upon *m* and is reflected through *f, e, d, c, b* or *n, o, p, r, s* (depending upon the angle at which it enters) emerging at *a*, exactly opposite. To our eyes, unable to perceive the inter-mediating surfaces, the light seems to come directly from the arm!"

He paused, glanced swiftly from one to the other, as tho keen to see whether we were following his exposition, and then went on with increased emphasis: "You see the result! The bells, under their remarkable covering, are entirely invisible! The same thing happens from any other point. Looking at *b*, the light from the object at *n* would seem to be coming in a straight line; from *s* we would see the object at *f*, and so on. It is all very simple

—". He ended with one of his queer, dry smiles—"— after some one else has worked it out for us!"

I drew a deep breath in admiration of the startling ingenuity that had conceived

"There is no doubt about it. They had only to inclose their planes in cylindrical or spherical coverings, built on the principle of this bracelet; but, of course, on a tremendously larger scale. Then, by applying the silencer to their motors, they could approach us unseen and unheard, to plant the contact points for the atomic detonators wherever they chose and send them off with a current from their selenium cells as soon as they were at a safe distance."

"Why didn't the selenoid towers record their presence?"

"For the same reason that our eyes didn't. The sol-rays past around their mirrored surfaces, so no image was recorded on the plates."

"Does this mean that you can now prevent further attacks?" asked Ava. She had risen and stood like a goddess from her own planet, her whole figure tense with the sudden animation of hope and victory.

Firman and I started, almost guiltily. In the satisfaction of having solved the mystery we had forgotten the danger still ahead of us.

Firman smiled up at her admiringly. Something of her unearthly beauty had arrested even his usual cold indifference to the charm of femininity. "You are right," he admitted. "Our work has only begun. But I have an idea that may work out successfully. Bring your precious bracelet in here."

He lifted his immense frame from the chair and led us to the projecting room adjoining his laboratory. Arranging his apparatus, he placed Ava's arm before a Helium-Planoscope screen and with a few swift adjustments directed a powerful helium ray upon it. Eagerly we crowded around it. An outline of the flesh and bones greatly enlarged was visible, as in an ordinary X-ray photograph, and around the wrist was a circlet of tiny bells!

I found myself clearing my throat hoarsely as tho choking. Before I could utter a word of explanation Firman was saying with deep satisfaction: "Just as I expected! The substance of these mirrors is transparent to the helium ray. Now, then, you two leave me alone to work out my plans—and, Elvan—" He caught me by the shoulder as we were passing out. The deep lines in his swarthy face wrinkled with sudden relief into a grim smile. Sheer mental power had seen, grasped and already was at work on the problem. The acquisitive, searching brain had selected, classified and was inwardly ordering about the principles of science that would cope with the menacing disaster. He dropt into an almost whimsical mood, the great commonplaceness of him returning to ordinary banter.

"When the Council meets again, Elvan," he went on, "let them get ready a final answer to the Martian demands; let them tell those damned devils that they can go right straight to—O, I beg your pardon—I forgot the girl! Well, anyway—Good night! I'll call you as soon as I have things shaped up." In another moment he was gently but firmly thrusting us into the outer corridor. His door shut with a decisive snap that found an answering echo of confidence in my heart. The master was at work!

Sunday past quietly. The outside world knew little or nothing of the mighty project at work within that fateful laboratory. That same evening the Interplanetary Coun-

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SYNOPSIS—PART I. This gripping scientific story deals with a "War of the Worlds"—an inter-planetarian struggle for supremacy—the scenes of which are laid in the year 2011. The planet Mars, with all her super-intellectualism, has made war upon all the planets. The hero is a special war correspondent of a New York newspaper, who, while detailed to the reception in Paris of the War Commission from Venus, becomes enamored with the beautiful daughter of the president of the visiting commission—the Honorable Peros Venasarol. She possesses a most remarkable bracelet—which is not only invisible but contains a set of tiny bells. The hero notes this bracelet carefully, for it apparently is something beyond earthly understanding. Suddenly the correspondent is summoned back to New York by his editor—he flies across the Atlantic over night. Philadelphia and London had been wiped off the face of the earth—swallowed up. Did an earthquake do it? Were the Martian 'planes getting thru the earth's air patrol fleet—and, even so, why didn't the selenoid towers indicate their approach?

this strange object and the acumen that had penetrated the mystery.

The "May" Number

Well, Friends, we sure have procured some mighty interesting articles for the "May" number of the ELECTRICAL EXPERIMENTER, if we do say it ourselves. And while we are on the subject, please note that in the issue before you, we have a page entitled "The Editor's Mail Bag." We ought to receive a sufficient number of good, conscientious letters from our readers regularly to fill up that page every month. Why don't you write us a short letter now and then? Tell us what you want and we will do our best to publish it. A little friendly criticism now and then, is relished by the best of Editors. We can't read your mind, therefore tell us what you think—it will cost you three cents—that's all. Now for the "May" E. E.: "How Radium Emanation is Helping to Cure the Sick," by George Holmes.

"Electric Vacuum Tubes—The Principal Types and Their Uses," by H. Winfield Secor.

"Shooting Electrical Troubles on Automobiles—A Clear Treatise on How to Test Your Battery, Motor, Generator and Wiring."

"Experimental Electrical Furnaces"—an instructive and well illustrated discourse by an expert.

"New Electric Stage Tricks." "Theory of Tuning, Wave Lengths and Harmonics"—of distinct importance to all Radio Students, by Prof. F. E. Austin, Instructor Electrical Engineering, Dartmouth College.

"Experimental Mechanics"—Part III, by Samuel Cohen.

"How to Build an Electrically Played Piano"—a real "live" article, by Charles Hortan, Consulting Engineer.

"Research and Its Importance to Human Progress," by Dr. W. R. Whitney, Research Laboratory, General Electric Co.

"Wave-meters—Their Uses and Construction"—Part III, by Morton W. Sterns.

"Then this is the method by which the Martians have made themselves invisible to us!" I exclaimed.