

Past Through Tomorrow



Robert A. Heinlein

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For GINNY

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CONTENTS

Introduction by Damon Knight

Life-Line

The Roads Must Roll

Blowups Happen.

The Man Who Sold the Moon

Delilah and the Space-Rigger

Space Jockey

Requiem

The Long Watch

Gentlemen, Be Seated

The Black Pits of Luna

It's Great to Be Back!

We Also Walk Dogs

Searchlight

Ordeal in Space

The Green Hills of Earth

Logic of Empire

The Menace from Earth

If This Goes On

Coventry

Misfit

Methuselah's Children

Introduction by Damon Knight

The year is 1967, and in Carmel, California, a retired admiral named Robert A. Heinlein is tending his garden. Commissioned in 1929, he served through World War II with distinction, taught aeronautical engineering for a few years, then became a partner in a modestly successful electronics firm. Aside from his neighbors, his business associates and Navy friends, no one has ever heard of him. This is a likely story, but not true. What really happened is much less probable: six years after graduation from the Naval Academy, while serving on a destroyer, Heinlein contracted tuberculosis. He spent a couple of years in bed, then was retired at the age of 27. Like the consumptive Robert Louis Stevenson, like Mark Twain, whose career as a river-boat pilot was swept away by the war, Heinlein turned to writing almost at random, because he could not lead the more active life he would have preferred. Cut adrift from the Navy and from the life-line that would have led him to that rose garden in Carmel, he took graduate courses in physics and mathematics, intending to pursue his old dream of becoming an astronomer, but was again forced to drop out because of poor health. He tried his hand at silver mining, politics, real estate, without conspicuous success. Then, in 1939, he happened across the announcement of an amateur short-story contest in a magazine called Thrilling Wonder Stories. The prize was \$50, not a fortune, but not to be sneezed at. Heinlein wrote a story, called it 'Life-Line', and submitted it, not to the contest editor, but to John W. Campbell, editor of Astounding Science-Fiction. Campbell bought it, and the next one, and the next. Heinlein's reaction was, 'How long has this been going on? And why didn't anybody ever tell me?' Except for the war years, which he spent at the Naval Air Experimental Station in Philadelphia in 'the necessary tedium of aviation engineering', he never did anything else for a living again. In the February, 1941, issue of Astounding, in which two Heinlein stories appeared (one under the pseudonym Anson MacDonald), the editor wrote: Robert A. Heinlein back again next month with the cover story, "Logic of Empire". This story is, as usual with Heinlein's material, a soundly worked out, fast-moving yarn, more than able to stand on its own feet. But in connection with it, I'd like to mention something that may or may not have been noticed by the regular readers of Astounding: all Heinlein's science-fiction is laid against a common background of a proposed future history of the world and of the United States. Heinlein's worked the thing out in detail that grows with each story; he has an outlined and graphed history of the future with characters, dates of major discoveries, et cetera, plotted in. i'm trying to get him to let me have a photostat of that history chart; if I lay hands on it, I'm going to publish it.'

He published the chart three months later-the same chart, with some modifications and additions, that appears in this book. Heinlein had the cover of that issue too, with a story called 'Universe'. 'Future History' is Campbell's phrase, not Heinlein's, and the author has sometimes been mildly embarrassed by it. This connected series of stories does not pretend to be prophetic. It is a history, not of the future, but of a future-an alternate probability world (perhaps the same one in which the retired Rear Admiral is tending his roses) which is logically self consistent, dramatic, and recognizably an

offshoot of our own past. The stories really do not form a linear series at all—they are more like a pyramid, in which earlier stories provide a solid base for later ones to rest on. Partly because of this pyramiding of background and partly because of the author's broad knowledge—about which more in a moment—Heinlein's readers find themselves in a world which is clearly our own, only projected a few years or decades into the future. There have been changes, naturally, but they are things you feel you could adjust to without much trouble. People are still people: they read Time magazines, are worried about money, smoke Luckies, argue with theft wives. It is easy to say what the ideal science fiction writer would be like. He would be a talented and imaginative writer, trained in the physical and social sciences and in engineering, with a broad and varied experience of people - not only scientists and engineers, but secretaries, lawyers, labor leaders, admen, newspapermen, politicians, businessmen. The trouble is that no one in his senses would spend the time to acquire all this training and background merely in order to write science fiction. But Heinlein had it all. Far more of Heinlein's work comes out of his own experience than most people realize. When he doesn't know something himself, he is too conscientious a workman to guess at it: he goes and finds out. His stories are full of precisely right details, the product of painstaking research. But many of the things he writes about, including some that strain the reader's credulity, are from his own life. A few examples, out of many. The elaborate discussion of the problems of linkages in designing household robots, in *The Door Into Summer*. Heinlein was an engineer, specializing in linkages. The hand-to-hand combat skills of the heroes of such stories as *Gulf and Glory Road*. Heinlein himself is an expert marksman, swordsman and rough-and-tumble fighter. The redheaded and improbably multi-skilled heroine of *The Puppet Masters* and other Heinlein stories. Heinlein's redheaded wife Ginny is a chemist, biochemist, aviation test engineer, experimental horticulturist; she earned varsity letters at N.Y.U. in swimming, diving, basketball and field hockey, and became a competitive figure skater after graduation; she speaks several languages so far, and is starting on an eighth. The longevity of the 'Families' in *Methuselah's Children*. Five of Heinlein's six brothers and sisters are still living. So is his mother: she is 87, 'frail, but very much alive and mentally active.' All the returns are not in yet. Even the improbably talented families that appear in *The Rolling Stones* and elsewhere are not wild inventions: Heinlein himself played chess before he could read. Of his three brothers, one is a professor of electrical engineering, one a professor of political science, and the third is a retired major general who 'made it the hard way - i.e. from private right up through every rank without any college education at all.' Like Mark Twain, Heinlein is from Missouri. It shows in his skepticism, his rich appreciation of human absurdity, and in an occasional turn of phrase - a taste for gaudily embellished understatement. He has the Missourian admiration for competence of any kind, for those who can get things done - even (or perhaps especially) if they bend a few rules in the process. (Heinlein: 'I stood quite high at the Naval Academy and would have stood much higher save for a tendency to collect "Black N's" - major offenses against military discipline.') Unlike most modern novelists, he has no patience with the unskilled and incompetent. Those who contribute most to the world, Heinlein thinks, are also those who have the most fun. Those who contribute nothing are objects of pity; and pity for the self-pitying is not high on Heinlein's list of virtues. This tough-mindedness is an altogether different thing from the cynicism of other writers. Heinlein is a moralist to the core; he devoutly believes in courage, honor, self-discipline, self-sacrifice for love or duty. Above all, he is a libertarian. 'When any government, or any church for that matter, undertakes to say to its subjects, "This you may not read, this you must not see, this you are forbidden to know," the end result is tyranny and oppression, no matter how holy the motives. Mighty little force is needed to control a man whose mind has been hoodwinked; contrariwise, no amount of force can control a free man, a man whose mind is free. No, not the rack,

not fission bombs, not anything - you can't conquer a free man; the most you can do is kill him.' The author himself has often denied that the stories in this book are prophecy. Yet it is apparent that some of Heinlein's fictional forecasts have already come true - not literally but symbolically. 'The Roads Must Roll' predicts urban sprawl, and anticipates Jimmy Hoffa's threat of a nationwide transport strike. The 1969 newspaper headlines in Methuselah's Children, illustrating the character of 'The Crazy Years' - Heinlein's term for the present era - seem less fantastic now than they did in 1941. 'Blowups Happen', written and published five years before the Bomb, is based on a series of shrewd guesses that turned out to be wrong. The specific dilemma of that story never became real; nevertheless, it mirrors the real, agonizing dilemma of atomic power with which we have been living since 1945. Some of these stories are minor entertainments, but one, at least, is a major work of art: 'The Man Who Sold the Moon'. Written with deceptive ease and simplicity, it functions brilliantly on half a dozen levels at once. It is a story of man's conquest of the Moon, a penetrating essay on robber baron capitalism, and a warm, utterly convincing and human portrait of an extraordinary man. As for the still-unfolding future, there are guideposts and warnings here. Heinlein continually reminds us that history is a process, not something dead and embalmed in textbooks. The ultimate problem is man's control of his own inventions-not only the minor ones, like the crossbow and the atom bomb, but the major inventions-language, culture and technology. We are a tough and resourceful lot, all things considered; our descendants will need to be tougher and more resourceful still. The odds are all against them. The stars are high, life is short, and the house always takes a percentage. But Man himself is so unlikely that if he did not exist, his possibility would not be worth discussing. Heinlein's money is on Man; and I have a hunch that the next century will prove him right.

The Anchorage Milford, Pennsylvania

Life-Line

THE chairman rapped loudly for order. Gradually the catcalls and boos died away as several self-appointed sergeants-at-arms persuaded a few hot-headed individuals to sit down. The speaker on the rostrum by the chairman seemed unaware of the disturbance. His bland, faintly insolent face was impassive. The chairman turned to the speaker, and addressed him, in a voice in which anger and annoyance were barely restrained. "Doctor Pinero," - the "Doctor" was faintly stressed - "I must apologize to you for the unseemly outburst during your remarks. I am surprised that my colleagues should so far forget the dignity proper to men of science as to interrupt a speaker, no matter," he paused and set his mouth, "no matter how great the provocation." Pinero smiled in his face, a smile that was in some way an open insult. The chairman visibly controlled his temper and continued, "I am anxious that the program be concluded decently and in order. I want you to finish your remarks. Nevertheless, I must ask you to refrain from affronting our intelligence with ideas that any educated man knows to be fallacious. Please confine yourself to your discovery - if you have made one." Pinero spread his fat white hands, palms down. "How can I possibly put a new idea into your heads, if I do not first remove your delusions?" The audience stirred and muttered. Someone shouted from the rear of the hall, "Throw the charlatan out! We've had enough." The chairman pounded his gavel. "Gentlemen, Please!" Then to Pinero, "Must I remind you that you are not a member of this body, and that we did not invite you?" Pinero's eyebrows lifted. "So? I seem to remember an invitation on the letterhead of the Academy?" The chairman chewed his lower lip before replying. "True. I wrote that invitation myself. But it was at the request of one of the trustees - a fine public-spirited gentleman, but not a scientist, not a member of the Academy." Pinero smiled his irritating smile. "So? I should have guessed. Old Bidwell, not so, of Amalgamated Life Insurance? And he wanted his trained seals to expose me as a fraud, yes? For if I can tell a man the day of his own death, no one will buy his pretty

policies. But how can you expose me, if you will not listen to me first? Even supposing you had the wit to understand me? Bah! He has sent jackals to tear down a lion." He deliberately turned his back on them. The muttering of the crowd swelled and took on a vicious tone. The chairman cried vainly for order. There arose a figure in the front row. "Mister Chairman!" The chairman grasped the opening and shouted, "Gentlemen! Doctor Van RheinSmitt has the floor." The commotion died away. The doctor cleared his throat, smoothed the forelock of his beautiful white hair, and thrust one hand into a side pocket of his smartly tailored trousers. He assumed his women's club manner. "Mister Chairman, fellow members of the Academy of Science, let us have tolerance. Even a murderer has the right to say his say before the state exacts its tribute. Shall we do less? Even though one may be intellectually certain of the verdict? I grant Doctor Pinero every consideration that should be given by this august body to any unaffiliated colleague, even though" - he bowed slightly in Pinero's direction - "we may not be familiar with the university which bestowed his degree. If what he has to say is false, it can no harm us. If what he has to say is true, we should know it." His mellow cultivated voice rolled on, soothing and calming. "If the eminent doctor's manner appears a trifle in urbane for our tastes, we must bear in mind that the doctor may be from a place, or a stratum, not so meticulous in these little matters. Now our good friend and benefactor has asked us to hear this person and carefully assess the merit of his claims. Let us do so with dignity and decorum." He sat down to a rumble of applause, comfortably aware that he had enhanced his reputation as an intellectual leader. Tomorrow the paper would again mention the good sense and persuasive personality of "America's handsomest University President". Who knew? Perhaps old Bidwell would come through with that swimming pool donation. When the applause had ceased, the chairman turned to where the center of the disturbance sat, hands folded over his little round belly, face serene. "Will you continue, Doctor Pinero?" "Why should I?" The chairman shrugged his shoulders. "You came for that purpose." Pinero arose. "So true. So very true. But was I wise to come? Is there anyone here who has an open mind who can stare a bare fact in the face without blushing? I think not. Even that so beautiful gentleman who asked you to hear me out has already judged me and condemned me. He seeks order, not truth. Suppose truth defies order, will he accept it? Will you? I think not. Still, if I do not speak, you will win your point by default. The little man in the street will think that you little men have exposed me, Pinero, as a hoaxer, a pretender. That does not suit my plans. I will speak." "I will repeat my discovery. In simple language I have invented a technique to tell how long a man will live. I can give you advance billing of the Angel of Death. I can tell you when the Black Camel will kneel at your door. In five minutes time with my apparatus I can tell any of you how many grains of sand are still left in your hourglass." He paused and folded his arms across his chest. For a moment no one spoke. The audience grew restless. Finally the chairman intervened. "You aren't finished, Doctor Pinero?" "What more is there to say?" "You haven't told us how your discovery works." Pinero's eyebrows shot up. "You suggest that I should turn over the fruits of my work for children to play with. This is dangerous knowledge, my friend. I keep it for the man who understands it, myself." He tapped his chest. "How are we to know that you have anything back of your wild claims?" "So simple. You send a committee to watch me demonstrate. If it works, fine. You admit it and tell the world so. If it does not work, I am discredited, and will apologize. Even I, Pinero, will apologize." A slender stoop-shouldered man stood up in the back of the hall. The chair recognized him and he spoke: "Mr. Chairman, how can the eminent doctor seriously propose such a course? Does he expect us to wait around for twenty or thirty years for some one to die and prove his claims?" Pinero ignored the chair and answered directly: "Pfui! Such nonsense! Are you so ignorant of statistics that you do not know that in any large group there is at least one who will die in the immediate future? I make you a proposition; let me test each one of you in this room and I will

name the man who will die within the fortnight, yes, and the day and hour of his death." He glanced fiercely around the room. "Do you accept?" Another figure got to his feet, a portly man who spoke in measured syllables. "I, for one, can not countenance such an experiment. As a medical man, I have noted with sorrow the plain marks of serious heart trouble in many of our elder colleagues. If Doctor Pinero knows those symptoms, as he may, and were he to select as his victim one of their number, the man so selected would be likely to die on schedule, whether the distinguished speaker's mechanical egg-timer works or not." Another speaker backed him up at once. "Doctor Shepard is right. Why should we waste time on voodoo tricks? It is my belief that this person who calls himself Doctor Pinero wants to use this body to give his statements authority. If we participate in this farce, we play into his hands. I don't know what his racket is, but you can bet that he has figured out some way to use us for advertising for his schemes. I move, Mister Chairman, that we proceed with our regular business." The motion carried by acclamation, but Pinero did not sit down. Amidst cries of "Order! Order!" he shook his untidy head at them, and had his say: "Barbarians! Imbeciles! Stupid dolts! You kind have blocked the recognition of every great discovery since time began. Such ignorant canaille are enough to start Galileo spinning in his grave. That fat fool down there twiddling his elk's, tooth calls himself a medical man. Witch doctor would be a better term! That little baldheaded runt over there - You! You style yourself a philosopher, and prate about life and time in your neat categories. What do you know of either one? How can you ever learn when you won't examine the truth when you have a chance? Bah!" He spat upon the stage. "You call this an Academy of Science. I call it an undertaker's convention, interested only in embalming the ideas of your red-blooded predecessors." He paused for breath and was grasped on each side by two members of the platform committee and rushed out the wings. Several reporters arose hastily from the press table and followed him. The chairman declared the meeting adjourned. The newspapermen caught up with him as he was going out by the stage door. He walked with a light springy step, and whistled a little tune. There was no trace of the belligerence he had shown a moment before. They crowded about him. "How about an interview, doe?" "What dyu think of Modem Education?" "You certainly told 'em. What are your views on Life after Death?" "Take off your hat, doe, and look at the birdie." He grinned at them all. "One at a time, boys, and not so fast. I used to be a newspaperman myself. How about coming up to my place, and we'll talk about it?" A few minutes later they were trying to find places to sit down in Pinero's messy bed-living-room, and lighting his cigars. Pinero looked around and beamed. "What'll it be, boys? Scotch, or Bourbon?" When that was taken care of he got down to business. "Now, boys, what do you want to know?" "Lay it on the line, doe. Have you got something, or haven't you?" "Most assuredly I have something, my young friend." "Then tell us how it works. That guff you handed the profs won't get you anywhere now." "Please, my dear fellow. it is my invention. I expect to make some money with it. Would you have me give it away to the first person who asks for it?" "See here, doe, you've got to give us something if you expect to get a break in the morning papers. What do you use? A crystal ball?" "No, not quite. Would you like to see my apparatus?" "Sure. Now we are getting somewhere." He ushered them into an adjoining room, and waved his hand. "There it is, boys." The mass of equipment that met their eyes vaguely resembled a medico's office x-ray gear. Beyond the obvious fact that it used electrical power, and that some of the dials were calibrated in familiar terms, a casual inspection gave no clue to its actual use. "What's the principle, doe?" Pinero pursed his lips and considered. "No doubt you are all familiar with the truism that life is electrical in nature? Well, that truism isn't worth a damn, but it will help to give you an idea of the principle. You have also been told that time is a fourth dimension. Maybe you believe it, perhaps not. It has been said so many times that it has ceased to have any meaning. It is simply a cliché what windbags use to impress fools. But I want

you to try to visualize it now and try to feel it emotionally." He stepped up to one of the reporters. "Suppose we, take you as an example. Your name is Rogers, is it not? Very well, Rogers, you are a space-time event having duration four ways. You are not quite six feet tall, you are about twenty inches wide and perhaps ten inches thick. In time, there stretches behind you more of this space-time event reaching to perhaps nineteen-sixteen, of which we see a cross-section here at right angles to the time axis, and as thick as the present. At the far end is a baby, smelling of sour milk and drooling its breakfast on its bib. At the other end lies, perhaps, an old man someplace in the nineteen-eighties. Imagine this space-time event which we call Rogers as a long pink worm, continuous through the years, one end at his mother's womb, the other at the grave. It stretches past us here and the cross-section we see appears as a single discrete body. But that is illusion. There is physical continuity to this pink worm, enduring through the years. As a matter of fact there is physical continuity in, this concept to the entire race, for these pink worms branch off from other pink worms. In this fashion the race is like a vine whose branches intertwine and send out shoots. Only by taking a cross-section of the vine would we fall into the error of believing that the shootlets were discrete individuals." He paused and looked around at their faces. One of them, a dour hard-bitten chap, put in a word. "That's all very pretty, Pinero; if true, but where does that get you?" Pinero favored him with an unresentful smile. "Patience, my friend. I asked you to think of life as electrical. Now think of our long pink worm as a conductor of electricity. You have heard, perhaps, of the fact that electrical engineers can, by certain measurements, predict the exact location of a break in a trans-Atlantic cable without ever leaving the shore. I do the same with our pink worms. By applying my instruments to the cross-section here in this room I can tell where the break occurs, that is to say, when death takes place. Or, if you like, I can reverse the connections and tell you the date of your birth. But that is uninteresting; you already know it." The dour individual sneered. "I've caught you, doe. If what you said about the race being like a vine of pink worms is true, you can't tell birthdays because the connection with the race is continuous at birth. Your electrical conductor reaches on back through the mother into a man's remotest ancestors." Pinero beamed, "True, and clever, my friend. But you have pushed the analogy too far. It is not done in the precise manner in which one measures the length of an electrical conductor. In some ways it is more like measuring the length of a long corridor by bouncing an echo off the far end. At birth there is a sort of twist in the corridor, and, by proper calibration, I can detect the echo from that twist. There is just one case in which I can get no determinant reading; when a woman is actually carrying a child, I can't sort out her life-line from that of the unborn infant." "Let's see you prove it." "Certainly, my dear friend. Will you be a subject?" One of the others spoke up. "He called your bluff, Luke. Put up, or shut up." "I'm game. What do I do?" "First write the date of your birth on a sheet of paper, and hand it to one of your colleagues." Luke complied. "Now what?" "Remove your outer clothing and step upon these scales. Now tell me, were you ever very much thinner, or very much fatter, than you are now. No? What did you weigh at birth? Ten pounds? A fine bouncing baby boy. They don't come so big any more." "What is all this flubdubbery?" "I am trying to approximate the average cross-section of our long pink conductor, my dear Luke. Now will you seat yourself here. Then place this electrode in your mouth. No, it will not hurt you; the voltage is quite low, less than one micro-volt, but I must have a good connection." The doctor left him and went behind his apparatus, where he lowered a hood over his head before touching his controls. Some of the exposed dials came to life and a low humming came from the machine. It stopped and the doctor popped out of his little hide-away. "I get sometime in February, nineteen-twelve. Who has the piece of paper with the date?" It was produced and unfolded. The custodian read, "February 22nd, 1912." The stillness that followed was broken by a voice from the edge of the little group. "Doe, can I have

another drink?" The tension relaxed, and several spoke at once, "Try it on me, doe." "Me first, doe, I'm an orphan and really want to know." "How about it, doe. Give us all a little loose play." He smilingly complied, ducking in and out of the hood like a gopher from its hole. When they all had twin slips of paper to prove the doctor's skill, Luke broke a long silence. "How about showing how you predict death, Pinero." "If you wish. Who will try it?" No one answered. Several of them nudged Luke forward. "Go ahead, smart guy. You asked for it." He allowed himself to be seated in the chair. Pinero changed some of the switches, then entered the hood. When the humming ceased, he came out, rubbing his hands briskly together. "Well, that's all there is to see, boys. Got enough for a story?" "Hey, what about the prediction? When does Luke get his 'thirty'?" Luke faced him. "Yes, how about it? What's your answer?" Pinero looked pained. "Gentlemen, I am surprised at you. I give that information for a fee. Besides, it is a professional confidence. I never tell anyone but the client who consults me." "I don't mind. Go ahead and tell them." "I am very sorry. I really must refuse. I agreed only to show you how, not to give the results." Luke ground the butt of his cigarette into the floor. "It's a hoax, boys. He probably looked up the age of every reporter in town just to be ready to pull this. It won't wash, Pinero." Pinero gazed at him sadly. "Are you married, my friend?" "Do you have any one dependent on you? Any close relatives?" "No. WHY, do you want to adopt me?" Pinero shook his head sadly. "I am very sorry for you, my dear Luke. You will die before tomorrow."

"SCIENCE MEET ENDS IN RIOT" "SAVANTS SAPS SAYS SEER" "DEATH PUNCHES TIMECLOCK" "SCRIBE DIES PER DOC'S DOPE" "HOAX' CLAIMS SCIENCE HEAD"

"... within twenty minutes of Pinero's strange prediction, Timons was struck by a falling sign while walking down Broadway toward the offices of the Daily Herald where he was employed. "Doctor Pinero declined to comment but confirmed the story that he had predicted Timons' death by means of his so-called chronovitameter. Chief of Police Roy..."

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- Legal Notice To whom it may concern, greetings; I, John Cabot Winthrop III, of the firm Winthrop, Winthrop, Ditmars & Winthrop, Attorneys-at-Law, do affirm that Hugo Pinero of this city did hand to me ten thousand dollars in lawful money of the United States, and instruct me to place it in escrow with a chartered bank of my selection with escrow instructions as follows: The entire bond shall be forfeit, and shall forthwith be paid to the first client of Hugo Pinero and/or Sands of Time, Inc. who shall exceed his life tenure as predicted by Hugo Pinero by one per centum, or to the estate of the first client who shall fail of such predicted tenure in a like amount, whichever occurs first in point of time. I do further affirm that I have this day placed this bond in escrow with the above related instructions with the Equitable-First National Bank of this city. Subscribed -- and sworn, John Cabot Winthrop III

Subscribed and sworn to before me this 2nd day of April, 1951. Albert M. Swanson Notary Public in and for this county and state My commission expires June 17, 1951.

"Good evening Mr. and Mrs. Radio Audience, let's go to Press! Flash! Hugo Pinero, The Miracle Man from Nowhere, has made his thousandth death prediction without a claimant for the reward he posted for anyone who catches him failing to call the turn. With thirteen of his clients already dead it is mathematically certain that - he has a private line to the main office of the Old Man with the Scythe. That is one piece of news I don't want to know before it happens. Your Coast-to-Coast Correspondent will not be a client of Prophet Pinero..." The judge's watery baritone cut through the

stale air of the courtroom. "Please, Mr. Weeds, let us return to our mutttons. This court granted your prayer for a temporary restraining order, and now you ask that it be made permanent. In rebuttal, Mr. Pinero claims that you have presented no cause and asks that the injunction be lifted, and that I order your client to cease from attempts to interfere with what Pinero describes as a simple - lawful business. As you are not addressing a jury, please omit the rhetoric and tell me in plain language why should not grant his prayer." Mr. Weeds jerked his chin nervously, making his flabby Grey dewlap drag across his high stiff collar, and resumed: "May it please the honorable court, I represent the public-" "Just a moment. I thought you were appearing for Amalgamated Life Insurance." "I am, Your Honor, in a formal sense. In a wider sense I represent several other major assurance, fiduciary, and financial institutions; their stockholders, and policy holders, who constitute a majority of the citizenry. In addition we feel that we protect the interests of the entire population; unorganized, inarticulate, and otherwise unprotected." "I thought that I represented the public," observed the judge dryly. "I am afraid I must regard you as appearing for your client-of-record. But continue; what is your thesis?" The elderly barrister attempted to swallow his Adam's apple, then began again. "Your Honor, we contend that there are two separate reasons why this injunction should be made permanent and, further, that each reason is sufficient alone. In the first place, this person is engaged in the practice of soothsaying, an occupation proscribed both in common law and statute. He is a common fortune teller, a vagabond charlatan who preys on the gullibility of the public. He is cleverer than the ordinary gypsy palm-reader, astrologer, or table tipper, and to the same extent more dangerous. He makes false claims of modern scientific methods to give a spurious dignity to his thaumaturgy. We have here in court leading representatives of the Academy of Science to give expert witness as to the absurdity of his claims. "In the second place, even if this person's claims were true-granting for the sake of argument such an absurdity" - Mr. Weems permitted himself a thin-lipped smile - "we contend that his activities are contrary to the public interest in general, and unlawfully injurious to the interests of my client in particular. We are prepared to produce numerous exhibits with the legal custodians to prove that this person did publish, or cause to have published, utterances urging the public to dispense with the priceless boon of life insurance to the great detriment of their welfare and to the financial damage of my client." Pinero arose in his place. "Your Honor, may I say a few words?" "What is it?" "I believe I can simplify the situation if permitted to make a brief analysis." "Your Honor," cut in Weems, "this is most irregular." "Patience, Mr. Weems. Your interests will be protected. It seems to me that we need more light and less noise in this matter. If Dr. Pinero can shorten the proceedings by speaking at this time, I am inclined to let him. Proceed, Dr. Pinero." "Thank you, Your Honor. Taking the last of Mr. Weems' points first, I am prepared to stipulate that I published the utterances he speaks of" "One moment, Doctor. You have chosen to act as your own attorney. Are you sure you are competent to protect your own interests?" "I am prepared to chance it, Your Honor. Our friends here can easily prove what I stipulate." "Very well. You may proceed." "I will stipulate that many persons have cancelled life insurance policies as a result thereof, but I challenge them to show that anyone so doing has suffered any loss or damage there from. It is true that the Amalgamated has lost business through my activities, but that is the natural result of my discovery, which has made their policies as obsolete as the bow and arrow. If an injunction is granted on that ground, I shall set up a coal oil lamp factory, then ask for an injunction against the Edison and General Electric companies to forbid them to manufacture incandescent bulbs." "I will stipulate that I am engaged in the business of making predictions of death, but I deny that I am practicing magic, black, white, or rainbow colored. If to make predictions by methods of scientific accuracy is illegal, then the actuaries of the Amalgamated have been guilty for years in that they predict the exact

percentage that will die each year in any given large group. I predict death retail; the Amalgamated predicts it wholesale. If their actions are legal, how can mine be illegal?" "I admit that it makes a difference whether I can do what I claim, or not; and I will stipulate that the so-called expert witness from the Academy of Science will testify that I cannot. But they know nothing of my method and cannot give truly expert testimony on it." "Just a moment, Doctor. Mr. Weems, is it true that your expert witnesses are not conversant with Dr. Pinero's theory and methods?" Mr. Weems looked worried. He drummed on the table top, then answered, "Will the Court grant me a few moments indulgence?" "Certainly." Mr. Weems held a hurried whispered consultation with his cohorts, then faced the bench. "We have a procedure to suggest, Your Honor. If Dr. Pinero will take the stand and explain the theory and practice of his alleged method, then these distinguished scientists will be able to advise the Court as to the validity of his claims." The judge looked inquiringly at Pinero, who responded, "I will not willingly agree to that. Whether my process is true or false, it would be dangerous to let it fall into the hands of fools and quacks" he waved his hand at the group of professors seated in the front row, paused and smiled maliciously "as these gentlemen know quite well. Furthermore it is not necessary to know the process in order to prove that it will work. Is it necessary to understand the complex miracle of biological reproduction in order to observe that a hen lays eggs? Is it necessary for me to reeducate this entire body of self-appointed custodians of wisdom - cure them of their ingrown superstitions - in order to prove that my predictions are correct? There are but two ways of forming an opinion in science. One is the scientific method; the other, the scholastic. One can judge from experiment, or one can blindly accept authority. To the scientific mind, experimental proof is all important and theory is merely a convenience in description, to be junked when it no longer fits. To the academic mind, authority is everything and facts are junked when they do not fit theory laid down by authority." "It is this point of view-academic minds clinging like oysters to disproved theories-that has blocked every advance of knowledge in history. I am prepared to prove my method by experiment, and, like Galileo in another court, I insist, 'It still moves!'" "Once before I offered such proof to this same body of self-styled experts, and they rejected it. I renew my offer; let me measure the life lengths of the members of the Academy of Science. Let them appoint a committee to judge the results. I will seal my findings in two sets of envelopes; on the outside of each envelope in one set will appear the name of a member, on the inside the date of his death. In the other set of envelopes I will place names, on the outside I will place dates. Let the committee place the envelopes in a vault, then meet from time to time to open the appropriate envelopes. In such a large body of men some deaths may be expected, if Amalgamated actuaries can be trusted, every week or two. In such a fashion they will accumulate data very rapidly to prove that Pinero is a liar, or no." He stopped, and pushed out his little chest until it almost caught up with his little round belly. He glared at the sweating savants. "Well?" The judge raised his eyebrows, and caught Mr. Weems' eye. "Do you accept?" "Your Honor, I think the proposal highly improper-" The judge cut him short. "I warn you that I shall rule against you if you do not accept, or propose an equally reasonable method of arriving at the truth." Weems opened his mouth, changed his mind, looked up and down the faces of learned witnesses, and faced the bench. "We accept, Your Honor." "Very well. Arrange the details between you. The temporary injunction is lifted, and Dr. Pinero must not be molested in the pursuit of his business. Decision on the petition for permanent injunction is reserved without prejudice pending the accumulation of evidence. Before we leave this matter I wish to comment on the theory implied by you, Mr. Weems, when you claimed damage to your client. There has grown up in the minds of certain groups in this country the notion that because a man or corporation has made a profit out of the public for a number of years, the government and the courts are charged with the duty of guaranteeing such

profit in the future, even in the face of changing circumstances and contrary public interest. This strange doctrine is not supported by statute nor common law. Neither individuals nor corporations have any right to come into court and ask that the clock of history be stopped, or turned back, for the private benefit. That is all." Bidwell grunted in annoyance. "Weems, if you can't think up anything better than that, Amalgamated is going to need a new chief attorney. It's been ten weeks since you lost the injunction, and that little wart is coining money hand over fist. Meantime every insurance firm in the country is going broke. Hoskins, what's our loss ratio?" "It's hard to say, Mr. Bidwell. It gets worse every day. We've paid off thirteen big policies this week; all of them taken out since Pinero started operations." A spare little man spoke up. "I say, Bidwell, we aren't accepting any new applications for United until we have time to check and be sure that they have not consulted Pinero. Can't we afford to wait until the scientists show him up?" Bidwell snorted. "You blasted optimist! They won't show him up. Aldrich, can't you face a fact? The fat little blister has got something; how I don't know. This is a fight to the finish. If we wait, we're licked." He threw his cigar into a cuspidor, and bit savagely into a fresh one. "Clear out of here, all of you! I'll handle this my own way. You too, Aldrich. United may wait, but Amalgamated won't." Weems cleared his throat apprehensively. "Mr. Bidwell, I trust you will consult with me before embarking on any major change in policy?" Bidwell grunted. They filed out. When they were all gone and the door closed, Bidwell snapped the switch of the inter-office announcer. "O.K.; send him in." The outer door opened; a slight dapper figure stood for a moment at the threshold. His small dark eyes glanced quickly about the room before he entered, then he moved up to Bidwell with a quick soft tread. He spoke to Bidwell in a flat emotionless voice. His face remained impassive except for the live animal eyes. "You wanted to talk to me?" "Yes." "What's the proposition?" "Sit down, and we'll talk." Pinero met the young couple at the door of his inner office. "Come in, my dears, come in. Sit down. Make yourselves at home. Now tell me, what do you want of Pinero? Surely such young people are not anxious about the final roll call?" The boy's honest young face showed slight confusion. "Well, you see, Dr. Pinero, I'm Ed Harley and this is my wife, Betty. We're going to have-that is, Betty is expecting a baby and, well-" Pinero smiled benignly. "I understand. You want to know how long you will live in order to make the best possible provision for the youngster. Quite wise. Do you both want readings, or just yourself?" The girl answered, "Both of us, we think." Pinero beamed at her. "Quite so. I agree. Your reading presents certain technical difficulties at this time, but I can give you some information now, and more later after your baby arrives. Now come into my laboratory, my dears, and we'll commence." He rang for their case histories, then showed them into his workshop. "Mrs. Harley first, please. If you will go behind that screen and remove your shoes and your outer clothing, please. Remember, I am an old man, whom you are consulting as you would a physician." He turned away and made some minor adjustments of his apparatus. Ed nodded to his wife who slipped behind the screen and reappeared almost at once, clothed in two wisps of silk. Pinero glanced up, noted her fresh young prettiness and her touching shyness. "This way, my dear. First we must weigh you. There. Now take your place on the stand. This electrode in your mouth. No, Ed, you mustn't touch her while she is in the circuit. It won't take a minute. Remain quiet." He dove under the machine's hood and the dials sprang into life. Very shortly he came out with a perturbed look on his face. "Ed, did you touch her?" "No, Doctor." Pinero ducked back again, remained a little longer. When he came out this time, he told the girl to get down and dress. He turned to her husband. "Ed, make yourself ready." "What's Betty's reading, Doctor?" "There is a little difficulty. I want to test you first." When he came out from taking the youth's reading, his face was more troubled than ever. Ed inquired as to his trouble. Pinero shrugged his shoulders, and brought a smile to his lips. "Nothing to concern you, my boy. A little mechanical misadjustment, I think. But I

shan't be able to give you two your readings today. I shall need to overhaul my machine. Can you come back tomorrow?" "Why, I think so. Say, I'm sorry about your machine. I hope it isn't serious." "It isn't, I'm sure. Will you come back into my office, and visit for a bit?" "Thank you, Doctor. You are very kind." "But Ed, I've got to meet Ellen." Pinero turned the full force of his personality on her. "Won't you grant me a few moments, my dear young lady? I am old and like the sparkle of young folk's company. I get very little of it. Please." He nudged them gently into his office, and seated them. Then he ordered lemonade and cookies sent in, offered them cigarettes, and lit a cigar. Forty minutes later Ed listened entranced, while Betty was quite evidently acutely nervous and anxious to leave, as the doctor spun out a story concerning his adventures as a young man in Tierra del Fuego. When the doctor stopped to relight his cigar, she stood up. "Doctor, - we really must leave. Couldn't we hear the rest tomorrow?" "Tomorrow? There will not be time tomorrow." "But you haven't time today either. Your secretary has rung five times." "Couldn't you spare me just a few more minutes?" "I really can't today, doctor. I have an appointment. There is someone waiting for me." "There is no way to induce you?" "I'm afraid not. Come, Ed." After they had gone, the doctor stepped to the window and stared out over the city. Presently he picked out two tiny figures as they left the office building. He watched them hurry to the corner, wait for the lights to change, then start across the street. When they were part way across, there came the scream of a siren. The two little figures hesitated, started back, stopped, and turned. Then the car was upon them. As the car slammed to a stop, they showed up from beneath it, no longer two figures, but simply a limp unorganized heap of clothing. Presently the doctor turned away - from the window. Then he picked up his phone, and spoke to his secretary. "Cancel my appointments for the rest of the day... No... No one... I don't care; cancel them." Then he sat down in his chair. His cigar went out. Long after dark he held it, still unlighted.

Pinero sat down at his dining table and contemplated the gourmet's luncheon spread before him. He had ordered this meal with particular care, and had come home a little early in order to enjoy it fully. Somewhat later he let a few drops of fiori d'Alpini roll around his tongue and trickle down his throat. The heavy fragrant syrup warmed his mouth, and reminded him of the little mountain flowers for which it was named. He sighed. It - had been a good meal, an exquisite meal and had justified the exotic liqueur. His musing was interrupted by a disturbance at the front door. The voice of his elderly maidservant was raised in remonstrance. A heavy male voice interrupted her. The commotion moved down the hail and the dining room door was pushed open. "Madonna! Non si puo entrare! The Master is eating!" "Never mind, - Angela. I have time to see these gentlemen. You ..may go." Pinero faced the surly-faced spokesman of the intruders. "You have business with me; yes?" "You bet we have. Decent people have had enough of your damned nonsense." "And so?" The caller did not answer at once. A smaller dapper individual moved out from behind him and faced Pinero.

"We might as well begin." The chairman of the committee placed a key in the lock-box and opened it. "Wenzell, will you help me pick out today's envelopes?" He was interrupted by a touch on his arm - "Dr. Baird, you are wanted on the telephone." "Very well. Bring the instrument here." When it was fetched he placed the receiver to his ear. "Hello.... Yes; speaking.... What? .. No, we have heard nothing... Destroyed the machine, you say.... Dead! How?.... No! No statement. None at all.... Call me later...." He slammed the instrument down - and pushed it from him. "What's up? Who's dead now?" Baird held up one hand. "Quiet, gentlemen, please! Pinero was murdered a few moments ago at his home." "Murdered?!" "That isn't all. About the same time vandals broke into his office and smashed his apparatus." - No one spoke at first. The committee members glanced around at each other. No one seemed anxious to be the first to comment. Finally one spoke up. "Get it out." "Get what out?" "Pinero's envelope. It's in there too. I've seen it." Baird located it and slowly tore it open. He unfolded

the single sheet of paper, and scanned it. "Well? Out with it!" "One thirteen p.m. - today." They took this in silence. Their dynamic calm was broken by a member across the table from Baird reaching for the lock-box. Baird interposed a hand. "What do you want?" "My prediction-it's in there-we're all in there." "Yes, yes. We're all in here. Let's have them." Baird placed both hands over the box. He held the eye of the man opposite him but did not speak. He licked his lips. The corner of his mouth twitched. His hands shook. Still he did not speak. The man opposite relaxed back into his chair. "You're right, of course," he said. "Bring me that waste basket." Baird's voice was low and strained but steady. He accepted it and dumped the litter on the rug. He placed the tin basket on the table before him. He tore half a dozen envelopes across, set a match to them, and dropped them in the basket. Then he started tearing a double handful at a time, and fed the fire steadily. The smoke made him cough, and tears ran out of his smarting eyes. Someone got up and opened a window. When he was through, he pushed the basket away from him, looked down, and spoke. "I'm afraid I've ruined this table top."

The Roads Must Roll

"Who makes the roads roll?" The speaker stood still on the rostrum and waited for his audience to answer him. The reply came in scattered shouts that cut through the ominous, discontented murmur of the crowd. "We do!" - "We do!" - "Damn right!" "Who does the dirty work 'down inside' - so that Joe Public can ride at his ease?" This time it was a single roar, "We do!" The speaker pressed his advantage, his words tumbling out in a rasping torrent. He leaned toward the crowd, his eyes picking out individuals at whom to fling his words. "What makes business? The roads! How do they move the food they eat? The roads! How do they get to work? The roads! How do they get home to their wives? The roads!" He paused for effect, then lowered his voice. "Where would the public be if you boys didn't keep them roads rolling? Behind the eight ball and everybody knows it. But do they appreciate it? Pfui! Did we ask for too much? Were our demands unreasonable? 'The right to resign whenever we want to.' Every working stiff in other lines of work has that. 'The same pay as the engineers.' Why not? Who are the real engineers around here? D'yuh have to be a cadet in a funny little hat before you can learn to wipe a bearing, or jack down a rotor? Who earns his keep: The 'gentlemen' in the control offices, or the boys 'down inside'? What else do we ask? 'The right to elect our own engineers.' Why the hell not? Who's competent to pick engineers? The technicians? - or some damn, dumb examining board that's never been 'down inside', and couldn't tell a rotor bearing from a field coil?" He changed his pace with natural art, and lowered his voice still further. "I tell you, brother, it's time we quit fiddlin' around with petitions to the Transport Commission, and use a little direct action. Let 'em yammer about democracy; that's a lot of eye wash - we've got the power, and we're the men that count!" A man had risen in the back of the hall while the speaker was haranguing. He spoke up as the speaker paused. "Brother Chairman," he drawled, "may I stick in a couple of words?" "You are recognized, Brother Harvey." "What I ask is: what's all the shootin' for? We've got the highest hourly rate of pay of any mechanical guild, full insurance and retirement, and safe working conditions, barring the chance of going deaf." He pushed his anti-noise helmet further back from his ears. He was still in dungarees, apparently just up from standing watch. "Of course we have to give ninety days notice to quit a job, but, cripes, we knew that when we signed up. The roads have got to roll - they can't stop every time some lazy punk gets bored with his billet. "And now Soapy-" The crack of the gavel cut him short. "Pardon me, I mean Brother Soapy - tells us how powerful we are, and how we should go in for direct action. Rats! Sure we could tie up the roads, and play hell with the whole community-but so could any screwball with a can of nitroglycerine, and he wouldn't have to be a technician to do it, neither. "We aren't the only frogs in the puddle. Our jobs are important, sure, but where would we be without the farmers - or the steel workers - or a dozen other trades and

professions?" He was interrupted by a sallow little man with protruding upper teeth, who said, "Just a minute, Brother Chairman, I'd like to ask Brother Harvey a question," then turned to Harvey and inquired in a sly voice, "Are you speaking for the guild, Brother - or just for yourself? Maybe you don't believe in the guild? You wouldn't by any chance be" - he stopped and slid his eyes up and down Harvey's lank frame - "a spotter, would you?" Harvey looked over his questioner as if he had found something filthy in a plate of food. "Sikes," he told him, "if you weren't a runt, I'd stuff your store teeth down your throat. I helped found this guild. I was on strike in 'sixty-six. Where were you in 'sixty-six? With the finks?" The chairman's gavel pounded. "There's been enough of this," he said. "Nobody who knows anything about the history of this guild doubts the loyalty of Brother Harvey. We'll continue with the regular order of business." He stopped to clear his throat. "Ordinarily we don't open our floor to outsiders, and some of you boys have expressed a distaste for some of the engineers we work under, but there is one engineer we always like to listen to whenever he can get away from his pressing duties. I guess maybe it's because he's had dirt under his nails the same as us. Anyhow, I'm present at this time Mr. Shorty Van Kleeck-" A shout from the floor stopped him. "Brother Van Kleeck!" "O.K.-Brother Van Kleeck, Chief Deputy Engineer of this road-town." "Thanks, Brother Chairman." The guest speaker came briskly forward, and grinned expansively at the crowd, seeming to swell under their approval. "Thanks, Brothers. I guess our chairman is right. I always feel more comfortable here in the Guild Hall of the Sacramento Sector - or any guild hall, for that matter - than I do in the engineers' clubhouse. Those young punk cadet engineers get in my hair. Maybe I should have gone to one of the fancy technical institutes, so I'd have the proper point of view, instead of coming up from 'down inside'. "Now about those demands of yours that the Transport Commission just threw back in your face - Can I speak freely?" "Sure you can, Shorty!" - "You can trust us!" "Well, of course I shouldn't say anything, but I can't help but understand how you feel. The roads are the big show these days, and you are the men that make them roll. It's the natural order of things that your opinions should be listened to, and your desires met. One would think that even politicians would be bright enough to see that. Sometimes, lying awake at night, I wonder why we technicians don't just take things over, and-"

"Your wife is calling, Mr. Gaines." "Very well." He picked up the handset and turned to the visor screen. "Yes, darling, I know I promised, but... You're perfectly right, darling, but Washington has especially requested that we show Mr. Blekinsop anything he wants to see. I didn't know he was arriving today.... No, I can't turn him over to a subordinate. It wouldn't be courteous. He's Minister of Transport for Australia. I told you that.... Yes, darling, I know that courtesy begins at home, but the roads must roll. It's my job; you knew that when you married me. And this is part of my job. That's a good girl. We'll positively have breakfast together. Tell you what, order horses and a breakfast pack and we'll make it a picnic. I'll meet you in Bakersfield - usual place.... Goodbye, darling. Kiss Junior goodnight for me." He replaced the handset on the desk whereupon the pretty, but indignant, features of his wife faded from the visor screen. A young woman came into his office. As she opened the door she exposed momentarily the words printed on its outer side; "DIEGO-RENO ROADTOWN, Office of the Chief Engineer." He gave her a harassed glance. "Oh, it's you. Don't marry an engineer, Dolores, marry an artist. They have more home life." "Yes, Mr. Gaines. Mr. Blekinsop is here, Mr. Gaines." "Already? I didn't expect him so soon. The Antipodes ship must have grounded early." "Yes, Mr. Gaines." "Dolores, don't you ever have any emotions?" "Yes, Mr. Gaines." "Hmmm, it seems incredible, but you are never mistaken. Show Mr. Blekinsop in." "Very good, Mr. Gaines." Larry Gaines got up to greet his visitor. Not a particularly impressive little guy, he thought, as they shook hands and exchanged formal amenities. The rolled umbrella, the bowler hat were almost too good to

be true. An Oxford accent partially masked the underlying clipped, flat, nasal twang of the native Australian. "It's a pleasure to have you here, Mr. Blekinsop, and I hope we can make your stay enjoyable." The little man smiled. "I'm sure it will be. This is my first visit to your wonderful country. I feel at home already. The eucalyptus trees, you know, and the brown hills-" "But your trip is primarily business?" "Yes, yes. My primary purpose is to study your roadcities, and report to my government on the advisability of trying to adapt your startling American methods to our social problems Down Under. I thought you understood that such was the reason I was sent to you." "Yes, I did, in a general way. I don't know just what it is that you wish to find out. I suppose that you have heard about our road towns, how they came about, how they operate, and so forth." "I've read a good bit, true, but I am not a technical man, Mr. Gaines, not an engineer. My field is social and political. I want to see how this remarkable technical change has affected your people. Suppose you tell me about the roads as if I were entirely ignorant. And I will ask questions." "That seems a practical plan. By the way, how many are there in your party?" "Just myself. I sent my secretary on to Washington." "I see." Gaines glanced at his wrist watch. "It's nearly dinner time. Suppose we run up to the Stockton strip for dinner. There is a good Chinese restaurant up there that I'm partial to. It will take us about an hour and you can see the ways in operation while we ride." "Excellent." Gaines pressed a button on his desk, and a picture formed on a large visor screen mounted on the opposite wall. It showed a strong-boned, angular young man seated at a semi-circular control desk, which was backed by a complex instrument board. A cigarette was tucked in one corner of his mouth. The young man glanced up, grinned, and waved from the screen. "Greetings and salutations, Chief. What can I do for you?" "Hi, Dave. You've got the evening watch, eh? I'm running up to the Stockton sector for dinner. Where's Van Kleeck?" "Gone to a meeting somewhere. He didn't say." "Anything to report?" "No, sir. The roads are rolling, and all the little people are going ridey-ridey home to their dinners." "O.K.-keep 'em rolling." "They'll roll, Chief." Gaines snapped off the connection and turned to Blekinsop. "Van Kleeck is my chief deputy. I wish he'd spend more time on the road and less on politics. Davidson can handle things, however. Shall we go?" They glided down an electric staircase, and debauched on the walkway which bordered the northbound five mile-an-hour strip. After skirting a stairway trunk marked OVERPASS TO SOUTHBOUND ROAD, they paused at the edge of the first strip. "Have you ever ridden a conveyor strip before?" Gaines inquired. "It's quite simple. Just remember to face against the motion of the strip as you get on." They threaded their way through homeward-bound throngs, passing from strip to strip. Down the center of the twenty-mile-an-hour strip ran a glassite partition which reached nearly to the spreading roof. The Honorable Mister Blekinsop raised his eyebrows inquiringly as he looked at it. "Oh, that?" Gaines answered the unspoken inquiry as he slid back a panel door and ushered his guest through. "That's a wind break. If we didn't have some way of separating the air currents over the strips of different speeds, the wind would tear our clothes off on the hundred-mile-an-hour strip." He bent his head to Blekinsop's as he spoke, in order to cut through the rush of air against the road surfaces, the noise of the crowd, and the muted roar of the driving mechanism concealed beneath the moving strips. The combination of noises inhibited further conversation as they proceeded toward the middle of the roadway. After passing through three more wind screens located at the forty, sixty, and eighty-mile-an-hour strips respectively, they finally reached the maximum speed strip, the hundred-mile-an-hour strip, which made the round trip, San Diego to Reno and back, in twelve hours. Blekinsop found himself on a walkway twenty feet wide facing another partition. Immediately opposite him an illuminated show window proclaimed:

JAKE'S STEAK HOUSE No. 4 The Fastest Meal on the Fastest Road! "To dine on the fly Makes the miles roll by!!"

"Amazing!" said Mr. Blekinsop. "It would be like dining in a tram. Is this really a proper restaurant?" "One of the best. Not fancy, but sound." "Oh, I say, could we-" Gaines smiled at him. "You'd like to try it, wouldn't you, sir?" "I don't wish to interfere with your plans-" "Quite all right. I'm hungry myself, and Stockton is a long hour away. Let's go in." Gaines greeted the manageress as an old friend. "Hello, Mrs. McCoy. How are you tonight?" "If it isn't the chief himself! It's a long time since we've had the pleasure of seeing your face." She led them to a booth somewhat detached from the crowd of dining commuters. "And will you and your friend be having dinner?" "Yes, Mrs. McCoy, I suppose you order for us-but be sure it includes one of your steaks." "Two inches thick-from a steer that died happy." She glided away, moving her fat frame with surprising grace. With sophisticated foreknowledge of the chief engineer's needs, Mrs. McCoy had left a portable telephone at the table. Gaines plugged it in to an accommodation jack at the side of the booth, and dialed a number. "Hello-Davidson? Dave, this is the chief. I'm in Jake's beanery number four for supper. You can reach me by calling ten-six-six." He replaced the handset, and Blekinsop inquired politely: "Is it necessary for you to be available at all times?" "Not strictly necessary," Gaines told him, "but I feel safer when I am in touch. Either Van Kleeck, or myself, should be where the senior engineer of the watch - that's Davidson this shift - can get hold of us in a pinch. If it's a real emergency, I want to be there, naturally." "What would constitute a real emergency?" "Two things, principally. A power failure on the rotors would bring the road to a standstill, and possibly strand millions of people a hundred miles or more, from their homes. If it happened during a rush hour we would have to evacuate those millions from the road-not too easy to do." "You say millions-as many as that?" "Yes, indeed. There are twelve million people dependent on this roadway, living and working in the buildings adjacent to it, or within five miles of each side."

The Age of Power blends into the Age of Transportation almost imperceptibly, but two events stand out as landmarks in the change: the achievement of cheap sun power and the installation of the first mechanized road. The power resources of oil and coal of the United States had - save for a few sporadic outbreaks of common sense - been shamefully wasted in their development all through the first half of the twentieth century. Simultaneously, the automobile, from its humble start as a one-lunged horseless carriage, grew into a steel-bodied monster of over a hundred horsepower and capable of making more than a hundred miles an hour. They boiled over the countryside, like yeast in fermentation. In 1955 it was estimated that there was a motor vehicle for every two persons in the United States. They contained the seeds of their own destruction. Eighty million steel juggernauts, operated by imperfect human beings at high speeds, are more destructive than war. In the same reference year the premiums paid for compulsory liability and property damage insurance by automobile owners exceeded in amount the sum paid that year to purchase automobiles. Safe driving campaigns were chronic phenomena, but were mere pious attempts to put Humpty-Dumpty together again. It was not physically possible to drive safely in those crowded metropolises. Pedestrians were sardonically divided into two classes, the quick, and the dead. But a pedestrian could be defined as a man who had found a place to park his car. The automobile made possible huge cities, then choked those same cities to death with their numbers. In 1900 Herbert George Wells pointed out that the saturation point in the size of a city might be mathematically predicted in terms of its transportation facilities. From a standpoint of speed alone the automobile made possible cities two hundred miles in diameter, but traffic congestion, and the inescapable, inherent danger of high-powered, individually operated vehicles cancelled out the possibility. In 1955 Federal Highway #66 from Los Angeles to Chicago, "The Main Street of America", was transformed into a superhighway for motor vehicles, with an underspeed limit of sixty miles per hour. It was planned as a public works project to stimulate heavy

industry; it had an unexpected by-product. The great cities of Chicago and St. Louis stretched out urban pseudopods toward each other, until they met near Bloomington, Illinois. The two parent cities actually shrunk in population. That same year the city of San Francisco replaced its antiquated cable cars with moving stairways, powered with the Douglas-Martin Solar Reception Screens. The largest number of automobile licenses in history had been issued that calendar year, but the end of the automobile era was in sight, and the National Defense Act of 1957 gave fair warning. This act, one of the most bitterly debated ever to be brought out of committee, declared petroleum to be an essential and limited material of war. The armed forces had first call on all oil, above or below the ground, and eighty million civilian vehicles faced short and expensive rations. The "temporary" conditions during World War II had become permanent. Take the superhighways of the period, urban thoroughouts their length. Add the mechanized streets of San Francisco's hills. Heat to boiling point with an imminent shortage of gasoline. Flavor with Yankee ingenuity. The first mechanized road was opened in 1960 between Cincinnati and Cleveland. It was, as one would expect, comparatively primitive in design, being based on the ore belt conveyors of ten years earlier. The fastest strip moved only thirty miles per hour and was quite narrow, for no one had thought of the possibility of locating retail trade on the strips themselves. Nevertheless, it was a prototype of social pattern which was to dominate the American scene within the next two decades- neither rural, nor urban, but partaking equally of both, and based on rapid, safe, cheap, convenient transportation. Factories - wide, low buildings whose roofs were covered with solar power screens of the same type that lined the roadway on each side. Back of them and interspersed among them were commercial hotels, retail stores, theatres, apartment houses. Beyond this long, thin, narrow strip was the open country-side, where the bulk of the population lived. Their homes dotted the hills, hung on the banks of creeks, and nestled between the farms. They worked in the "city" but lived in the "country" - and the two were not ten minutes apart.

Mrs. McCoy served the chief and his guest in person. They checked their conversation at the sight of the magnificent steaks. Up and down the six hundred mile line, Sector Engineers of the Watch were getting in their hourly reports from their subsector technicians. "Subsector one-check!" "Subsector two-check!" Tensionometer readings, voltage, load, bearing temperatures, synchrotachometer readings-"Subsector seven-check!" Hard-bitten, able men in dungarees, who lived much of their lives 'down inside' amidst the unmuted roar of the hundred mile strip, the shrill whine of driving rotors, and the complaint of the relay rollers. Davidson studied the moving model of the road, spread out before him in the main control room at Fresno Sector. He watched the barely perceptible crawl of the miniature hundred mile strip and subconsciously noted the reference number on it which located Jake's Steak House No. 4. The chief would be getting in to Stockton soon; he'd give him a ring after the hourly reports were in. Everything was quiet; traffic tonnage normal for rush hour; he would be sleepy before this watch was over. He turned to his Cadet Engineer of the Watch. "Mr. Barnes." "Yes sir." "I think we could use some coffee." "Good idea, sir. I'll order some as soon as the hourlies are in." The minute hand of the control board chronometer reached twelve. The cadet watch officer threw a switch. "All sectors, report!" he said, in crisp, self-conscious tones. The faces of two men flicked into view on the visor Screen. The younger answered him with the same air of acting under supervision. "Diego Circle - rolling!" They were at once replaced by two more. Angeles Sector - rolling!" Then: "Bakersfield Sector - rolling!" And: "Fresno Sector - rolling!". Finally, when Reno Circle had reported, the cadet turned to Davidson and reported: "Rolling, sir." "Very well-keep them rolling!" The visor screen flashed on once more. "Sacramento Sector, supplementary report." "Proceed." "Cadet Guenther, while on visual inspection as cadet sector engineer of the watch, found Cadet Alec Jeans, c

watch as cadet subsector technician, and R. J. Ross, technician second class, on watch as technician of the same subsector, engaged in playing cards. It was not possible to tell with any accuracy how long they had neglected to patrol their subsector." "Any damage?" "One rotor running hot, but still synchronized. It was jacked down, and replaced." "Very well. Have the paymaster give Ross his time and turn him over to the civil authorities. Place Cadet Jeans under arrest and order him to report to me." "Very well, sir." "Keep them rolling!" Davidson turned back to the control desk and dialed Chief Engineer Gaines' temporary number.

"You mentioned that there were two things that could cause major trouble on the road, Mr. Gaines but you spoke only of power failure to the rotors." Gaines pursued an elusive bit of salad before answering. "There really isn't a second major trouble-it won't happen. However - we are travelling along here at one hundred miles per hour. Can you visualize what would happen if this strip under us should break?" Mr. Blekinsop shifted nervously in his chair. "Hmm - rather a disconcerting idea, don't you think? I mean to say, one is hardly aware that one is travelling at high speed, here in this snug room. What would the result be?" "Don't let it worry you; the strip can't part. It is built up of overlapping sections in such a fashion that it has a safety factor of better than twelve to one. Several miles of rotors would have to shut down all at once, and the circuit breakers for the rest of the line fail to trip out before there could possibly be sufficient tension on the strip to cause it to part. "But it happened once, on the Philadelphia-Jersey City Road, and we aren't likely to forget it. It was one of the earliest high speed roads, carrying a tremendous passenger traffic, as well as heavy freight, since serviced a heavily industrialized area. The strip was hardly more than a conveyor belt, and no one had foreseen the weight it would carry. It happened under maximum load, naturally, when the high speed way was crowded. The part of the strip behind the break buckled for miles, crushing passengers against the roof at eighty miles per hour. The section forward of the break cracked like a whip, spilling passengers onto the slower ways, dropping them on the exposed rollers and rotors down inside, and snapping them up against the roof. "Over three thousand people were killed in that one accident, and there was much agitation to abolish the roads. They were even shut down for a week by presidential order, but he was forced to reopen them again. There was no alternative." "Really? Why not?" "The country had become economically dependent on the roads. They were the principal means of transportation in the industrial areas-the only means of economic importance. Factories were shut down; food didn't move; people got hungry-and the President was forced to let them roll again. It was the only thing that could be done; the social pattern had crystallized in one form, and it couldn't be changed overnight. A large, industrialized population must have large-scale transportation, not only for people, but for trade." Mr. Blekinsop fussed with his napkin, and rather diffidently suggested, "Mr., Gaines, I do not intend to disparage the ingenious accomplishments of your great people, but isn't it possible that you may have put too many eggs in one basket in allowing your whole economy become dependent on the functioning of one type of machinery?" Gaines considered this soberly. "I see your point. Yes-and no. Every civilization above the peasant and village type is dependent on some key type of machinery. The old South was based on the cotton gin. Imperial England was made possible by the steam engine. Large populations have to have machines for power, for transportation, and for manufacturing in order to live. Had it not been for machinery the large populations could never have grown up. That's not a fault of the machine; that's its virtue. "But it is true that whenever we develop machinery to the point where it will support large populations at a high standard of living we are then bound to keep that machinery running, or suffer the consequences. But the real hazard in that is not the machinery, but the men who run the machinery. These roads, as machines, are all right. They are strong and safe and will do everything they were designed to do. No, it's not the machines,

it's the men. "When a population is dependent on a machine, they are hostages of the men who tend the machines. If their morale is high, their sense of duty strong-" Someone up near the front of the restaurant had turned up the volume control of the radio, letting out a blast of music that drowned out Gaines' words. When the sound had been tapered down to a more nearly bearable volume, he was saying: "Listen to that. It illustrates my point." Blekinsop turned an ear to the music. It was a swinging march of compelling rhythm, with a modern interpretive arrangement. One could hear the roar of machinery, the repetitive clatter of mechanisms. A pleased smile of recognition spread over the Australian's face. "It's your Field Artillery Song, The Roll of the Caissons, isn't-it? But I don't see the connection." "You're right; it was the Roll of the Caissons, but we adapted it to our own purposes. It's the Road Song of the Transport Cadets. Wait." The persistent throb of the march continued, and seemed to blend with the vibration of the roadway underneath into a single tympani. Then a male chorus took up the verse:

"Hear them hum! Watch them run! Oh, our job is never done, For our roadways go rolling along! While you ride; While you glide; We are watching 'down inside', So your roadways keep rolling along!

"Oh, it's Hie! Hie! Hee! The rotor men are we- Check off the sectors loud and strong! (spoken) One! Two! Three! Anywhere you go You are bound to know That your roadways are rolling along! (Shouted) KEEP THEM ROLLING! That your roadways are rolling along!"

"See said Gaines, with more animation in his voice, "See? That is the real purpose of the United States Academy of Transport. That is the reason why the transport engineers are a semi-military profession, with strict discipline. We are the bottle neck, the sine qua non, of all industry, all economic life. Other industries can go on strike, and only create temporary and partial dislocations. Crops can fail here and there, and the country takes up the slack. But if the roads stop rolling, everything else must stop; the effect would be the same as a general strike-with this important difference: It takes a majority of the population, fired by a real feeling of grievance, to create a general strike; but the men that run the roads, few as they are, can create the same complete paralysis." "We had just one strike on the roads, back in 'sixty-six. It was justified, I think, and it corrected a lot of real, abuses-but it mustn't happen again." "But what is to prevent it happening again, Mr. Gaines?" "Morale-esprit de corps. The technicians in the road service are indoctrinated constantly with the idea that their job is a sacred trust. Besides which we do everything we can to build up their social position. But even more important is the Academy. We try to turn out graduate engineers imbued with the same loyalty, the same iron self-discipline, and determination to perform their duty to the community at any cost, that Annapolis and West Point and Goddard are so successful in inculcating in their graduates." "Goddard? Oh, yes, the rocket field. And have you been successful, do you think?" "Not entirely, perhaps, but we will be. It takes time to build up a tradition. When the oldest engineer is a man who entered the Academy in his teens, we can afford to relax a little and treat it as a solved problem." "I suppose you are a graduate?" Gaines grinned. "You flatter me-I must look younger than I am. No, I'm a carry-over from the army. You see, the Department of Defense operated the roads for some three months during reorganization after the strike in 'sixty-six. I served on the conciliation board that awarded pay increases and adjusted working conditions, then I was assigned-" The signal light of the portable telephone glowed red. Gaines said, "Excuse me," and picked up the handset.' "Yes?" Blekinsop could overhear the voice at the other end. "This is Davidson, Chief. The roads are rolling." "Very well. Keep them rolling!" "Had another trouble report from the Sacramento Sector." "Again? What this time?" Before Davidson could reply he was cut off. As Gaines reached out to dial him back his coffee cup, half full, landed in his lap. Blekinsop was aware, even as he was rocked against the

edge of the table, of a disquieting change in the hum of the roadway. "What has happened, Mr. Gaines?" "Don't know. Emergency stop-God knows why." He was dialing furiously. Shortly he flung the phone down, without bothering to return the handset to its cradle. "Phones are out. Come on! No-You'll be safe here. Wait." "Must I?" "Well, come along then, and stick close to me." He turned away having dismissed the Australian cabinet minister from his mind. The strip ground slowly to a stop, the giant rotors and myriad rollers acting as fly wheels in preventing a disastrous sudden stop. Already a little knot of commuters, disturbed at their evening meal, were attempting to crowd out the door of the restaurant. "Halt!" There is something about a command issued by one who is used to being obeyed which enforces compliance. It may be intonation, or possibly a more esoteric power, such as animal tamers are reputed to be able to exercise in controlling ferocious beasts. But it does exist, and can be used to compel even those not habituated to obedience. The commuters stopped in their tracks. Gaines continued, "Remain in the restaurant until we are ready to evacuate you. I am the Chief Engineer. You will be in no danger here. You!" He pointed to a big fellow near the door. "You're deputized. Don't let anyone leave without proper authority. Mrs. McCoy, resume serving dinner." Gaines strode out the door, Blekinsop tagging along. The situation outside permitted no such simple measures.

The hundred mile strip alone had stopped; a few feet away the next strip flew by at an unchecked ninety-five miles an hour. The passengers on it flickered past, unreal cardboard figures. The twenty-foot walkway of the maximum speed strip had been crowded when the breakdown occurred. Now the customers of shops, of lunchstands, and of other places of business, the occupants of lounges, of television theatres-all came crowding out onto the walkway to see what had happened. The first disaster struck almost immediately. The crowd surged, and pushed against a middle-aged woman on its outer edge. In attempting to recover her balance she put one foot over the edge of the flashing ninety-five mile strip. She realized her gruesome error, for she screamed before her foot touched the ribbon. She spun around, and landed heavily on the moving strip, and was rolled by it, as the strip attempted to impart to her mass, at one blow, a velocity of ninety-five miles per hour-one hundred and thirty-nine feet per second: As she rolled she mowed down some of the cardboard figures as a sickle strikes a stand of grass. Quickly, she was out of sight, her identity, her injuries, and her fate undetermined, and already remote. But the consequences of her mishap were not done with. One of the flickering cardboard figures bowled over by her relative momentum fell toward the hundred mile strip, slammed into the shockbound crowd, and suddenly appeared as a live man-but broken and bleeding, amidst the luckless, fallen victims whose bodies had checked his wild flight. Even there it did not end. The disaster spread from its source, each hapless human ninepin more likely than not to knock down others so that they fell over the danger-laden boundary, and in turn ricocheted to a dearly bought equilibrium. But the focus of calamity sped out of sight, and Blekinsop could see no more. His active mind, accustomed to dealing with large' numbers of individual human beings, multiplied the tragic sequence he had witnessed by twelve hundred miles of thronged conveyor strip, and his stomach chilled. To Blekinsop's surprise, Gaines made no effort to succor the fallen, nor to quell the fear-infected mob, but turned an expressionless face back to the restaurant. When Blekinsop saw that he was actually re-entering the restaurant, he plucked at his sleeve. "Aren't we going to help those poor people?" The cold planes of the face of the man who answered him bore no resemblance to his genial rather boyish, host of a few minutes before. "No. Bystanders can help them - I've got the whole road to think of. Don't bother me." Crushed, and somewhat indignant, the politician did as he was ordered. Rationally, he knew that the Chief Engineer was right-a man responsible for the safety of millions cannot turn aside from his duty to render personal service to one-but the cold detachment of such viewpoint was repugnant to him. Gaines was back in the restaurant "Mrs. McCoy, where is your get-

away?" "In the pantry, sir." Gaines hurried there, Blekinsop at his heels. A nervous Filipino salad boy shrank out of his way as he casually swept a supply of prepared green stuffs onto the floor and stepped up on the counter where they had rested. Directly above his head and within reach was a circular manhole, counterweighted and operated by a handwheel set in its center. A short steel ladder, hinged to the edge of the opening was swung up flat to ceiling and secured by a hook. Blekinsop lost his hat in his endeavor to clamber quickly enough up the ladder after Gaines. When he emerged on the roof of the building, Gaines was searching the ceiling of the roadway with a pocket flashlight. He was shuffling along, stooped double in the awkward four feet of space between the roof underfoot and ceiling. He found what he sought, some fifty feet away-another manhole similar to the one they had used to escape from below. He spun the wheel of the lock and stood up in the space, then rested his hands on the sides of the opening and with a single, lithe movement vaulted to the roof of the roadways. His companion followed him with more difficulty. They stood in darkness, a fine, cold rain feeling at their faces. But underfoot, and stretching beyond sight on each hand, the sun power screens glowed with a faint opalescent radiance, their slight percentage of inefficiency as transformers of radiant sun power to available electrical power being evidenced as a mild phosphorescence. The effect was not illumination, but rather like the ghostly sheen of a snow covered plain seen by starlight. The glow picked out the path they must follow to reach the rain-obscured wall of buildings bordering the ways. The path was a narrow black stripe which arched away into the darkness over the low curve of the roof. They started away on this path at a dog trot, making as much speed as the slippery footing and the dark permitted, while Blekinsop's mind still fretted at the problem of Gaines' apparently callous detachment. Although possessed of a keen intelligence his nature was dominated by a warm, human sympathy, without which no politician, irrespective of other virtues or shortcomings, is long successful. Because of this trait he distrusted instinctively any mind which was guided by logic alone. He was aware that, from a standpoint of strict logic, no reasonable case could be made out for the continued existence of the human race, still less for the human values he served. Had he been able to pierce the preoccupation of his companion, he would have been reassured. On the surface Gaines' exceptionally intelligent mind was clicking along with the facile ease of an electronic integrator-arranging data at hand, making tentative decisions, postponing judgments without prejudice until necessary data were available, exploring alternatives. Underneath, in a compartment insulated by stern self-discipline from the acting theatre of his mind, his emotions were a torturing storm of self-reproach. He was heartsick at suffering he had seen, and which he knew too well was duplicated up and down the line. Although he was not aware of any personal omission, nevertheless, the fault was somehow his, for authority creates responsibility. He had carried too long the superhuman burden of kingship - which no sane mind can carry light-heartedly - and was at this moment perilously close to the frame of mind which sends captains down with their ships. Only the need for immediate, constructive action sustained him. But no trace of this conflict reached his features. At the wall of buildings glowed a green line of arrows, pointing to the left. Over them, at the terminus of the narrow path, shone a sign: "ACCESS DOWN." They pursued this, Blekinsop puffing in Gaines' wake, to a door let in the wall, which gave in to a narrow stairway lighted by a single glowtube. Gaines plunged down this, still followed, and they emerged on the crowded, noisy, stationary walkway adjoining the northbound road. Immediately adjacent to the stairway, on the right, was a public tele-booth. Through the glassite door they could see a portly, well-dressed man speaking earnestly to his female equivalent, mirrored in the visor screen. Three other citizens were waiting outside the booth. Gaines pushed past them, flung open the door, grasped the bewildered and indignant man by the shoulders, and hustled him outside, kicking the door closed after him. He cleared the visor screen with one sweet

of his hand, before the matron pictured therein could protest, and pressed the emergency-priority button. He dialed his private code number, and was shortly looking into the troubled face of his Engineer of the Watch, Davidson. "Report!" "It's you, Chief! Thank God! Where are you?" Davidson's relief was pathetic. "Report!" The Senior Watch Officer repressed his emotion and complied in direct clipped phrases, "At seven-oh-nine p.m. the consolidated tension reading, strip twenty, Sacramento Sector, climbed suddenly. Before action could be taken, tension on strip twenty passed emergency level; the interlocks acted, and power to subject strip cut out. Cause of failure, unknown. Direct communication to Sacramento control office has failed. They do not answer the auxiliary, nor the commercial line. Effort to re-establish communication continues. Messenger dispatched from Stockton Subsector Ten. "No casualties reported. Warning broadcast by public announcement circuit to keep clear of strip nineteen. Evacuation has commenced." "There are casualties," Gaines cut in. "Police and hospital emergency routine. Move!" "Yes, sir!" Davidson snapped back, and hooked a thumb over his shoulder-but his Cadet Officer of the Watch had already jumped to comply. "Shall I cut out the rest of the road, Chief?" "No. No more casualties are likely after the first disorder. Keep up the broadcast warnings. Keep, those other strips rolling, or we will have a traffic jam the devil himself couldn't untangle." - Gaines had in mind the impossibility of bringing the strips up to speed under load. The rotors were not powerful enough to do this. If the entire road was stopped, he would have to evacuate every strip, correct the trouble on strip twenty, bring all strips up to speed, and then move the accumulated peak load traffic. In the meantime, over five million stranded passengers would, constitute a tremendous police problem. It was simpler to evacuate passengers on strip twenty over the roof, and allow them to return home via the remaining strips. "Notify the Mayor and the Governor that I have assumed emergency authority. Same to the Chief of Police and place him under your orders. Tell the Commandant to arm all cadets available and await orders. Move!" "Yes, sir. Shall I recall technicians off watch?" "No. This isn't an engineering failure. Take a look at your readings; that entire sector went out simultaneously. Somebody cut out those rotors by hand. Place offwatch technicians on standby status-but don't arm them, and don't send them down inside. Tell the Commandant to rush all available senior-class cadets to Stockton Subsector Office number ten to report in. I want them equipped with tumblebugs, pistols, and sleepy bombs." "Yes, sir." A clerk leaned over Davidson's shoulder and said something in his ear. "The Governor wants to talk to you, Chief." "Can't do it-nor can you. Who's your relief? Have you sent for him?" "Hubbard-he's just come in." "Have him talk to the Governor, the Mayor, the press - anybody that calls - even the White House. You stick to your watch. I'm cutting off. I'll be back in communication as quickly as I can locate a reconnaissance car." He was out of the booth almost before the screen cleared. Blekinsop did not venture to speak, but followed him out to the northbound twenty-mile strip. There Gaines stopped, short of the wind break turned, and kept his eyes on the wall beyond the stationary walkway. He picked out some landmark, a sign - not apparent to his companion - and did an Eliza-crossing-the-ice back to the walkway, so rapidly that Blekinsop was carried some hundred feet beyond him, and almost failed to follow when Gaines ducked into a doorway and ran down a flight of stairs. They came out on a narrow lower walkway, 'down inside'. The pervading din claimed them, beat upon their bodies as well as their ears. Dimly, Blekinsop perceived their surroundings, as he struggled to face that wall of sound. Facing him illuminated by the yellow monochrome of a sodium arc, was one of the rotors that drove the five-mile strip, its great, drum-shaped armature revolving slowly around the stationary field coils in its core. The upper surface of the drum pressed against the under side of the moving way and imparted to it its stately progress. To the left and right, a hundred yards each way, and beyond at similar intervals, farther than he could see, were other rotors. Bridging the gaps between the rotors were the slender

rollers, crowded together like cigars in a box, in order that the strip might have a continuous rolling support. The rollers were supported by steel girder arches through the gaps of which he saw row after row of rotors in staggered succession, the rotors in each succeeding row turning over more rapidly than the last. Separated from the narrow walkway by a line of supporting steel pillars, and lying parallel to it on the side away from the rotors, ran a shallow paved causeway, joined to the walk at this point by a ramp. Gaines peered up and down this tunnel in evident annoyance. Blekinsop started to ask him what troubled him, but found his voice snuffed out by the sound: He could not cut through the roar of thousands of rotors and the whine of hundreds of thousands of rollers. Gaines saw his lips move and guessed at the question. He cupped his hands around Blekinsop's right ear, and shouted, "No car - I expected to find a car here." The Australian, wishing to be helpful, grasped Gaines' arm and pointed back into the jungle of machinery. Gaines' eye followed the direction indicated and picked out something that he had missed in his preoccupation - a half dozen men working around a rotor several strips away. They had jacked down a rotor until it was no longer in contact with the road surface and were preparing to replace it in toto. The replacement rotor was standing by on a low, heavy truck. The Chief Engineer gave a quick smile of acknowledgment and thanks and aimed his flashlight at the group, the beam focused down to a slender, intense needle of light. One of the technicians looked up, and Gaines snapped the light on and off in a repeated, irregular pattern. A figure detached itself from the group, and ran toward them. It was a slender young man, dressed in dungarees and topped off with earpads and an incongruous, pillbox cap, bright with gold braid and Insignia. He recognized the Chief Engineer and saluted, his face falling into humorless, boyish intentness. Gaines stuffed his torch into his pocket and commenced to gesticulate rapidly with both hands-clear, clean gestures, as involved and as meaningful as deaf-mute language. Blekinsop dug into his own dilettante knowledge of anthropology and decided that it was most like American Indian sign language, with some of the finger movements of hula. But it was necessarily almost entirely strange, being adapted for a particular terminology. The cadet answered him in kind, stepped to the edge of the causeway, and flashed his torch to the south. He picked out a car, still some distance away, but approaching at headlong speed. It braked, and came to stop alongside them. It was a small affair, ovoid in shape, and poised on two centerline wheels. The forward, upper surface swung up and disclosed the driver, another cadet. Gaines addressed him briefly in sign language, then hustled Blekinsop ahead of him into the cramped passenger compartment. As the glassite hood was being swung back into place, a blast of wind smote them, and the Australian looked up in time to glimpse the last of three much larger vehicles hurtle past them. They were headed north, at a speed of not less than two hundred miles per hour. Blekinsop thought that he had made out the little hats of cadets through the windows of the last of the three, but he could not be sure. He had no time to wonder - so violent was the driver's getaway. Gaines ignored the accelerating surge; he was already calling Davidson on the built-in communicator. Comparative silence had settled down once the car was closed. The face of a female operator at the relay station showed on the screen. "Get me Davidson-Senior Watch Office!" "Oh! It's Mr. Gaines! The Mayor wants to talk to you, Mr. Gaines." "Refer him-and get me Davidson. Move!" "Yes, sir!" "And see here-leave this circuit hooked in to Davidson's board until I tell you personally to cut it." "Right." Her face gave way to the Watch Officer's. "That you, Chief? We're moving-progress O.K.-no change." "Very well You'll be able to raise me on this circuit, or at Subsector Ten office. Clearing now." Davidson's face gave way to the relay operator. "Your wife is calling, Mr. Gaines. Will you take it?" Gaines muttered something not quite gallant, and answered, "Yes." Mrs. Gaines flashed into facsimile. He burst into speech before she could open her mouth. "Darling I'm all right don't worry I'll be home when I get there I've got to go now." It was all out in one breath, and he slapped the control that cleared the screen. They slammed t

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