ENGINEER No. 1

By Raymond Moley and Celeste Jedel

INTERNATIONAL NEWS PHOTO

Businessman William L. Batt (left), now one of Uncle Sam's trouble shooters in Russia, confers outside the White House with Engineer No. 1, Gano Dunn.

"WOULD you like," asked the fat man as he tossed a piece of soap into the air and caught it—"would you like to have me explain the Einstein theory?" The group in the washroom of the Pullman car eyed him sleepily.

"That soap," continued the washroom scientist, "fell into my hand exactly underneath the highest point that it reached in its trip into the air. But the train in which we are riding is going sixty miles an hour. Why didn't the train, this room, my hand, move away from the downward path of the soap?"

Nobody knew. "Neither do I," said the fat man. "Neither does Einstein. But," he mused, "Einstein pointed out the fact that the train, my hand, and the soap don't change positions relatively. And that, my friends, is all I know about relativity."

The audience looked dashed. The demonstration seemed completely pointless until a little man in the corner muttered, "You've got something there. I've just spent a week in Washington trying to find out from the OPM and the SPAB how I'm supposed to go on employing people and turning out goods when I can't get raw materials. And I tell you that moving our production machine at a faster and faster pace for defense while we try to get the soap to fall down in the same place—wait a minute, I mean while we try to keep the same relative economic situations we've always had in this country—well, that's something for Einstein to dope out. They ought to get that guy down in Washington."

A Washington SOS

WASHINGTON seems to have had some such idea months back. The great scientist himself was not summoned, of course. But President Roosevelt did call in Gano Dunn, an old friend of Einstein's, one of the eleven men once reputed to understand the Einstein theory. And to Dunn, early this year, the President put the most crucial of all how-to-get-the-economic-soap-to-fall-down-in-the-same-place questions. He asked Dunn to advise him on the capacity of the steel industry.

Everyone who has even the dimmest notion of the mechanics of defense production knows that steel capacity, intelligently used, is the cornerstone of the defense effort. What is not generally known is that for many months now there has been a raging controversy about whether there should or should not be a vast expansion of the steel industry. Needless to say, the arguments on each side involve considerations of defense. But they also involve calculations of what will happen to this basic American industry and the industries that depend on it when the defense effort is over. Which means that they involve critical questions about the political and economic future of us all.

Gano Dunn, to whom the President turned for advice, is the head of the J. G. White Engineering Corporation. As such, he has directed great construction projects all over the world—among them the steam plant at Muscle Shoals now operated by the TVA; the first long-distance natural-gas pipe line in California; enormous sulphur-extraction plants and oil refineries; thirteen transoceanic radio stations; the original Government aviation station at Langley Field; the naval oil base at Pearl Harbor; the 20,000-kilowatt power plant that pumps oil taken from under water off the shores of Lake Maracaibo in Venezuela. For the republic of Chile he has built three large irrigation and power dams; for the republic of Mexico, five; for the government of Colombia he has built power plants; for the republic of Panama, the Chiriqui railroad; for the Haitian government he is now carrying out an immense bridge-and-road-building project.

But it is as an engineer's engineer that Gano Dunn is best known. He and his firm are called in on difficult problems by the engineers of railroads, utilities, radio and telegraph companies, oil producers and refiners, in much the same way that a big law firm is called in by the legal divisions of its corporate clients. In accepting the President's assignment, Dunn might well have recalled Oscar Wilde's bitter half-truth: "It is always a silly thing to give advice, but to give good advice is absolutely fatal." On the other hand, as an engineer's engineer he has successfully survived a lifetime of giving good advice. So sound has his advice proved, in fact, that his signature on an engineering report is accepted the country over as a symbol of authority and integrity. To him have come the highest honors that his profession can give—among them the Hoover Medal and the Edison Medal.

Dunn's answer to the President's question on steel took the form of two reports, the first of which appeared late in February and the second of which appeared late in May. No one has ever made a survey that compares even remotely with the scope of his. Dunn began by appraising the physical capacity of the nation's steel plants—a job that involved the use of production figures always hitherto kept the closest of secrets by the steel people. These calculations he then extended, Einsteinwise, beyond the question of the capacity of the steel mills to produce. He studied the sources of the materials that go into steel—coke, ore, manganese, and the rest. He took into account the ability of the Great Lakes and other transportation systems to convey such materials to the mills and the amount of available labor in the face of the emergency. And, above all, he grappled with the theory that there ought to be a precipitate expansion of the steel industry now, in the midst of the armament program.

Struggle in Steel

FOR years it has been one of the basic tenets of the New Deal economists that steel could be much cheaper if steelmakers would produce more steel. The steel people, on the other hand, have insisted that producing steel is not like making and selling electric current or straw hats. Increased volume in producing such things results in lower costs of production. Increased volume in steel production results in lower costs to only a limited extent. This the steel people demonstrated with facts and figures in the hearings before the late Temporary National Economic Committee a year and a half ago. They convinced everyone but the New Deal economists.

Among those economists is a Mr. Melvin G. de Chazeau, who is now associated with the OPA. Before Dunn's first survey, Mr. de Chazeau was asked to make a report on steel capacity. Not surprisingly, it twanged the *(Continued on Page 110)*

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dear old New Deal refrain—expand steel production. After estimating existing steel capacity, defense needs and probable civilian needs in terms of possible future national income, De Chazeau recommended an increase of 8,000,000 tons in steel capacity.

Dunn's survey proceeded to deal with the De Chazeau findings dispassionately. But when he had finished with them, with words as gentle as eiderdown he had spread a completely sopping blanket over the contentions of the expansionists. The radical journals screamed with rage. The New Dealers themselves were temporarily silent. Dunn's findings permitted no further argument. Worse still, from the New Dealers' point of view, the President, in announcing that Dunn had completed the report, stated that it was the best thing of its kind done to date—a standard on which the Government could rely. So enthusiastic about it was he that he asked Dunn to prepare a second report at the end of three months.

If anyone who read Dunn's first report missed the fact that he was dealing with a controversy whose outcome might change the whole American scheme of things, Dunn's second report left no possibility of misunderstanding. Shortly before it was made, Mr. Stacy May's Bureau of Research and Statistics in the OPM produced an estimate of 1942 demands for steel which literally dwarfed the estimates of the De Chazeau report. The steel industry would have to expand its capacity from 91,300,000 tons to 120,000,000 tons, or nearly 30,000,000 tons, it said. Dunn turned to a consideration of this new estimate and plucked it to pieces with the same benign detachment that marked his first report.

The increase for which the Stacy May estimate asked was not to meet the demands of the armament program, Dunn showed. For armament purposes not more than one quarter of the steel industry's existing capacity was needed. It was for civilian uses that the expansion was demanded. Moreover, to produce the amount of steel called for by the Stacy May estimate, Dunn showed, would require that 6,047,200 employees be added to the 7,591,500 employees of the steel and steel-consuming industries in 1940—an increase of 77 per cent in the labor required. Such an increase would be impossible. There was not only not enough available labor to produce the 30,000,000-ton expansion for which May's estimate called: there was not enough to consume it if it could conceivably be produced.

Pricking a Bubble

Even to expand the nation's steel capacity by, say, a comparatively modest 10,000,000 tons, Dunn observed, would be a grave step. The cost would be staggering—$1,250,000,000 for increased transportation facilities, ships and mining equipment, for mine development and coke-oven construction, for added furnaces and finishing mills. The time required would be two years.

More ominous still, the consequence would be to divert 4,160,000 tons of finished steel urgently needed for immediate use to the building of facilities to increase steel production in the future.

This final consideration is what momentarily stumped the New Dealers. For their theories of expansion simply had not taken it into account. By way of emphasis, when he presented his report to the President, Dunn told him the story, variously credited to Mark Twain and Lincoln, of the little Mississippi steamboat whose whistle was so big that it had to stop its engine each time it tooted. The President was delighted. When he went into his press conference he repeated the story with embellishments. Again he hailed the monumental character of Dunn's findings. Again he set the figurative seal of his approval upon them. The New Dealers' stubbornly fought expansion cause seemed, for the moment, to be lost.

But zeal such as theirs can survive many a blow. And so, ironically, within a few days after Dunn's second report, the New Dealers seem to have got authorization—how, why and with what powers of persuasion remain a mystery—to plan for a 10,000,000-ton steel expansion. Jesse Jones called in the amazed steel people, told them to expand, and announced that the Government would put up 90 per cent of the cost. Before long there was talk of a 15,000,000-ton expansion.

A Ninety-Seven-Cent Year

Then, suddenly, around mid-July, fragments of news began to suggest that, New Dealers or no New Dealers, the ambitious program of expansion was running into trouble at every turn. Expansion on the Pacific Coast was delayed because of fears that the Coast might be vulnerable to attack. Expansion elsewhere was slowed down by difficulties in getting skilled labor, by difficulties in providing for adequate railroad and ship facilities, and by each of the dozen other intricate factors that Gano Dunn had calmly warned about.

This is not to say that Dunn's advice will finally prevail. It is true that there are inexorable processes in motion that may bring themselves to bear conclusively before it is too late. But Russia's entry into the war may fundamentally increase the demands on the steel industry and alter the timetable of those demands. More, it would be a mistake to underestimate the determination of the New Dealers.

In any event, the decisions forced by the determination of the New Dealers will never be attributed to Dunn. For he assumed no further responsibility in the matter. Shortly after the steel expansion was announced, his resignation as Senior Consultant to the OPM, the official title he had held for nearly a year, was submitted to the President. This was done, he said, in line with a decision he had reached weeks before. His reasons for it had nothing to do with the fate of his reports. His business and many other personal responsibilities made his departure from Washington necessary, and his strength, at seventy, had been heavily taxed by the year's grueling work. Cordial and affectionate letters were exchanged with the President. Dunn received a ninety-seven-cent check from the Government for his services and went off for a vacation on his sailing boat. He will make no more steel reports for the Government.

These are the facts about Dunn's resignation. But what the New Deal

expansionists have had to say about it is another story. In a manner now well established in contentious Washington, they have fired parting volleys at him. There has been bitter unofficial talk by Government officials. The writers for the left-wing daily and weekly press have echoed this talk. The Dunn reports, it is said, were "full of misconceptions." They used "misleading arguments." They have been "discredited" by the course of events, for is the expansion policy not proof that he "minimized" an impending steel shortage? Dunn's resignation is more "reassuring" than his reports. And, for good measure, one commentator has expressed the hope that Dunn's "spiritual brothers on the OPM" will follow him into retirement.

Dunn is not worried about such attacks. But he is concerned about the Governmental policy that disregards the economic consequences of a big steel expansion for civilian needs. For Dunn realizes what may happen when, after the precipitate expansion of steel capacity takes place, the abnormal demand for steel falls off. He knows, and has demonstrated in his reports, a transcendently important fact about the steel industry. The industry's expansions have largely taken place in periods of depression.

Consider what that means. It means that when the demand for steel on the part of big steel users has been slack, the steel industry itself has taken up some of that slack by producing the steel to expand itself. The effect of that policy has been to even out the production curve, to a degree, in this feast-and-famine industry, and to provide employment in slack times.

The New Dealers, on the other hand, want the steel industry to expand not in slack times but in piping times. And do they now ask it to do this in order to meet the requirements of the armament program? Certainly not. It is to meet a theoretical civilian demand when a theoretical economic concept called "national income" is rising, and to give their greater-volume-lower-cost theory a tryout later when the emergency is over.

In short, they propose a stupendous gamble—a gamble which, if unsuccessful, must be paid for by everyone—by the industry, by labor, by taxpayers, by everyone except those safely ensconced in Government jobs. And when the steel industry falters in the inevitable deflation to come, it may find itself, at long last, in the hands of the Government.

An American Lord Bacon

Time will tell whether the expansionists were justified in the gamble. But, on the record of Dunn's career, laying down the chips against his advice is scarcely the safest bet in the world. For what he is, what he knows and what he has achieved carry formidable weight.

Dunn would probably be shocked by a comparison of his peculiar talents with those of Lord Bacon. But there is something about his influence that suggests the role of that man of universal learning in the court of Queen Elizabeth. There is the hint of the sorcerer about Dunn—not the sorcerer of Disney's Fantasia, but the Elizabethan master of subtle mysteries. In twentieth-century terms, Dunn is a man who might push back impeccable cuffs and, to amuse his dinner guests between courses, repair a lagging chronometer or whip together a complete radio set. More astonishing than even such bits of legerdemain are the color and flashing opulence of his knowledge. Explanations of atomic power, coaxial cables and the uses of manganese in steelmaking are the kind of intellectual fare he sets forth for his friends. His mind moves joyously among the miracles of an age that has never grown tired of producing miracles and exploring the miraculous.

One of Dunn's first devotees was the late Frank Munsey. Early in the 1900's, Dunn met Munsey. Dunn was then chief engineer of an electrical-manufacturing concern. Munsey had some magazines whose formula was based on his interest in science and adventure. After three or four evenings of exciting talk, the great man summoned Dunn to his office.

A Munsey Tribute

"What does your present job pay you?" Munsey demanded.

"Six thousand dollars," Dunn answered.

"Good. I am offering you ten."

Startled, Dunn asked, "What for?"

"Last night you explained to me how a turbine works," Munsey said. "You made me understand it as I'd never understood it before, by comparing a turbine to a child's pin wheel. I know of no other scientist engineer with your gift of simplification for the layman. I am offering you the job of editor in chief of all my magazines."

Dunn was flattered, but he preferred to confine his talents for popularization to a more limited audience. The audience remains small but distinguished. Such men as Edward Stettinius, Jr., W. A. Harriman, Harold Stanley, Joseph Ripley, Robert Millikan and David Sarnoff are among those of a whole generation in the business and scientific worlds upon whom his influence has been profound. Now filling key posts in the OPM and elsewhere in the Administration, some of these men and scores of others less well known have an almost worshipful respect for Dunn's judgments. They come to him not only for professional guidance but for personal advice.

Dunn's relationship with Sarnoff is more or less characteristic. Sarnoff, a young radio operator, had, by 1913, become chief inspector of the Marconi Wireless Telegraph Company of America, or, as it came to be known, the American Marconi Company. One of his duties was to serve as a contact man for his company in connection with the big job of erecting the first transatlantic radio towers, which his company had given to Dunn's engineering firm. Sarnoff, at twenty-two, thus found himself dealing with Dunn, a man already at the top of his profession. "He was the Pope of my realm," says Sarnoff. "He first taught me to see the engineer as an organizer. He showed me how important it was for the technician to understand the applications and implications of what he knew. And, without patronizing me, he gave me advice about my career. It's only fair to say that he was the first person of importance who took any interest at all in what was to become of me, personally."

It was a proud moment for Sarnoff years later when, as president of the Radio Corporation of America, he could ask Dunn to serve as a member of his board of directors. "But," Sarnoff says, "I wanted him as a director not because he was kind to me and not because to me he symbolized what is greatest in engineering. I have profound respect for his radio knowledge.

And even more, I wanted him because, more than any other man living, Dunn brings poetry into science and engineering. I can explain that best by saying that if I ask a good engineer to explain a new circuit of some sort, I get an accurate description in suitable technical terms. But if I ask Dunn to describe it, I get an explanation of the relationship of that circuit to other devices, an estimate of its possible uses and a prophetic glimpse of the developments to which it's apt to lead."

Casually, after a board meeting, Dunn looks down shimmering vistas of science with such men as Sarnoff and descries marvels still to come. It was the result of such a quiet moment as this, for instance, that Dunn, in 1913, pulled a young unknown named Edwin H. Armstrong out of the figurative hat for Frederick M. Sammis, the chief engineer of the American Marconi Company. Dunn told Sammis that he'd do well to look into the work Armstrong was doing in one of the laboratories at Columbia University. Armstrong, later the inventor of the superheterodyne and frequency modulation, turned out to be working on the regenerative circuit, or "feed-back." His work was to revolutionize the radio industry.

Armstrong tells an illuminating story of the encounter that led to that momentous tip. He was sitting in his laboratory when Dunn, tall, handsome and clad in the frock coat and high hat of that period, asked permission to enter. He had heard, he said, that Armstrong had a device capable of amplifying wireless signals so greatly that he was receiving signals from Europe with it. Would Armstrong show him the device and explain how it worked?

Armstrong not only would and did but was so filled with enthusiasm by Dunn's quick and sympathetic questions that he offered to build him a feed-back.

"If you don't mind," Dunn said, "I'd prefer to build it at home myself. Then I can really fix the principle of the thing in my mind."

So, Armstrong recalls, he and Dunn set about collecting the materials Dunn would need to make a feed-back at home. When they came to the fiber tubing around which the coils were to be wound, they found none of the required length available. Dunn fell to and cut some. "And I will never forget the picture," Armstrong says. "Dunn, who was somebody in the engineering world, I can tell you, sawed away at that fiber tubing with his frock-coat tails flying, and asking more questions than one would think a president of the United Engineering Society would bother his head with." One out of a thousand engineers, Armstrong adds, would have had the patience to dig into the details of what he was talking about. "And of those who did, 99 per cent would have said I had a very nice toy. But Dunn saw the future of what I had in the feed-back instantly."

Down-to-Earth Science

There is a sense in which the word "popularize" means to jazz up the long words and abstruse ideas of others. But when Dunn quietly told the American Marconi people to look into Armstrong's work, he was popularizing science in a sense far beyond Munsey's comprehension of the term. He was describing the significance of what was known to three or four men in a way that would make it important to millions. He was bringing together the invention and the practical men who could employ it in terms that affected everyday living.

Only a man of vast insight can do this. A quack can be an excellent popularizer. The super-popularizer must keep the respect of the cognoscenti. That Dunn has, is attested by the fact that he has had literally dozens of offers from scientific and educational institutions. Herbert Hoover offered him the directorship of the Bureau of Standards. Once he was asked to consider the secretaryship of the Smithsonian Institution, and twice the presidency of the Massachusetts Institute of Technology.

Dunn has turned down all such invitations for as good a reason as any. His grandfather was a schoolteacher, and Gano was brought up on the dictum, "Now, don't be like your grandfather." The inference is that Grandpa Nathaniel Dunn, an "impractical visionary," was a kind of skeleton in the family closet. Actually, Gano is exceedingly proud of him.

Nathaniel Dunn was a member of the famous class of 1825 at Bowdoin which included Longfellow and Hawthorne. A successful schoolmaster from the first, he seems to have had only one vagary. Each time he saved enough money from his modest salary, he blew it in on an invention.

This career Grandpa Dunn summed up in a flash of rueful wit. "A rolling stone gathers no moss," said he. "That is not always true, however. It depends on how you roll. I rolled and gathered no moss. Peter Cooper rolled and gathered mountains of it. And the explanation of it in part is this: He was by nature a businessman, and I was not. Indeed, as respects business talents, I have been an unmitigated failure." Doubtless it would have comforted the "unmitigated failure" if he could have seen his grandson become president of the institution founded by Peter Cooper—The Cooper Union for the Advancement of Science and Art—for the education of poor boys and girls.

Grandpa Dunn ended his days lecturing on chemistry, philosophy, geology and mineralogy, with asides to his gaping classes on proper ventilation, animal heat and other "marvels of the animal, vegetable and mineral kingdoms." To young Gano, his stories of how chemicals behaved and how his inventions and "constructions" were made were a source of unfailing enchantment. Unquestionably it was he who made Gano decide to become an engineer. It was he who gave Dunn that consuming interest in what was new that saved him from the normal conservatism of engineers. And if Nathaniel Dunn left Gano permanently skeptical of the delights of a schoolmaster's life, he also passed on to him the rare gift of vivid exposition.

Autumn Romance

Yet time and chance had a part in Dunn's success too. Time and curious time relationships, as a matter of fact, have played a strange role in his life. A confirmed bachelor at forty, Dunn found himself dropping by with increasing frequency at the home of the lovely, spirited Mrs. Julia Gardiner Gayley. He and everyone else first thought that her three beautiful daughters were the reasons for his visits. A long time passed before it dawned on him that it was the mother with whom he was falling in love. The situation could hardly have been more difficult. Mrs. Gayley was older than he. Her sense of the proprieties was a formidable obstacle. It took ten years of persistence to overcome it. Dunn himself was fifty when they married, and she lived only seventeen years longer. Still he believes himself blessed beyond all other men because he could share her last years.

Even now, he regards her daughters and granddaughters as his, portraits of her hang everywhere in his home, and her name recurs constantly in his conversation.

But if, when he thinks of her, like the hero of Berkeley Square, he grieves that he was born too late, the engineer in him must grant that he appeared on the scene at the most propitious of all possible moments. When Dunn was six years old the nation was celebrating its centennial at Philadelphia.

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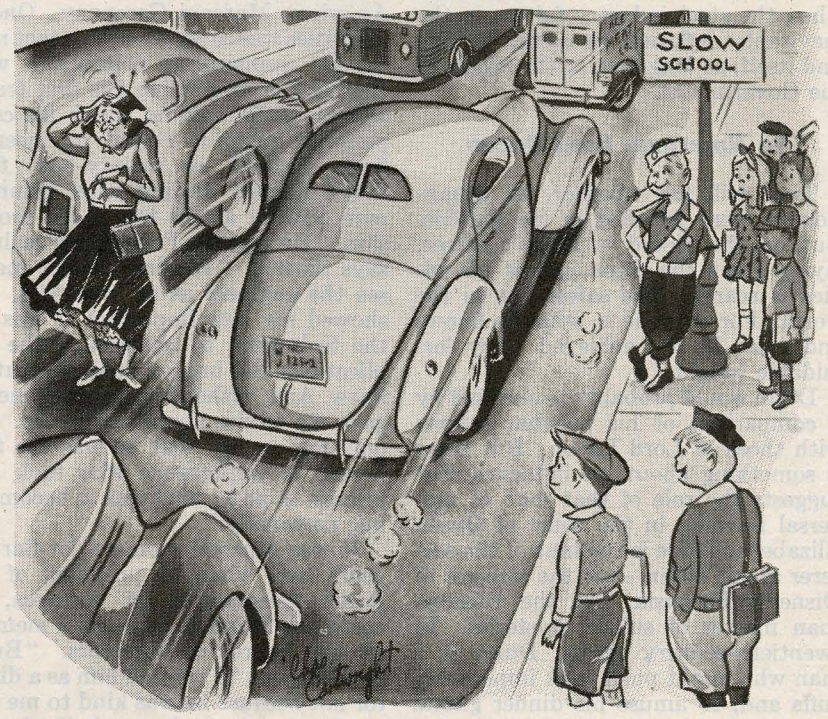

"He loves to escort the teachers to the middle of the street, and then leave them stranded!"

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There at the exposition, wholly overshadowed by the gigantic Corliss steam engine, were two little things which suggested that some tired workman had disposed of a few bits of wire by winding them on pieces of iron. They were dynamos. In that same year, in a barn in Wickliffe, near Cleveland, a young man named Charles F. Brush was working on a primitive electric dynamo that would create illumination through the agency of arc lamps. When Dunn was nine, Edison first produced light in a sealed glass bulb. By the time Dunn was entering New York's City College, William Stanley's historic local lighting system was operating in Great Barrington, Massachusetts, and queer horseless streetcars were soon to lurch uncertainly in city streets.

Those were the days when it was possible for a seventeen-year-old, working his way through college as a night telegrapher, to visit the shrine of Edison and talk with the wizard, man to man. Dunn told the story a half century later when he was awarded the Edison Medal. "Out of an almost infinite kindness for young men who were struggling, Mr. Edison received me in the midst of some laboratory work he was doing in the coating of laminated armature plates," he said. "Seeming to be interested in the questions I asked him, he drew me out in turn, and spent an hour personally showing me over his lamp works. . . . I still cherish two of the first one-candle-power lamps that were ever made, which Mr. Edison picked from a box and handed me as a present. . . . At the end of the visit, he offered me a job."

But Dunn decided to forgo the job and finish college. Edison afterward said that Dunn had decided well. Despite his early prejudice against book learning in students of electricity, he watched Dunn's career with the keenest interest. Twice the maestro visited the young engineer in his own laboratory to observe his experiments. In 1910 Edison himself took the lead in nominating Dunn for the presidency of the American Institute of Electrical Engineers.

A Columbia Pioneer

Dunn's studies at City College continued, sustained by his job with Western Union. Every night trick he sat behind a brass railing in the Murray Hill Hotel sending and receiving telegrams. And in those days that meant sitting close to the center of things. The famous and great of the Brownstone Decades passed through that lobby. Mark Twain, when he lived there, used to send and receive innumerable messages. One evening, in making change for him, Dunn inadvertently pushed a penny off the plate and nervously replaced it with another from the till. The great humorist gravely pocketed the change and then, picking up the dropped penny from the floor, pocketed that too. "Thank you, sir, thank you," said he as he turned away, leaving behind him a boy baffled until the tomfoolery registered.

Dunn got his engineering degree from Columbia in 1891, after completing the first electrical-engineering course given by an American university. In fact, because his name was first in the alphabetical class roster, he happens to have been the first electrical engineer graduated by an American university. Two great pioneers, Francis Crocker and Michael Pupin, conceived Columbia's course in electrical engineering. Pupin was later to testify that Dunn was the most versatile and gifted of all his students. Crocker thought so well of him that he took him on as engineer in his Crocker-Wheeler Electrical Manufacturing Company.

When Dunn emerged from Columbia, the era of development and promotion had begun in the electrical industry. The job before him was to perfect the crude tools at hand. Almost without effort, it seemed, a stream of inventions flowed from his inquisitive brain. There was a process making it possible to wind strip copper edgewise simply and economically, which revolutionized the winding of generators and which is now used all over the world. There was the first noiseless machine for ringing telephones; the first long-distance telephone call from New York to Chicago was rung with one of Dunn's machines. And, finally, there were the designs for steelmaking machinery, some of which is still being used after more than forty years.

Stalking Capital

An electrical engineer was not simply an electrical engineer then; he had to be a raiser of capital too. In the new world that electricity was shaping, the part played by the marriage of capital to invention is easy to underestimate. The inventor sitting alone could not move mountains. He could only dream of moving mountains and draw blueprints for moving them. It took machines to move mountains, it took labor to make and operate the machines and it took management to direct labor. But money was needed to get these things—money in quantities beyond the dreams of all the ages, fast-moving, daring, reckless money. And money to develop the marvelous things born of electricity did not grow on street corners. It had to be got from people who had it or controlled it. Some inventors saw this. All engineeers saw it. For engineers were the middle men between science and utility.

Dunn learned important things in the 90's. He learned, perhaps from his armory of inventive labor-saving ingenuity, how to conserve energy in the process of marrying invention and capital. Reduced to its simplest terms, the problem was how to walk streets and climb stairs with a minimum of effort. The solution was so obvious that it had escaped the notice of his colleagues. Clubs, societies, social functions saved shoe leather. As it happened, they also provided the kind of recreation that he really liked. But primarily they offered the opportunity to melt the stiffness of the banker's face with the magic flow of words; to talk, relaxed, with the usually crusty and suspicious inventor; to introduce, in an atmosphere of gracious urbanity, these reluctant parties to the promising union of science and venture capital.

Dunn's mastery of that job was almost immediately recognized. Any fair inventory of his gifts must include the fact that he is handsome, tall, with the controlled movements of a gentle man who is conscious of his powerful physique. Very early in the game he realized the importance of dressing well. The Lord Chesterfield in him first emerged in 1895, when he was sent to London, briefly, by his firm. Before that, he had had the indifference of most engineers to his own appearance—an attitude in which, sad to relate, he was encouraged by Edison himself. It seems that when he was visiting the Edison works in 1893,

Edison, showing him a new construction shack, flung open the door upon a bathroom complete with tub, and whispered apologetically, "See that thing? My wife made me put it in."

London changed all that so far as Dunn was concerned. He began to see that while, in the realm of theory, the apparel did not proclaim the man, it certainly did get him into a lot of nice places. No more thereafter were black ties bought in dozen lots and suits acquired only when old suits wore out. Dunn became a model of fastidious elegance. And yet, characteristically, it was the engineer and not the Chesterfield in Dunn that chose the valet who has been serving him for thirty years. The valet, Mr. Hedquist to you, is an ex-armature winder. He spends much of his day in the tiny machine shop next to Dunn's bedroom, tinkering with motors, radios, clocks and Dunn's remarkable collection of microscopes.

Ultimately, long after social life had ceased to be even a partial means to an end, Dunn and his wife were to give intimate dinners that would be the talk of New York—dinners at which Albert Einstein played his violin, accompanied by virtuosi Harold Bauer and Ernest Schelling, and physicist Robert Millikan argued with astronomer George Ellery Hale over the merits of a play. But in the 90's and 1900's, Dunn's subtle social sense was put to more practical use. He had the capacity to pick from the conflict of personalities the most minute particles of agreement. Temper and pique were luxuries that the engineer, whose function was to articulate the elixir of capitalism with the genius of invention, could not afford.

Only once did he discard the velvet glove. Thirty years ago, when Dunn was president of the American Institute of Electrical Engineers, he invited Samuel Insull to read a paper before one of its meetings. Insull was at the height of his power, a power which has perhaps never been wielded so completely by one man in a great industry. Even Rockefeller had partners. Insull had only employees. Engineers, executives, bankers and public officials quailed before his arrogance. When Insull had finished reading his address to the institute, Dunn, in conformity with custom, asked for questions from the audience. Dr. Cary T. Hutchinson, a well-known engineer, rose and observed coolly that what Mr. Insull had said was remarkable if his figures on the cost of power production were correct. Would the speaker, Hutchinson continued, favor him with a description of the method by which those figures were arrived at?

Drama in One Act

Insull was not a man to be questioned. While Hutchinson was still speaking, he shouted irrelevantly, "That's not true! It's false!"

In the pandemonium that followed, Dunn, in an aside on the stage, asked Insull to withdraw the remark, since it was neither responsive nor parliamentary.

"I'll be damned if I will," Insull snapped.

For a fraction of a second Dunn considered the possible consequences of crossing Insull. And then, rising to his full height, he announced to the incredulous audience, "In the name of the American Institute of Electrical Engineers I apologize to Doctor Hutchinson for the rude conduct of Samuel Insull. The meeting is adjourned."

Adolph Lewisohn was one of the men who put capital into the Crocker-Wheeler Electrical Manufacturing Company in the early 1900's. Because of a sense of obligation to men like Lewisohn, who had invested their money with a confidence born of knowing him, Dunn turned down all outside offers for many years, including three from General Electric. His quiet refusals were so quixotic that Lewisohn was moved to reward them materially in 1911, when Dunn, after discharging his "obligation" many times over, eventually decided to resign. Lewisohn offered Dunn the presidency of the Crocker-Wheeler Company.

But Dunn had by this time determined on a quite different course. The problems of a manufacturing engineer no longer interested him. Above all, now that he felt free to choose what he would do, he wanted to keep his independence, to pick his own jobs, to work on projects of many kinds.

A Persian Comedy

In making that decision and staying by it, Dunn has become the member of a tribe now approaching extinction—the independent engineer. Over the years, as head of the J. G. White Engineering Corporation, he has seen scores of other big engineering firms disappear, their personnel swallowed up, more often than not, by the engineering departments of the utilities. Dunn's firm has kept its identity through wars, depressions, New Deals and utility-holding-company waxings and wanings. It has emerged, out of it all, as the best-known American engineering firm carrying out construction in foreign countries. But of their numberless foreign jobs, Dunn and his associates like best to recall the two that gave them both the most trouble and the most fun—working on the railroad for the Shah of Persia and preparing to dam the Blue Nile at Lake Tana for Emperor Haile Selassie of Ethiopia.

In the late 20's, Dunn's firm was employed by the Shah of Persia, together with others of an engineering syndicate, to construct the southern section of the Persian railroad. Months before the line was to have been finished, the shah suddenly took it into his head to inaugurate it. To begin with, the rolling stock of the railroad had not yet arrived, and so the royal train consisted only of a few sorry flatcars and boxcars drawn by a small construction engine. The engine itself, being equipped with a Richardson pop valve, occasionally let out steam with an ear-splitting blast. The shah and his retinue appeared and prepared to cut the usual ribbons before boarding the train. Just as the shah poised his shears, the valve on the engine popped. The shah and his company were thrown into an uproar, mistaking the terrifying pop of the valve for an assassin's gun.

From that moment, one disaster succeeded another. The valve persisted in popping until the shah, enraged, charged that the Americans were deliberately tormenting him. To stop it, the engineer drew the fire. Whereupon the engine refused to move the train. When a compromise had been worked out with the engine, the train moved on. But then a small triumphal arch was struck by a projection from the train and wobbled. One of the shah's dignitaries, the governor of Ahwaz, arrayed in a brilliant uniform, tripped as he was bowing himself backward on a dock and fell off into the mud. A crew of the shah's own men, who, at the shah's insistence, had been placed in

charge of a launch used at the sea end of the railroad, forgot to cast off one of the lines that held the launch to the dock; the boat started and, while the engineers looked on in an agony of suppressed laughter, it stopped with a jerk that hurled the shah and his retinue flat on their faces. At the end of that mad journey, the American syndicate was told to leave the country.

The Blue Nile job was another cup of tea. For more than twenty years the British government had been trying to persuade the Ethiopian emperor to permit the damming of Lake Tana, whose waters they needed to develop some 3,000,000 acres of the Anglo-Egyptian Sudan. Haile Selassie just as persistently refused, apparently fearing that British engineers would be more tender of Anglo-Egyptian interests than they would of his. One day, wholly unexpectedly, his emissary appeared at Dunn's New York office. He wished, he said, to discuss the vast project. When he left the country he left behind him an appointment giving the job of surveying and other preliminary work to Dunn's firm.

At once the British Foreign Office and the British newspapers began to howl for Dunn's head. They all but implied that it was an affront to the British Empire for an American company to get the agreement that their twenty-odd years of statesmanship had failed to clinch.

Within a few days these complaints grew loud enough to be heard across the Atlantic. Suddenly it occurred to Dunn that the emperor's emissary had tossed in his lap the job of being a diplomat as well as an engineer, for without British co-operation it was hopeless to proceed.

A diplomat Dunn therefore became. He went to the British ambassador and explained that he had never contemplated proceeding with the job unless the British approved. In fact, he had made a stipulation to that effect in the agreement with the emperor's representative. He visited London and spent weeks conferring with government officials. And by the time the British had decided that he was a gentleman and a scholar, preparations for the Ethiopian expedition had been completed. Two great expeditions went and came back from the wild Lake Tana region while Dunn kept officialdom purring. So far did Dunn's diplomacy succeed that only the outbreak of the Italo-Ethiopian War prevented actual construction at Lake Tana by Dunn's firm.

Stemming the New Dealers' expansionist ideas makes the problem of damming Lake Tana look like child's play. This, in 1941, brought to a critical test even Dunn's practiced hand as a diplomat. Dunn's initial Washington triumph was remarkable. It consisted in bringing out, with the enthusiastic acclaim of the President, a picture of the steel situation that was anathema to the New Deal economists.

That decisive victory, as we have seen, was followed by what looked like a defeat. But time works its own judgments, and time alone will write the end of the story. If, as Dunn fears, a program of steel expansion great enough for both "guns and butter" ultimately causes a profound change in our economic system, it will be well for all of us to remember that a great engineer raised a minatory finger when there was still time—an engineer whose life has been devoted to the task of bringing people the largest measure of the good things of life with the least effort and the smallest possible cost.

For Dunn's definition of an engineer is a product of his personal philosophy. Engineering he defined long ago as "the art of the economic application of science to the purposes of man." Stressing the importance of the word "economic" in this definition, he discarded soft speech on one occasion. "A real engineer," he said, "is a man who can do for one dollar what any fool can do for two." If any man ever lived his philosophy, that man is Dunn. It is not without significance that he was the inventor, forty years ago, of a noiseless charging machine for the battery of telephone transmitters. Think of Dunn when you make your next telephone call. He stands for less noise and more clarity.

BIMINI HAUL

(Continued from Page 19)

came back, grindingly. She slowed and stopped.

Crunch, with an expression of terrible alarm, vaulted up to the top controls again. Des stood petrified.

In his eagerness to watch the struggles of the amber jack, Percy had forgotten that he was steering. And the Poseidon had run up on the reef. She stuck fast, rising and falling on the gentle swell and gritting horridly against the lava-sharp coral.

Crunch looked overboard on all sides. "Everybody in the stern," he said.

Mr. Gale, only dimly aware of the disaster, muttered, "This fish is getting under the boat, Des."

And Crunch, who had forgotten the amber jack, called, "Cut it off!"

The fish knife flashed. Des, Patricia and Percy gathered around Mr. Gale in the stern. Crunch put both engines in reverse and notched them up, faster and faster. The Poseidon lifted, slid grittily, banged down, lifted again, and pulled slowly back into deep water. Crunch listened. No gurgle of the sea coming in through a hole. Des, white-faced, lifted the engine hatch and stared at the bilge. It wasn't rising. "She's still dry," he called.

Crunch was shaking. If the Poseidon had been going faster, or if it had been rough, she might have stuck, and pounded and been lost. Not the people aboard her—dry land was only a few yards away—but the boat. His boat. Desperate's boat. Their pride and their livelihood. He was so relieved that she was not making water that he sat down, feeling deathly sick. Des brought him a cigarette. He took two or three deep drags and only then thought of Mr. Gale.

They had cut off Mr. Gale's fish to prevent further complications of the brief menace. Now—or about now—he would be going into one of his rages. Crunch peered cautiously over the canopy. Mr. Gale was placidly offering a cigarette of his own to the handsome Patricia.

He was saying, "Oh, yes. Under the circumstances, they had to chop it off. Nothing really. We'll have another on in a jiffy."

Love, Crunch thought, was an extraordinary thing. But he had a feeling, a brittle presentiment, that the