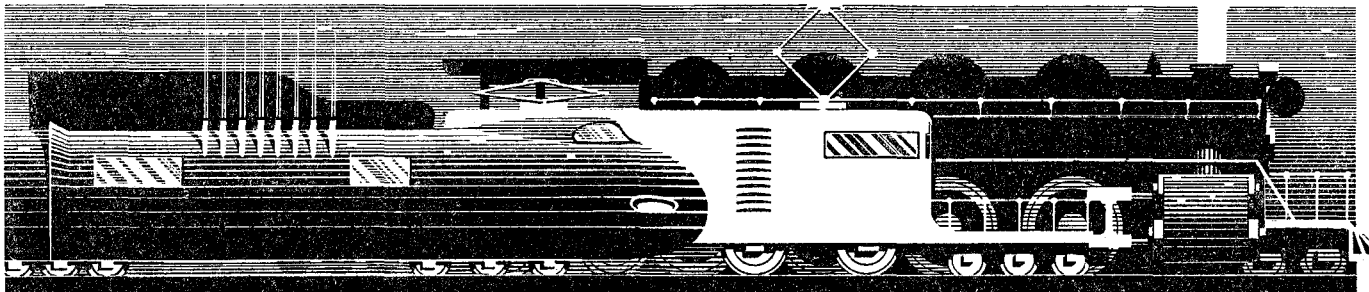


# Steam Fights Back

by Donald Wilhelm



*What does the final arrival of the Diesel-powered streamlined train mean to the steam train? Not the demise of the old iron horse, according to Mr. Wilhelm, writer and authority on industrial subjects, who predicts the coming of a titanic struggle on rails, a rebirth for railroading.*

**I**N THE HOMES of the nation's commuters, in family conferences on travel plans—be they for the nominal head of the family alone or for the whole family—in power plant laboratories, in not unduly crowded board rooms, they are talking today. Who? Everyone. About the dawn of a new era of speed on rails. In roundhouses, in coal offices, in signal towers, in dispatchers' shacks, in boiler factories, they are talking about the dawn of a new era of speed. But the two groups are not talking about the same thing. The former speaks with the light of a great vision in the eye, the glint of the dreamer who sees fairy-light, articulated metal, energized by Diesel-produced electricity, annihilating distance in long silver streaks. The average age of the latter group of talkers is considerably greater than that of the first, they are a little grayer about the temples, a trifle more realistic, and they speak from experience, perhaps with some sentimental memories of "Old 99" and with a vague recollection that something like this present threat of the Diesel-streamlined "10001" and her silver-colored sisters occurred once before.

Although they themselves, and rightly, inspired it, there is not the unanimity of unreasoned enthusiasm for the new train, an enthusiasm on the part of the layman which permits of belief that we will wake tomorrow and see everywhere, and only, on steel rails the new high-speed streamlined train. It can't be as simple as that. The realists of railroading know better. They know that progress is often represented by two steps forward and one step back. Old "10001" (we'll be calling it "old" affectionately very shortly) and the "Zephyr" have demonstrated long, rushful strides forward. Pending the inevitable recession to consolidate the victories of progress, to conform the new instrument to work-day practices of scheduled transportation, steam is preparing to fight back. The now discernible evidence is that it will be a grand and spectacular fight, regardless of the ultimate outcome. And also regardless of that outcome, it may well prove to be one of the epics of railroading in America. One thing: the achievement of new, regular-run speeds (a general stepping up of running time) will be an inevitable result. A day of extensive re-equipment has arrived for laggard American railroads. We'll ride better tomorrow.

The achievement of the light metal, Diesel-powered, streamlined train does not represent the first time that the Sword of Damocles has swung over the head of the old Iron Horse. For example, what did N. W. Storer, Chief Engineer of the Railway Division of the Engineering Department of the Westinghouse Electric Company, so conclusively tell the members of the New York Railroad Club at their meeting of September 20, 1907? Just this, with not a dissenting voice:

"We do not need to say much in defense of the electric locomotive. It does not need any defense. My only fear is that we are going to be compelled to build electric locomotives faster than we can get facilities for doing so; that is, when we consider that the 47,000 steam locomotives are to be replaced by electrics in this country, and to be replaced in such a short space of time that many good locomotives will have to be sent to the scrap heap!"

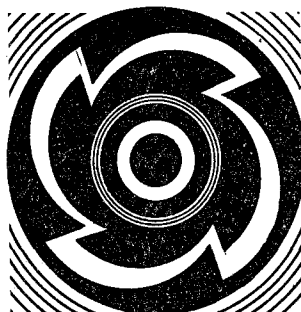
With a snort the old Iron Horse met this challenge with a will: Since 1907 nearly 60,000 new steam locomotives

have been built in America for use in America. There are 10,000 more in use and storage today than in 1907. The electrified route miles in the United States at this date constitute less than one per cent of our total quarter-million of railroad route miles, and, in the main, because of the large initial investment required, they are not likely to be generally increased. The Dieselized unit, like the steam-unit, advantageous as a rule in that it is self-contained, is a further discouragement to electrification, regardless of the fact that in some areas, for example in tunnel operation and in congested areas where large track capacity is expedient and in some metropolitan areas where steam is prohibited, electrified transport is desirable. Undoubtedly it has bearing on the fact that in 1932 49 per cent of America's railroad passenger revenue was paid for riding on only 10 per cent of our railroad mileage, that represented by the Pennsylvania, New York Central and New Haven systems, all of which are in a measure electrified.

The issue here—the real battle of the century in transportation—is *not* between the electrified rail unit and the steam-unit. That fight seems to be over, despite the fact that the fifty-seven new Pennsylvania electric-driven units, recently ordered, represent one of the largest purchases of power equipment ever made by a railroad. They are to be streamlined and though no official pronouncement about their top speed is available it is easy enough to see that electrified speed of two miles a minute is wholly conceivable in units designed to that end. And such a speed, with the advantage of in-town and convenient terminals, may well be our railroads, effective answer to other non-rail forms of transportation. But it is not for these reasons alone that all the roundhouse talk goes on in America today about the renaissance of interest in speed on rails. It springs rather from a traditional respect for steam, and further from a belief that steam has never really been given a chance—that it has been inhibited and restricted unnaturally in that period which should have seen its greatest natural growth. So great is the conviction of some of the older, admittedly more conservative, minds in railroading about this point that there are some interesting activities going on, more or less secretly, in the repair shops for steam locomotives of the nation. A tentative plan of one of the larger eastern railroads is to stage an actual knock-down and drag-out fight between a light steam-powered train and one of the modern light-metal miracles.

Spectacular as such a contest might be, and as great as traditional prejudice of individual railroads may be, what the railroad fraternity really seeks in such a contest is the *answer*: the real truth. The Baltimore & Ohio Railroad, for example, has accepted the loan of one of the modern 3,600 horsepower Diesel trains, and is reported to be building two other similar trains; yet the road's veteran president, Mr. Willard, has been seen frequently in recent months in the road's main shops supervising the rehabilitation of "*Lady Baltimore*." "*Lady Baltimore*" is one of the more elderly dames of the Steam Family. Twenty years old, she has been places and seen things. For some secret test, the complete details of which have not been announced at this writing, she has had installed within her

still august person a new 300-pound-pressure boiler, and been given new 84-inch drive-wheels. Mr. Willard happened in upon this rejuvenating process recently and discovered that the old engine was being prepared for her part in the battle of steam which is ahead, that her face was being lifted with unorthodox streamline gadgets and what-nots. "That doesn't even look like a steam locomotive! Take all that sheathing off!" he ordered.



The public generally is more or less familiar with the sudden rush of orders which have come from the railroads for the new-type Diesel streamlined train.

In addition to the "*M-10001*," the Union Pacific has on the way into service three additional trains, likewise new in kind and powered with Winton Diesels, one of six cars with a 900 horsepower motive unit, the others of nine cars with 1,200 horsepower units, the cars of which are being built by Pullman, at Chicago.

The Burlington has two more 3-car articulated trains, like the "*Zephyr*," the first of its kind in regular service, where it has not been able to carry all the passengers it attracts, for service between Chicago, Milwaukee and St. Paul. These are being assembled by the Budd Manufacturing Company.

The Baltimore & Ohio, as already indicated, in its own shops, is producing two streamlined trains, one of an aluminum-alloy and the other of Cor-Ten, one to be hauled by steam, the other by a Diesel-electric.

The New Haven has under way, in addition to fifty streamlined, modern light cars not articulated, a "*Rail Zeppelin*" train, reported as having three cars and a Diesel-electric power unit at each end, to eliminate turn-arounds, for service between Providence and Boston (44 miles in 44 minutes), through a congested area.

The Boston & Maine has a 3-car train, by Budd and Winton, to travel 115 miles per hour, to be called "*The Flying Yankee*," in addition to ten *de luxe* modern cars being made, like the New Haven's cars, by Pullman-Bradley at Worcester, Mass.

The Illinois Central has a 5-car, 1,200 horse power, \$400,000 train, by Pullman, on the way.

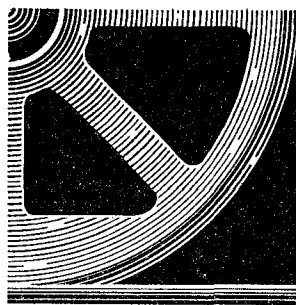
The Sante Fé has one 3,600 horsepower Diesel-electric locomotive on order. The Lackawanna has another.

The Gulf, Mobile & Northern has ordered from the American Car & Foundry Company two light 3-car non-articulated streamlined trains of three cars each and

seven extra non-articulated streamlined coaches, one with a 600 horsepower Diesel-electric power plant.

And to all of this, what is steam's answer? There is an answer, now being prepared, about which the public knows very little.

With some of its fifty beautifully appointed new cars now being completed at the rate of one a day—light by comparison with the old, not radically streamlined and not articulated so that they can be used in any train like other cars—the New Haven has been making some experiments which obviously indicate that the steam locomotive is not to be quickly or lightly abandoned. Without diffi-



culty in these experiments the old Iron Horse has been attaining sustained speeds of 87 miles in areas by no means so propitious for speed as many others.

The Baltimore & Ohio's rejuvenated old steam locomotive, not now streamlined, it is reported will be capable of moving along at more than 90 miles per hour. The New York Central has streamlined another old locomotive, to see what it can do, while its president reaffirms faith in steam. The Santa Fé indicates that when so minded, and willing to clear the way for "*The Chief*," its crack train from Los Angeles to Chicago, it could give the "*M-10001*" a run for its money.

Other roads have manifested willingness or desire to remove some of the many handicaps by tradition imposed on the steam locomotive, such as the excessive weight of Pullman cars of around eighty-five tons each (the "*M-10001*" weighs only 211 tons complete, including power unit and full load), and to give it a chance.

And the Milwaukee has been more explicit in behalf of steam than any other road whose plans are available. Reflecting many a railroad executive's resentment against what some call "stunts" and insisting upon the inherent railroad need of flexibility in power and train capacity, in July, 1934, without any special preparation, with a regular steam locomotive in regular service, this road permitted a regular train to smash all steam records by travelling from Mayfair, Illinois, to Lake Wisconsin, a distance of 69.9 miles, at an average speed of 91.1 miles per hour while at times attaining 103 miles an hour. Then, in October, this alert road did what no other anywhere in America, and possibly in the world, has done. It ordered, from the American Locomotive Company, two new fairly light, scientifically streamlined locomotives to haul two new fairly light but, except for the tail end of the last cars, *not* streamlined trains between Chicago and St. Paul, one each way daily, 411 miles, to be covered, including five stops, in 330 minutes at average cruising speed of 72 miles an hour. In order to do this, no matter the weather, snow, blizzards or other conditions which at times confront railroads, these locomotives, with 300-pound-pressure boilers and four 84-inch drive wheels, are guaranteed to haul their appointed full-size loads at 100 miles an hour.

But while the main issue concerns a tussle between steam and Diesel power, this does not mean that these are the only factors involved. Also interested are some of the largest industrial and labor organizations of the country.

First, our huge electrical industry has an interest in this issue, for the simple reason that mechanical drive for Diesel rail units is not now and may never be practicable. The Diesel unit, in other words, is in a sense an electrical unit. In it a Diesel motor, a motor necessarily heavy because it is fired by compression at high temperature without use of spark plugs, or more than one motor, with a central generator, is used to manufacture electricity on wheels, to energize those wheels, along with the wheels of the train it is hauling.

Also, our fifty-odd Diesel manufacturers have an interest in the issue. Therefore General Motors, whose Diesel subsidiary is Winston, has an interest; working together, General Motors and General Electric, with all their research facilities to be considered, are building many of the Dieselized, or oil-electric, units that are being, or are to be, tried out against the steam unit. A GM-GE unit is that of the Union Pacific's train, the "*M-10001*." The same two corporations are providing the power units of three more Union Pacific Dieselized trains along with the 3600 horsepower unit to be loaned to the Baltimore & Ohio Railroad.

Other manufacturers new to the railroad game or now approaching it in a new way are also interested in the issue. For example, the E. G. Budd Manufacturing Company, which built the "*Zephyr*," is building other trains. On one side, too, is our coal industry; steadily the one-time trend to oil for steam locomotives has trekked back to coal. On the other side is Oil.

Directly interested, too, are giant metallurgical concerns—the Aluminum Corporation of America, with alloys of aluminum and of promising magnesium for sale, and the United States Steel, one of whose alloy steels, Cor-Ten, is used in one of the new streamlined trains built by the B & O; Bethlehem Steel Corporation, which has also built a train, for the Norfolk & Western.

And squarely at the center of the whole vast picture are the Big Three—the American Locomotive Company, Baldwin and Lima. The first two of these are nearly a century old; all three are rooted deep in the traditions of the railroad industry. All have formidable research facilities which have made important contributions that, in the traditions of the railroad industry, have not come to the attention of the public. All make steam locomotives. All are now prepared to make Diesel-electrics. It no doubt will be news to many that American has provided, in addition to the thousands of steam locomotives, along with its share of the 150 Dieselized switching units now in use, hundreds of electric locomotives for the New York Central and New Haven roads, and, to boot, the largest ever made, for the Virginian Railroad.

Now, to make the issue still more exciting, there are 1,700,000 railroad employees, many of whom may be affected by the eventual outcome of the issue. Add all those people and institutions owning twenty billions of railroad securities, including in the picture some millions of

Americans who are depositors in mutual savings banks and allied institutions and the policy holders of our insurance companies, which also own large amounts of railroad securities. Add hundreds of areas, and thousands of concerns, with all their employees, directly interested in the purchases of our railroads, by all odds our largest consumers of materials. Add, finally, all of us who ride on trains.

The issue is simple enough: *Which unit is to win through, Diesel-electric or steam, in main-line railroad passenger hauling?* For it is not, at this date, a question of main-line freight hauling. Main-line freight hauling, the mainstay of our railroads, has by no means suffered so badly





as passenger traffic, which has fallen off more than 70 per cent since the peak year of 1920. Since the post-war return of the roads to their owners, it has been made progressively faster and in all directions vastly more efficient. Although 60 per cent of our steam locomotives are twenty years old or older, nevertheless, those in common use generally provide around 3,500 to 4,000 horsepower and frequently haul at high speed cargoes of 10,000 net tons, the equivalent of the loads of 1,000 10-ton trucks. As yet there is in service no Diesel-electric railroad unit of such power. Some such, multi-motored, are promised. But steam units are available, are by comparison cheap, enduring, and railroads are chary of promises, of innovations not absolutely necessary, so many in the past having failed to stand up under the punishment administered in the laboratory of the road.

Railroad men are eminently practical men, realists decidedly, who, for many understandable reasons of organization and maintenance, are notoriously prone to leave well enough (even bad enough) alone. So here, I think, we may score one for steam, in main-line freight hauling. It must be remembered that freight switching must clearly be distinguished from main-line freight hauling. In switching, single-motor Diesel-electric units of about 600 horsepower, about 150 of which are in use, have conclusive superiorities, at busy terminals, over steam units.

The issue likewise involves, but it does *not* turn on, branch-line passenger traffic. Here, already in use, there are approximately 1,000 Dieselized or gasoline motorized *rail cars*, with more on order, to replace trains, often of only one or two cars, now hauled by steam locomotives that have seen better main-line days.

Numerous railroad experts insist that light steam locomotives designed for light branch-line work can just as efficiently handle light loads (an opinion which your roving reporter, with the memory of an elephant and the curiosity of a magpie, much doubts). If that be the case, then railroads are likely to avoid maintenance facilities for both steam *and Diesels*.

Much emphasis has been placed upon passenger comfort. But other things being equal, with air-conditioning, an essential to scientific streamlining, removing the main passenger objections to steam, it is my belief that passengers do not care one whoop whether a Dieselized or a steam unit hauls them, if only they get there (*where* is another matter), as comfortably and as fast as they want to go.

And, though here I beseech my reader not to hurry through the ceiling at once, it is *not*, in the long view, a question of speed. The simple fact is that with few exceptions our railroads have not gone in for speed. In other words, they have not attempted, with all too few exceptions have not even approached, and certainly have not exhausted, the speed possibilities of steam. That is why the new light streamlined, Dieselized trains, the Union Pacific's "*M-10001*" and the Burlington's "*Zephyr*," in coming over the railroad and public horizon like revelations, beautifully dramatized in accordance with the best traditions of our automobile industry, not only made more history and excited more public interest in a jiffy than our

railroad industry had aroused in a generation, but also performed an infinitely precious service in waking up the old Rip Van Winkle himself, that is, our railroad industry.

Now suppose we list twenty-five of our best steam passenger trains, the "*Twentieth Century*," "*Broadway Limited*" and the rest of them. Then we figure out and set down their schedules. Next we check back twenty years and set down, wherever possible, comparative findings. Then we can see beyond doubt that, with only a half dozen or so exceptions, the schedules of our crack trains have not been improved in twenty years! Further, you will find that, with the exception of a half dozen or so trains, even our crack trains maintain average speeds between end-points of their runs of only between thirty and forty miles an hour!

Possibly our forefathers were content—felt that they were getting their money's worth—while travelling as the porpoise nowadays seems to travel. It was then an event to travel at all; you liked prolonging the event! Today, given certain emergencies, I could, I have often felt, for short distances, beat some of our crack trains on my hands and knees, no matter how gray my beard! Certainly I could beat them with the 15-year-old Cadillac I sold for ten dollars the other day. And many a fellow does beat them in his car. Moreover, the airplane, now carrying passengers at a fifth of the speed of the sun round the Equator, is always in our minds for comparative purposes. Further, the airplane and the automobile long since energized redefinition of the convenient measurement, "*miles per hour*." In other words, they have so vastly improved passenger comfort, well aware as their designers have been that human rather than power limitations had to be overcome, that the expression, "*miles per hour*," has come, by implication and in reality, to mean infinitely greater travel comfort than of old, at much greater speed than of old.

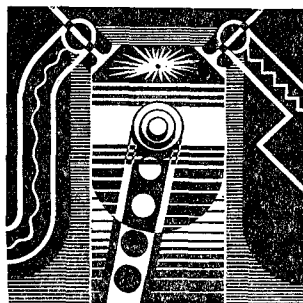
And the railroads? There has been no increase in speed and there has been no "general" improvement in increasing the attractiveness of railroad traffic in years and years.

Safety, which means weight as well as fewer claims for compensation, has been the thing the roads in general have tried to sell. In 1932 they lost just one paying passenger, yet, for many reasons, while annually the projectile called the automobile went on killing almost as many people as we lost in battle during the 18 months we fought the World War and injuring a million, automobiles swiftly grew in popularity. There has been no general improvement in cutting down delays at railroad stations, little if any in expediting the handling of express and

baggage, even of passengers. In short, there is overwhelming evidence that our railroads have not gone in for speed.

And, by the same token reinforced by the records, they certainly have not exhausted, indeed have hardly approached, the speed possibilities of steam. Suddenly, against this doing-nothing background, the Diesel-electric unit appears, hauling a train wholly new in kind.

The forerunner of this new train appeared first in Germany, the "*Flying Hamburger*," in 1932, to cover the 179 miles between Berlin and Hamburg in 140 minutes, on a run, by the way, where repeatedly, when repairs were needed, steam trains of conventional design and weight have



replaced it and as a rule come in on time. Then it appeared in the United States, notably in the Union Pacific's "M-10001" and the Burlington's "Zephyr," the first to create a complete sensation by its non-stop run from Denver to Chicago, 1,015 miles in 785 minutes, at an average speed of 77.5 miles per hour, with the "M-10001" biding its time and then crossing the continent, from Los Angeles to New York City, in 56 hours and 55 minutes, in an hour less time than the Sante Fé "Chief," the fastest of steam trains operating between Los Angeles and Chicago, covers that distance. These two trains, as everyone was well advised, in short order broke almost all existing speed records on rails. The "M-10001" maintained an 84-mile-an-hour average for 508 miles between Cheyenne and Omaha and, between Kimball and Potter, Nebraska, shortly before midnight on the evening of Tuesday, October 23, 1934, covered eighteen miles at 109 m.p.h. and two miles at 120 m.p.h.

These events at once crystallized the issue, at once led most Americans to assume that the old iron horse was doomed, that the Diesel-electric would replace it in main-line passenger hauling as well as in switching and branch-line work. But *is* the issue settled?

If, in the light of many conversations, I can reflect the general views of our railroad executives on the central issue: Steam vs. Diesel-electric in main-line passenger hauling, then these conclusions may no doubt be set down:

All but one or two heartily agree that if the "M-10001" and the "Zephyr" disappeared over the horizon tomorrow, like ghost trains, they would, nevertheless, deserve immortality for having focussed public attention on the railroads like nothing else in a generation; made their executives aware of lost opportunities and of what the public wants, and energized what now promises to be the greatest era of railroad replacements and record-making in history.

Next, however, it must be kept in mind that these history-making train records were achieved under conditions extraordinary. Railroad men appear to be familiar with these conditions but appear to hang together, lest they hang singly, in refusing to promulgate them in public. They know and in candid moments point out, for example, that the "Zephyr" made her run from Denver to Chicago down-grade, Denver being a mile above sea-level and, I have repeatedly been told, attained her top speed at the end of a 14-mile grade where track and other conditions were ideal. Further, she made no stops. In routine practice, it is hardly conceivable that when hauling only 125 passengers at most (a New York City commuting train often hauls 1,000), in competition with passenger airplanes, say, a train could profitably make no stops. Further, with due regard for safety, the track was cleared before her, long ahead. Likewise, with due regard for safety as well as speed, the "M-10001" made

her transcontinental run under special conditions and, I am told, at times, at around 75 m.p.h., swayed so precariously that work on her two sister-trains of nine instead of five cars was stopped in order to permit extensive redesigning.

Nevertheless, with an eye to recouping their passenger losses, a goodly number of railroads have acquired or have on order, in nearly all instances with funds borrowed from the government, Dieselized power units, complete trains, or cars exemplified by the "M-10001" and the "Zephyr." And all alert railroads, it may be assumed, are seriously contemplating the part they are to play, by use of electricity, steam, or Diesels and appropriate equipment, in the new era of railroad transportation that is at hand.



Now, while steam squares around slowly, because large bodies (including railroads) move slowly, to meet the issue of the day and the challenge of the Diesel-electric, perhaps we may safely summarize with these observations and conclusions:

*First.* Our steam locomotives in storage and use (in many instances interchangeably for freight and passenger duty), are in more than the majority twenty years old or older. During these twenty years far more progress has been made in steam combustion generally, and notably in steam locomotive design, than had been made during all the years before. But, because only 477 new locomotives were built in 1932 and 521 in 1933, the replacements warranted by operating economies will keep all of our locomotive plants working full time for many years to come.

*Second.* Now that the jinx of excessive weight in passenger locomotives and cars has been broken, so that the 1,200-ton total weight of a 14-car Twentieth Century may be halved, say, there is simply no saying, certainly no precedent for saying, what the new iron horse explicitly and for the first time explicitly designed for speed, may do.

*Third.* Air-conditioning, an essential to scientific streamlining, and the revolutionary revision now current in car comforts and conveniences, even to dehydrated and non-frosting windows and indirect lighting of course, are quite as practicable in steam-hauled as Diesel-electric trains. Who cares, all things being as nearly equal as they can be made to be, whether it's a rejuvenated iron horse that sweeps us along, or an oil-electric?

*Fourth.* We are going to have in all respects a better, faster railroad ride than ever before, quite possibly a cheaper ride, possibly one so much better, faster and cheaper that we shall in much larger numbers in the future elect to go by rail rather than by car or bus. And we may thank science, and in a large measure the "M-10001" and the "Zephyr," for it.

*Fifth.* Without the least question, our railroads are entering upon the greatest era of replacements in all their long history, which ought to be heartening in terms of national recovery.

# The Youth Ticket

by Cedric Fowler

ACCORDING to Mr. Hoover's *Recent Social Trends* report, one person of every forty-four in the United States has had college training. The figure gives us something like three million men and women who have received the benefits of the higher education—or, to put it still more mathematically, 2.2 per cent of our total population. The survey was undertaken in 1930, but it is very likely not materially altered now in 1934, since those graduating this year have entered college four years before. Many of them, it is true, have had to drop out of college before graduation. While no accurate census has been carried out since, reliable estimates indicate that this number is more than equalled by normal registration. The fate of this great mass of educated persons in the Depression, particularly the younger portion of it, was brought sharply to mind by a pre-Christmas incident.

The writer was doing his Christmas shopping. The store was hot and the crowds were steaming. It was late and there wasn't much good nature left in the masses of shoppers. They were shoving each other and grabbing desperately for gifts, only wanting to get it over with and get home. The store employes were tiredly showing endless stocks of things to customers, looking at the clock and wondering why it never seemed to be more than six. They were on extra shifts. Many of the customers were snapping at them, and some of the salespeople, against all rules, were snapping back.

●

In the midst of exasperated humanity the writer saw a friend. He had not seen him for a long time, in fact not since they had been in the same department of the university, two years before. It was a little hard to recognize him, dressed as he was in a plum colored uniform with military cap and white gloves. He was running an elevator in the store. Squeezed by a score of people, the

writer went up to the tenth floor, where the crowd thinned out a little. The friend said, "Wait a minute. I'd like to see you after this is over. Can you wait till after we close at seven? I will be off an hour after that."

At eight o'clock the friend came out of the employes' entrance in his civilian clothes. He wanted to go somewhere and get a glass of beer. He wanted to tell the writer something; he wanted to talk. This is what he said, with the interruptions and digressions left out of it:

"I've been doing this now for eighteen months. It's the only thing I could get—after I got my M.A. Sure, I tried everything else. No experience, and I had a hard time getting this without it. I was four years at college and two in graduate work and I had a hard time getting this.

"They say, 'You're lucky to have a job.' What does it mean? It means you're lucky to eat. That's the kind of a world this is—a world where you're lucky if you eat. After you've been through college and

done several years of graduate work you're lucky if you can earn fifteen dollars a week as a stenographer or sell books in a department store or run an elevator.

"Of course, you really are lucky. After all you're not one of the sixteen or seventeen million unemployed. But that doesn't make life a bed of roses for you, or contribute very much to the well being of society either. You've had a long expensive training. You've fitted yourself to work in a special field. You might even make a real contribution to knowledge, if you had a chance. But you haven't.

"There's a tremendous social waste. Think of the thousands of trained young people who are being wasted. Young people who are doctors, lawyers, engineers, as well as every kind of Ph.D. People who could really be of some use to the community spending their time, instead running elevators, driving taxis, selling anything and everything in order to eat.

"But that's only the beginning. What happens to these

