

The Economic Club of New York

Charles F. Kettering

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Mr. Sloan, Distinguished Guests: Ladies and Gentlemen: Mr. Sloan can say all those nice things because I am not on his payroll any more (Laughter) I don't suppose an inventor ever got into such a high class group as this is tonight, because I come to you as an inventor.

Now, the difference between invention and economics is quite simple. Economics looks after the going concerns and inventors look after the coming concerns. (Laughter and Applause)

Now, the difference in approach between inventions and the development of ideas and actual operations is quite considerable, and I would like to just give you quickly the different steps that are involved in this. All business is run on a fiscal basis. You have reports at the end of the year, the end of the quarter, and so forth. Ideas don't come on any fiscal basis at all. They don't come by the year. Nobody can pick out the guy that is going to have them, either. (Laughter)

So that everything you have that applies to operations doesn't apply to engineering.

When Mr. Sloan asked me to take over the job, which I retired from last year, I told him I would take it on three very definite considerations: First, that I would never have any responsibility, I would never have any authority, and nobody would ever question what I spent the money for. But, they can fire me without notice at any time they want to.

The old adage that “necessity is the mother of invention” only holds for smaller inventions, it doesn’t hold for big ones at all, because it was not necessity that made Morse invent that telegraphy, or Bell the telephone, or Edison the electric light, or Wright the airplane, or what have you. There is something else in there that is very, very much more important, and that is, it was either plain curiosity or because the fellow thought he could do it when nobody else could.

So far as an inventor every doing a thing because he thought he was going to make some money out of it, that’s out. As a rule, inventors never make any money, unless they get hitched up to a fellow like Mr. Sloan, or something like that.

So, this question of how ideas get started is very, very difficult to explain. I think it was the Brookings Institution that made the study and said that the more education a man had the less likely he was to make an invention. Well, I don’t know whether it was so or not. I am always interested to investigate if it is so why. And I came to this conclusion: It didn’t have anything to do with education. From the time the kid starts school until he graduates from college, he is examined two or three times a year, and if he fails it is terrible; he is out. An inventor, he fails 999 times, and if he succeeds once, he is in. That’s the big difference.

We have emphasized failure in our educational system to such an extent that people don’t want to take any chances, not only in capital investment but in necks sticking out.

Now, so far as opportunity in invention is concerned, that's limitless. We don't know very much about anything. When Mr. Ford moved the Wright Brothers laboratory over to Greenfield Village he asked me if I would preside as toastmaster at the dinner which was broadcast. I said I would be glad to. He said, "What are you going to talk about? What point are you going to make?"

"That no intelligence test in the world can depict he or Orville Wright out." (Laughter) If they had gone up against these tests, they would have gone out just like that (snapping fingers.)

To show you how thoroughly convinced people were that at least the Wright brothers were working on the wrong track, when they flew down in Kitty Hawk on the 17th of December some 47 or 48 years ago, of course they wired back home. They wired back to their sister. They said they had a very satisfactory day; we made five flights with the power, and we are very happy that we are going to be home for Christmas.

So, when she got that, she naturally thought that was a great scoop, so she ran up the newspaper in Dayton—and the fellow who took this message is still out there and tells this story. They were playing pinochle, so the bell rang and rang. Finally he took off the receiver and he said, "Yes." And she said, "This is Catherine Wright." In a very excited breath she read this telegram. He said, "That is fine. I am glad to know the boys are going to get home for Christmas." (Laughter)

There wasn't much necessity back of that. If you had gone out and said you could fly across the ocean some day, they would put you in the hoosegow right now. That was when they tried to sell telephone stock right here in New York—and that's something. Because the Lord never intended you to talk over a wire. Well, I don't know about that, it worked out pretty good.

It was out of those things that I made a little wager with a friend of mine that I would be at ten to one odds that the conclusion of studied opinions of the experts would be wrong on any new thing. (Laughter) An inventor and a researcher are amateurs. That's all the word "reason" means is amateur, because what an amateur is doing he is doing for the first time. So, you can be amateur in gold, and you know what your score is right away when you are trying it for the first time. Our scoring is about as good as that.

So, the original model of any new thing is the work of a bunch of amateurs. Maybe some of you people have bought some of them; I don't know. Out of that, then, there comes this intense thing we all call technology, of trying to make that thing better and better, and as Mr. Price said, get the price-down.

I don't know anything about operations in business. However, I learned two things. First, if you have an article that a customer wants, and you sell it for more than it costs, you to make it, you don't have much trouble with the bankers. (Laughter)

And the next thing. If it is worth a lot more to the customer than he pays for it, your business will grow.

Mr. Price mentioned one thing, this double taxation thing. That is going to be very hard to lick in view of the counter thing that is going on continuously, and that is the financial page of any metropolitan newspaper. You never put anything in there, only profits. Those are the little bits of teeny-weeny profits that the manufacturer makes. You never say anything about the profits that the customer makes, and those are the profits that make this country go. How do you find out what the customer's profit is? Well, how much more would you pay for an electric light if you couldn't get another one? How much more would you pay for your telephone than you do now? How much more is it worth to you than you are paying for it now? That is your customer's profit. That's the reason why this great management city of New York is here.

A friend of mine, who had never been in this country before, was looking out the window of one of the downtown buildings, and he said, "Who pays for all this?"

"Well," I said, "We people out West wonder like that once in a while ourselves."

He said, "These people don't produce anything," He said, "They are all sitting at desks writing on a piece of paper."

But, that's the management end of it that makes possible for the customer to have such a big profit, see.

You have heard the old story during the war about the fellow that came around inspecting the shipyard, and he said to the fellow, "You are behind in your job."

He said, "No, I am not."

He said, "You are."

He said, "No, I am not." He said, "I weighed the papers today and I weighed the ship, and they both weight the same thing." (Laughter)

That's just to give you a slight idea of the managerial problem.

But this question of keeping things organized. Now, what is this great technological thing that we have in America that apparently nobody else has? It is quite simple. It is our ability to make pieces alike, to duplicate parts. That's why we made this great showing in the war. Take as a simple illustration the machine gun. It was brought to one of our divisions. They knew nothing about guns. I happened to, by accident, be in that office that day. I said, "Colonel, will that gun shoot satisfactorily?"

He said, “Yes. If you want to see it fired, we will take it out and do it right now.”

I said, “Have you got drawings for it?”

He said, “Yes.”

I said, “Well, boys, you don’t need to know anything more. All you need to do it take it apart and make pieces exactly like those and you can't put it together and have it be anything but a machine gun. If the parts are exactly duplicated, they will be just as good a machine gun as this sample.”

Now, that’s an old thing that we haven’t recognized. That’s all the printing industry is, that is where the great development of interchangeability of reproduction started was in the printing press... You write a thin, you write a rough copy and you edit it, and so forth, and you finally set it up in type. You proofread it finally, and that’s going to say that same thing every time that paper goes through there, no matter what happens. It may not be any good but, nevertheless, it will read exactly the same thing to everybody that reads it; that is, if it is written so you can understand it.

We were able to take people who had never seen machine guns, never seen gyroscopes, never seen anything else, and if they had working samples, a proofread copy, if you please, then we

know how to duplicate parts. There is no other country in the world ever did. That's the reason why we can deliver these high-grade materials at such low cost; we can make them in unlimited quantities by people who never say them before.

We had a very interesting experience, also, during the war with this question of making some of these new diesel injectors of ours, which have a limit of 15 millionths of an inch. Now, if you want to get an idea what that is, if you take a human hair, that is, if you have one of them, it is about three-thousandth of an inch; if you cut that up into about 150 equal parts, one of those is what I am talking about. We were told by experts that you couldn't do that kind of stuff; you have to make 85,000 of those a month in a plant in which 85 percent of the people were women, people that had never seen any kind of manufacturing work don't at all—simply because of this process of controlling the limits and so forth, automatic gauging, and all that sort of thin, which is the technology.

Now, going back to the scientific thing. The idea is one thing, the inventor's idea and his patents is one thing, but that is a long, long way from a product. We have these steps of getting a working model, and then a better model, and so on. Finally, in about 15 or 20 years you get down to where you can do production engineering.

But so far as there being no opportunity for these new ideas to come, that is limitless. We sometimes get ourselves tied up into following rules and regulations. Everybody is laughing

about the Gallup polls. There is nothing funny about that. Every inventor knows all about that. There is never a new thing he ever put out but there wasn't a poll taken among the learned people and they all said that thing is no good. We know all about that. That's why I say the consensus of studied opinion is always wrong. We get so used to running a routine, it is hard to get out of it.

I have an interesting little story. It was an actual happening. Our laboratory used to be in Dayton and we moved it over to Detroit, and our homes are still in Dayton, so we drove back and forth together. So, one of these fellows said to me one day, "I understand you drive from here to Dayton in four hours and a half."

I said, "Yes."

He said, "I don't believe it."

He said, "I am a lot better driver than you are and I can't do it in four hours and a half."

"Well," I said, "I am going down Friday afternoon; why don't you ride along down."

He did. We rode into Dayton in about four hours and a half. He said, "Hell, no wonder you can do it in four and a half hours' you didn't stay on Route 25." (Laughter)

I am not worried about the future. I think these politicians, these statesmen, these businessmen; these economists will get us all out of the woods after a while. But I do know that in 25 years from now, regardless of what business you are in, you are going to have to make changes, and you can make them in one of two ways: Either you can make them when the sheriff starts down the road, or you can make them continuously. You can have a growing thing, because everything in the universe is change; growth is simply a question of change. All the researcher and the inventor tries to do is to keep well enough in advance, not by volition, not by intent or anything, but by knowing what the problems are, to keep them set up far enough in advance so you can make these changes intelligently.

We sometimes have difficulty—I never had it with Mr. Sloan, or any of our corporation fellows—justifying the expense of research. So I said: Let's call it not research, let's call it insurance. What it costs every year is the premium that you pay for this insurance policy. And the fellow said, "What are you insuring against?"

I said, "Surprise." (Laughter)

I think if the Republicans had one of those policies they could have used it.

But with these great factories across the country today, with engineers and research and everything else, there never was a time in the history of the world when there was such opportunities for doing things that will improve the lot of man.

This internal combustion engine with which we have been working with for many, many years has done a wonderful job. It still has more work to do. The total installed horsepower in all the central stations in the United States is about 60 million. We have got 40 million cars and trucks and tractors out in the field. If you count them only 50 horsepower each, which is way below what the advertising fellows claim for them, (laughter) which comes out to two billion horsepower.

People say: Well, we are just ruining the country; we are raising all this food, and so forth. I said: I wouldn't worry about that too much. I think if we starve to death it is our own fault. I am not worried about that. By the introduction of the farm tractor we have reduced the horse population in the last ten years by about 11 million. Now, every time you don't feed a horse you can feed four more people: so you can have 44 million more population. I will admit it is kind of hard on the horses.

But this whole question of the economic problems of the future is how to distribute the energy, which we are unable to use. For what purpose? As I said to the petroleum industry last week out in Chicago: As long as the sun shines, because that is where we get all our energy and everything

from—as long as the sun shines, if we don't have power, if we don't have fuel, and we don't have food, it is our fault, and not nature's.

Opportunity is all around us. Thank you so much. (Applause)