# PROCEEDINGS

OF

# All Ohio Safety Congress

Held Under the Auspices of
THE INDUSTRIAL COMMISSION OF OHIO
and the direct management of
THE DIVISION OF SAFETY AND HYGIENE

Published under the authority

of

The Industrial Commission of Ohio

DESHLER-WALLICK
COLUMBUS, OHIO
April 14-15-16
1942

THE F. J. HEER PRINTING CO.
COLUMBUS, OHIO
1942
Bound at the State Bindery

quantities to give us a real test. The Standard Oil and the Dow Chemical Company were experimenting about that. They have had a great many tests, and those tests showed that a small percentage of synthetic rubber increased the quality of the linemen's gloves. If we go too far with it the gloves got stiff and it was not practical for use. It had certain factors related to it that the natural rubber gloves did not have, but a small percentage of this rubber in the glove was valuable. The trouble at that time was to get the material that would dissolve this stuff, a liquid solvent for the use of that glove. However, I believe that question has been corrected. However, to answer your question directly, the problem as to synthetic rubber is not 100 per cent perfect and I cannot say exactly what is being done because I don't know what might be done in the near future.

Mr. Grawert: Thank you very much.

Chairman Fitzgerald: If there is nothing further, we will stand adjourned.

# CERAMICS SECTION

## Wednesday Morning Session
## April 15, 1942

This section of the Ceramics Section of the All Ohio Safety Congress was called to order at 10 o'clock by Mr. Howard A. Murray, Federal Glass Company, Columbus, Ohio.

**Chairman Murray:** Our first speaker is Mr. William Hazard, of the Personnel Division of the Owens-Illinois Glass Company, Toledo, Ohio, who has done an outstanding job on employee help which has helped the industry a great deal, and who has helped cut down accidents and occupational diseases as well. Mr. William Hazard. (Applause)

### HEALTH HAZARDS IN THE GLASS INDUSTRY

**MR. WILLIAM HAZARD**
**Personnel Division, Owens-Illinois Glass Company, Toledo, Ohio**

Mr. Chairman, ladies and gentlemen:

Recently in a magazine there was a cartoon showing two men seated across from each other at a table. One of them was Mr. Smith, a news broadcaster, and the other was the announcer, and the announcer was saying, "The commentary of Mr. Smith is not necessarily the official opinion of this broadcasting station, or the sponsor, or of Mr. Smith." (Laughter)

Well, that is a little bit the way I am this morning. What I am going to talk about is the glass container industry, and there happens to be only one company in it. Of course, there are a lot of other phases of the glass industry besides glass containers. People sometimes ask us, "Do you find that your employees get a lot of cuts and lacerations from handling glass bottles?" It is also expressed by some people that the factor that men work around very hot furnaces and tanks, that there is a great deal of heat exhaustion and burns. In the way of accidents in the year 1941 in our company, 7 per cent of the lost time injuries were due to burns and the National Safety Council reports that for industry as a whole that about 5 per cent of lost time injuries are due to burns, and of course in the glass plants the proportion is not very much higher. In 1941 thirteen per cent of our own lost time injuries were due to cuts and lacerations. Again, the National Safety Council reports that for the industry as a whole there were 23 per cent of all injuries due to cuts and lacerations. In other words, the industry as a whole has more than twice the amount of cuts that we have. Cuts and lacerations might be taken as the effect of handling glass bottles. In all the glass plants last year, that is in our own glass plants, I mean, there were only nine lost time or one out of every twenty in which glass was in any way involved. Considering the millions of bottles that are handled, this does not look very bad.

Additional evidence that the glass bottle is not necessarily a dangerous product comes from a survey that was recently made in some consumer plants. In 25 plants employing about 250,000 persons there were only three minor injuries last year due to glass bottles, either milk bottles or beverage bottles that are used in the plants.

It seems, therefore, that glass container plants have about the same accident exposure as the industry as a whole, and there is every reason to believe that the same methods of safety applied to a glass plant will produce just as good results as when applied to any plant. Our own lost time frequency rate in 1939 was 12 lost time injuries per million man hours of exposure. In the following year this went down to 10, and in the year 1940 it was six. Last year it remained at six. Thus, in three years it was cut in half, and last year it remained the same as in 1940. Those firms that we have found most successful in safety work have built their programs around three points: first, guarding machinery; taking care of the physical hazards in the plant. This, of course, is management's role

and primary responsibility. Second, the development of safety rules by the people themselves, and the enforcement of those rules, and third, the building up of safety consciousness through all means of safety promotion and safety education.

The mechanism for carrying out this three-point program, guards, rules and promotion, is built around a Safety Committee plan.

In our plants the safety committees are of three ranks or grades. There is a shift committee made up of one committee for each shift and of which there is a shift foreman and three or four members of his department. Above this committee is the department committee, composed of the department head which shows him as the foreman and each foreman of the shift committees. For the plant as a whole is the Supervisory Safety Council which is composed of all department heads and the plant manager. The committees meet monthly and have a rotating membership. This means that during the course of the year a large number of people take an active part in safety.

One of the best ways to arouse a safety consciousness is to get people interested actively in the program, and that, our men feel, is the advantage of this committee plan. Each of these committees has full authority which is exercised in carrying out and putting into effect safety recommendations.

The shift committee foreman has authority to do certain jobs and those he can't do are referred to the department committee, and the department head has authority to take care of things immediately in his own department. Where one or more departments is involved or where a large expenditure of money is involved, the recommendation is referred upward to the plant safety council, and the plant manager gives his decision.

The keystone of the safety program is the foreman. He is made responsible for all the accidents that occur in his own department. The lost time accidents are figured also in the production plants, in our bottle plants. We have found that this is a good idea, although we know that some companies have reported more harm than good because there may be a tendency for plants to cover up after the accident happens.

One of the cardinal points of the injury prevention plan is to spare no money or time or patience in getting a man back to good health after the injury occurs. The place to save expense, of course, is to prevent injury. Once it does happen, then everything has to be done to get the man back into good shape.

While medical books will show a higher percentage list of occupational disease hazards, a good many of these today are potential hazards rather than being actual. For example, glass blowers' cataract, which is an occupational disease, is not seen very often because the exposure has been removed. Now, there is the bottle blowing machine. Furnace tenders, of course, are exposed to the light of hot blowing glass inside their tanks, but they are rather easily protected by dark glasses or dark glass shields, and no doubt most of you here are more familiar with that than I am.

Silica, in the form of sand, is used in the manufacture of glass. If harmful quantities of it are breathed, a condition of the lungs may result that the doctors call silicosis.

The only departments in which there is free silica dust are the batching and furnace departments, ordinarily, and in that our company employees, about 350 men in all the plants taken together, all these men have received chest X-rays one or more times. This X-ray program was taken eight years ago, and during the eight years there has been a certain number of men who used to work in the batching or furnace departments, but who have now been moved to other departments, or who have now gone to work somewhere else. There are about a hundred of these men who have at one time worked in our batching and furnace departments who aren't there and on whom we haven't been able to get chest X-rays. Altogether there are about 450 men who have one or more sets of X-rays. The actual number of films is between 900 and a thousand. A year ago these films were all gathered together and sent to a group of doctors, individually to five doctors who were supposed to be experts at reading chest films. Out of the 450 employees there was only one individual for whom all the doctors gave the diagnosis of silicosis. There were seven other persons whom some of the doctors said had silicosis and some didn't agree. The total cases would therefore look to be eight; assuming that this is the right number, that means an incidence of silicosis of two per cent. All of the eight men that I am speaking about were car unloaders, and seven of them had worked from 10 to 12 years at that job. The eighth man had worked only three years. It is believed that his former employment contributed to his present lung condition. It is significant



that some of these eight persons worked as batch mixers, car handlers or furnace tenders. They were all unloaders. Twenty-nine persons out of this group of 450 had worked in dust exposure for 10 years or longer, some of them much longer. Only three in this group of 29 were said by one or more doctors to have silicosis. Some of the men in this group are old timers, had been unloaders for many, many years, but showed no lung conditions at all. Of the eight individuals, one of them applied for workmen's compensation benefits and was awarded such claim. The other seven are still working voluntarily and they apparently want to keep on working. From the best medical advice that we can get, it seems better to keep them at that job, because if they worked this long in a total exposure and have contracted only a mild silicosis, the chances are they won't get a serious case during the remainder of their working life time. Of course, this would only be wise if improvements, from an engineering point of view, had been made in the unloading operation and the entire batch house.

Today these plants are modernized much more than they were in the old days. It is unlikely that silicosis in the form of new cases will develop in the future.

One improvement for the unloader has been the use of covered hopper but less care for transporting raw materials such as sand, soda, ash and lime to the plant. This makes the unloading process almost dustless.

Another dust control procedure which is used, although it is not as effective as the covered hopper car, is the placing of an exhaust hood inside the box car so as to ventilate the interior of the car. Protection is also given by a number of respirators. Of course, in the old days, good respirators weren't available.

The question is sometimes raised: how much sickness, such as colds, influenza, grippe, bronchitis, tonsilitis, general respiratory sicknesses do batch and furnace men have? It may be that some of the cases which are diagnosed as "flu", or bronchitis, actually are the result of dust exposure. It may be that batch and furnace men have more of this sickness than the general population. For three years absence records have been kept in the plants showing the number of illnesses that lost one day or longer. According to these reports in 1938 batch and furnace men had 8 per cent less respiratory illnesses than the plant as a whole. In 1940 batch and furnace men had 26 per cent less respiratory illnesses than the men of the plant as a whole. The figures for 1941 aren't complete yet, although they probably will show the same condition. Even these figures, however, aren't conclusive because there may be serious illnesses of long duration, although not many in number, which batch men have oftener than the general population. These long illnesses may be submerged in the total mass of cases losing one day or more.

It is common practice, I believe, in this sort of work in the United States to divide into two groups the illnesses. That is, major illnesses and minor illnesses. The major illnesses being those in which more than a week is lost and the minor illnesses those in which the loss is from one to seven days.

In 1938 this batch and furnace group had one third as many major illnesses as did men in the plants as a whole. In 1939 they had 7-10 as much and in 1940 they had again only one third as much. These figures are confirmed by a report issued last September by the United States Public Health Service, in which Dr. Kaufauver discusses illnesses among glass workers. His report shows that batch mixers, furnace and casting workers had 28 per cent less major respiratory illness cases than the plant average. These figures consequently indicate that the total plants in question hadn't more, but fewer colds, tonsilitis, influenza and other respiratory ailments in the batch and furnace departments than in the plant as a whole. This does not mean that the batch and furnace departments are exactly health resorts, but it does mean at least that their respiratory illness rate is not greater than the plant as a whole.

Granted that occupational diseases and occupational injuries are the sole responsibility of the employer, and granted that he should leave no stone unturned in eliminating them, taken together there is no larger toll because of lost time than general sickness.

Most of us are surprised at the toll that general sickness takes from their people. This is not a peculiarity of the glass industries, but applies to all industries in general. Some of us read the results of the Gallup poll which was made last fall in which it was stated that for the country as a whole, in one month there were twenty-four million man days lost from work because of general sickness. Dr. Gallup pointed out that this was enough to build 445 medium bombers, 3200 light tanks. That was just one month's time. Our industry is just as vulnerable to this as any other. We are going to have to do

something about it, and I feel it is about time that we sat down and outlined the program.

Now, there are a few steps, perhaps, that we can all take to keep on top of this general sickness problem. As the war progresses the labor shortage that we have already felt is really going to squeeze us. It is going to be more and more necessary to keep every man who is on the payroll working regularly every day. Furthermore, industries such as the glass container industry, are probably going to hire a larger and larger proportion of women workers. This is significant from the sickness point of view, because women workers have two and a half times the illness of men. So far as the women employees are the industry injury problem is not very serious. It seems that a woman will lose about one day from an industry accident for every fifty that she loses from ordinary sickness. Tied in with this question of labor turnover and labor shortage is the matter of training of new employees. It seems hardly wise to spend a lot of time and money in training new people, put them on the job and then let them get sick right away; you have got to get somebody to replace them.

There is a real economic factor tied up in the matter of general sickness. Industries which have had a rather strict standard for their pre-employment examinations are going to have to relax those examinations in all of those standards, in all probability. This is because the usual husky worker that works in a glass plant won't be available. The All-American type will be in the Army. This probably is going to be a good thing because physical examinations will be used for placement of persons rather than of their rejection. That is the same fundamental purpose of industries' physical examinations anyway. They are not intended to weed out people, but rather to put as many as possible in jobs which necessary to re-examine them and to follow them closer than we have in the past.

The average man in industry is said to lose about eight days a year because of sickness. The average woman loses about 14 days or two weeks. These figures are very high. Of course, this sickness is not spread over the entire group equally. There are certain people who are off for long periods of time and who have repeated cases, but on the average each man loses eight days and each woman fourteen days. Sickness is a more elusive problem than accidents. The plant manager and the personnel director, the safety director, can't do as much about general sickness as they can about industrial accidents. On the other hand, if they are successful in reducing general sickness, even by a fairly small percentage, say by a quarter, they are going to have tremendous gains in their working forces.

What, then, can a glass plant do about it? First of all is the medical department. Now, in the medical department, there need not be a great many people. Oftentimes the medical department simply consists of a nurse and the plant physician working part time, or in a larger plant full time. It is desirable, of course, since our operation is 24 hours, to have more than one nurse; to have nursing service spread over more than one shift. This can't always be done, however, because the plant may not be big enough to support it. The doctor, himself, should have some training in public health. A physician, or a doctor who is a physician with public health training is usually of more use to the plant than the cut-and-out surgeon. The public health man thinks in terms of prevention where the surgeon thinks only in terms of cure and treatment. The medical set-up is needed because sickness information must be kept confidential. It can't be spread out among the laymen in the plant. We can after the organization is there.

The next step is to study the particular plant's problems: in what department are these sicknesses occurring? In what group of people: what type of sicknesses are these? This means that absence records are needed. That is very easy to say, but oftentimes it is pretty hard to do. Perhaps one of the most accurate ways of doing it is to tie it in with the time distribution cards. In many plants each day each employee has a time distribution card filled in for him. On these cards is put the number of hours the man worked the day before, and if he didn't work the day before the foreman or the time clerk can put in a symbol to that effect, and if he happens to know that he was off sick, he puts a sickness symbol and sends a list of these persons to the plant's nurse. This is urged to you to get in on the picture.

Third, investigate each case. During the last war a British doctor working in the munition plant on absenteeism said that every single case of absence called for an investigation. That is just as important today as it was then. The investigation does not necessarily mean that the nurse will have to spend all her time making home visits. That is quite out of the question, because it takes too much of her time.

It does mean, however, that persons who have been off sick should check in to the medical department on their return to work. Sometimes this cannot be done after one day absences because of shift schedules, although that is the ideal condition.

There was a case in one of our plants which illustrates the point pretty well. Last year a girl came back after being off sick for two weeks to work in the packing department. They didn't have this check-up on return to work at that time, and after she had been at work just a few hours she fainted and fell on the concrete floor and very easily could have had a serious accident. She was then off for another two weeks and she was in no condition, probably, to come back to work, and the check by the nurse would have shown that.

Fourth, we should use all the tools that are available in a preventive medicine program for reducing illness. One of the outstanding tools is the physical examination. Physical examinations of both applicants and of present employees. Where there is a particular disease or injury hazard, such as in the foundries and furnace departments, these examinations are probably being made most everywhere today. The examination has to be adapted to the purpose. For example, batching and furnace men should get annual chest X-rays. Persons who have an exposure may require more frequent examinations. Certain tests for lead poisoning; food handlers, perhaps, should be examined quarterly. In their case it is not so much to prevent the spread of disease as it is a matter of health prevention to impress food handlers that the company is really sincerely interested in getting them well.

Now, I have jotted down a few points about the examination program itself. First of all, our present employees we have found it should be voluntary and not compulsory. The finding should be held in strictest confidence between the doctor, nurse and employee. That should not be revealed to the personnel director, the safety director, the supervisor, the plant manager or anyone else unless the employee himself wants to tell it.

After the examination the examiner should always take a few minutes to discuss his findings with the employee. If he does not do this, then the man is not going to get any good out of the examination.

These examinations aren't made to protect the company. They are not made to file away in a file drawer to be forgotten. They are made to help the man improve his own condition if it needs improvement. No one, of course, should be eliminated because of his examination findings; the doctor should always be encouraged to make a thorough examination. I speak of this because the examination of normal healthy people is quite difficult. It is not like examining a person who comes in the doctor's office or in a hospital, who knows there is something wrong with him. In our case these people are all especially well and healthy and the doctor must really be on his toes if he is going to pick up some small deviation from normal which later may result in some disability or illness.

After the examination is made it falls on the nurse to follow up the man: to urge him in every way to get his condition taken care of. If it is teeth, urge him to go to his dentist; if it is tonsils, urge him to get them taken out, and so on. Most people need a little prodding, and even with prodding some people could not do anything about it, but there will always be a few borderline cases that will be encouraged to take these steps. The employers should be urged to use their family doctor. We are not in the business to treat illness. We are not in competition with the local doctors. Of course, that is the most difficult way to get things done, that is, to urge a man to go out and spend some money to take care of some physical ailment; nevertheless, the results do come in, and when they come they are most encouraging in the nurse's program.

Last year there were 5500 pre-employment physical examinations made and 1900 examinations on present employees, making a total of about 11,400 examinations. During the same year the nurses in all these plants reported there were 2400 physical defects that had been taken care of by the people at their own expense. All this work was done privately by the local doctors and dentists in the town. Such a program does real good to everyone.

As I said at the beginning, this rather rambling talk relates only to one particular company and one phase of the glass industry, the manufacturing of glass containers, and it may not apply to the glass industry as a whole.

If anyone is interested in some of the actual forms that these records are kept on, they are welcome to look at these absence reports.

I certainly enjoyed being here. It is the first time I attended this session, and I want to congratulate the State of Ohio in having a Glass Section.

Thank you. (Applause)

Chairman Murray: Mr. Hazard, we certainly want to thank you for that fine talk.

While you have said it may not apply to all the glass industry as a whole, I think it certainly applies. Most of the things you spoke of apply to most of us and to most of the companies here represented.

Now, we will proceed with our next talk, and after that we will use the remaining time in a general discussion of both these subjects. The next speaker is Mr. J. W. Beall, one of the pioneers in safety work in the State of Ohio, and former Chairman of the Industrial Commission, and now associated, as Claim Director and Accident Prevention Director, with Merriman & Sutherly. Mr. J. W. Beall. (Applause)

## SAFETY TALK

By MR. J. W. BEALL
Merriman & Sutherly, Columbus, Ohio
(Substituting for Mr. Thos. E. Ashton)

Mr. J. W. Beall, Merriman & Sutherly, Columbus, Ohio: Mr. Chairman, ladies and men: You may wonder why I say "men" instead of the customary "gentlemen". They say gentlemen prefer blondes and I see a wonderful group of attractive brunettes here this morning. (Laughter)

The baseball season having opened, I am going to take the liberty of acting as umpire for a moment and declare this the Seventh Inning. Everybody stretch. (Audience rose)

I didn't call that "stretch" in order to lose my audience. (Laughter)

In my home city I had occasion, a number of times, to put on home talent productions of minstrel shows, and of giving operas for charity benefits, and we always wound up the production of any one given performance by showing at the Lozane state hospital, and I had occasion to make a curtain speech there one night between acts. I told my audience that I was very glad to bring my shows out there because the audience could not walk out on me. (Applause)

I have been referred to as one of the "pioneers" in safety work in Ohio, which recalls to my mind the closing of a campaign in Hamilton, Ohio, where I spoke at the wind-up banquet. Immediately opposite me at the banquet table were some newspaper men, and in response to that introduction I said I was proud that I had been rather early in the safety work; that as a matter of fact I was born in the neighboring county and wore my first safety pin in 1875. (Laughter). The Inquirer came out the next morning and said I wore my first safety button in 1871. (Laughter)

I am asked to go to bat here in place of a very distinguished gentleman, Dr. Thomas E. Ashton, Personnel Director of the Anchor Hocking Glass Corporation of Lancaster. That is a bit dangerous, having me to go in bat for a doctor, because my many years, about 25 in all, as safety man, personnel man, and a member of the Industrial Commission for six and a half years has led me into taking a number of doctors to the mat. But I promise you that I am not going to say anything bad about the doctors. They are a good deal like policeman: you know the average onlooker when he sees a policeman in a battle with a prisoner, he hopes the prisoner will get the best of him, but how he does love that policeman when he needs him! (Laughter)

The same way with the doctor. We think a lot of him when we need him and we forget to pay him when we are through with him. (Laughter)

I promised you I wasn't going to say anything bad about the doctors. They are wonderful men. We need them every day, but there are some that need a little tramping on now and then.

I heard one testify the other day, under oath, that a little tap on the head that didn't cause the man to lose consciousness, nor didn't fracture his skull, was the cause of an attack of appendicitis that developed three years later. (Laughter)

During a breathing spell in the taking of the testimony he asked to be excused from the room where the examination of witnesses was being conducted. He said he had left his hat and overcoat in an adjoining room and he wanted to go and get them because he didn't trust anybody. When he came back, I said, "Doctor, did you include the members of the medical profession in that indictment?" He said, "Why?" "Well", I said, "I know a number of doctors who are honest. I know one in particular who is, I know, honest." He says, "How is that?" "Well," I said, "he filled out an application for a death award for a widow, and he filled out all the lines in the long form, and when he got down to the bottom where it said 'Cause of death', he signed his name." (Laughter)

I see that Dr. Ashton's topic, which I am supposed to unfold is, "Keep Moving." That is why I had you stand up, but I didn't know you were going to walk out on me. (Laughter)

A couple of young colored men left New York to go to Prison, and they went by plane, a new experience, and very thrilling for them. At Pittsburgh when they landed they saw a bright red truck driven out on the field and almost the same instant they came to a stop the plane was being refueled. In a few minutes another take-off and on to Chicago. When they landed, out comes a red truck, refueling, and off again. So on at Omaha, Los Angeles, and whenever they stopped they were always there ready with the refueling red truck. So when they finally got out of the plane and regained their drink at Frisco, one of the colored boys says, "Say, we made wonderful time coming out here. That ol' plane sure did make good time." The other boy says, "Well, that red truck wasn't doing so bad." (Laughter)

A commissioned examiner in examining a rookie, testing his mental powers, said, "What will happen if I cut off one of your ears?" The rookie replied, "I couldn't hear." The commissioned officer then said, "Supposing I cut off both ears?" The rookie replied, "Well, then I couldn't see." "Couldn't see; why not?" snapped the commissioned officer. "Well, my hat would come down over my eyes." (Laughter)

So, he tried another rookie. He said, "Young man, if you should see a battleship coming up the road, what would you do?" "I would torpedo it," replied the rookie. The commissioned officer said, "Where did you get the torpedo?" "The same place you got the battle ship." (Laughter)

I haven't had the honor to talk to this group before, although we have had in the past problems that were more or less in common. For many years I was safety man and personnel man for a big steel foundry concern that had three plants in Ohio and one at Bay City, Michigan. We had silicosis to deal with, and early in the history of these All Ohio Safety Conferences I introduced in the Foundry section the problem of silicosis, and we had Carey McCord over from Cincinnati as one of the early pioneers in the study of silicosis.

I find from personal experience that we should not be too greatly confused nor alarmed by some of the lay doctors who don't know a case of silicosis from one of tuberculosis. I have even had asthma cases diagnosed as silicosis. The dust may have had something to do with the bronchial condition, but it is a fine place to enlarge a lung condition or any other respiratory trouble that you don't know what it really is.

I promised you I wasn't going to take the doctors to task, but I do remember another one. (Laughter)

Just about a year ago—I remember mentioning this at last year's Safety Congress—I was in the medical section at the Industrial Commission talking with Dr. Horen and in came a young lady who said she was directed to the medical department when she should have gone to the information or the claim section on the seventh floor, but she got off at the second floor and somebody said, "There is Dr. Horen's office", and in she walked. She said, "I came over here to file a claim." "Well," Dr. Horen said, "you aren't in the right place, for a claim for what?" She said, "A claim for industrial dermatitis." He said, "Do you have dermatitis?" She said, "Yes, the doctor said I have and to come over here and file a claim and he would treat me for the dermatitis. I would not have to pay him anything or worry about it, the State would pay him." The doctor looked at her and took her temperature, and he said, "Young lady, you had better go home and go to bed. You have a fully developed case of measles." Now, I say there can only be two answers, and one of which must be correct. Either that doctor who sent her up there to file a claim didn't know what any grandmother, and any of your nurses of Ohio would have known in a few minutes, that that girl had measles. Hence, they spoiled many a good bed carrier in making doctors out of them. (Laughter)

The other alternative was that he was dishonest. He thought he would make an industrial case out of that; let it reflect against that employer's risk of a case of dermatitis. The State Fund would pay him and he would treat the girl for measles.

In any event, that is another doctor who is honest enough to want to get his money from somebody. (Laughter)

Not having talked to this particular group before, I can, perhaps, tell a couple of my favorite stories. In industry you safety men, you nurses, you

operating here in the State of Ohio, they have men on foot and men in machines riding the power lines. Civilian defense becomes an individual responsibility, thus to be your homes to your factories, churches, schools and the local communities. Now if you can put *armor* plate around them, your men might get to one situation. There are hundreds of other ways that the enemy might get to them, but that is one of our greatest problems, from within. Are there any other questions *from the floor*?

Mr. Lee, O. S. U.: Can anybody tell me anything about this protection on plate glass or window glass from dying? There has been tape suggested, and so forth, to be put over it.

Mr. Ward: Well, the protection for plate glass seems to be the only protection over in England, that they secured it on with tape and found that that wasn't very satisfactory. You know glass can be destroyed not only from the blast but from a shock of any type, so they don't have a regular remedy for the protection of plate glass outside of tape, to prevent it from flying and protect the public from being cut in the street, or doing that type of damage, so we have to go along with that and just simply recognize that as a hazard that we can't do anything about, only have each individual protect themselves while going along the street during a bombing.

Lieutenant William T. Fargo, Fire Department, Cleveland, Ohio: In Cleveland we have had the opportunity of hearing three members of the London Fire Fighters during the past month, and one of the things explained to us by Chief Kirby, who is a District Officer in London- he mentioned plate glass, that the street cars are equipped with a glass that is heavier than our ordinary window glass, and he said they very successfully protected the occupants of these cars from *flying* glass by gluing ordinary lace curtains on these windows. It's been very successful, and they are doing it in their homes. Rather than using tape, they use old lace curtains.

Mr. Merriam: Just one other interesting point regarding glass came up in discussions of black-outs. Of course you realize that many times people have the thought that in a black-out situation they just have to paint the glass with black paint. Well, I am not going to argue the merits or demerits of that particular method of black-out, but I would like to caution you on one thing, and that is if you paint your glass black, be careful on which side you paint it, because if you paint it on one side—I might mention this, the black paint absorbs heat, and as a result the expansion of the glass is very apt to break the glass and defeat the purpose for which you *painted* the glass in the first place. I am not going to tell you, because I have forgotten which side, and without stopping to analyze it, I can't tell you which side of glass you should paint it on, but before you paint glass with black paint, or any other heat-*absorbing* type of paint, be sure you put it on the proper side or you will have a lot of broken glass when the sun comes out.

Mr. Burdsall: I will turn the meeting back over to Chairman Rider.

Chairman Rider: I certainly appreciate the patience that you men have shown. I never have yet attended one of these meetings in which so few of the audience left before the conclusion of the session.

I want to go back to Mr. Fleming's talk. He talked about the fellow who didn't have any water in his nozzles because of the way he connected up his underground pipe, and if you have any type of open sprinklers or stand pipe systems, be sure that you have the manager from the company that puts it in figure your friction loss; that is very necessary. When the big companies put in fog nozzles, they are supposed to figure the friction loss. If the friction loss is not figured, you won't have any water, and that is very important, and I would insist that, if anybody puts it in, be sure they know what water there is going out of the nozzle.

We will now adjourn, and I wish to thank each and every person that appeared on our program, and also each and every person that attended this session of "Industrial Fire Prevention." Thank you very much for your kind cooperation and your *serious* attention, which I believe made this a very interesting and educational session.

Whereupon the session of the "Industrial Fire Prevention" Section adjourned at 12:30 p. m.

# OCCUPATIONAL DISEASE HAZARDS

## Thursday Morning Session

## April 16, 1942

This session of the *Occupational Disease Hazards* of the All-Ohio Safety Congress was called to order at 9:30 a. m. by Dr. A. L. Kefauver, Assistant Superintendent, Medical Division, Industrial Commission of Ohio, Columbus, Ohio.

Chairman Kefauver: We will go on to the first number for the day, Dr. R. R. Sayers, Director U. S. Bureau of Mines, Washington, D. C., who will speak on Occupational Diseases and Industrial Hygiene Under Present Conditions.

Dr. Sayers. (Applause.)

### OCCUPATIONAL DISEASES AND INDUSTRIAL HYGIENE UNDER PRESENT CONDITIONS[1]

BY R. R. SAYERS[2]

In the present-day three-dimensional, mechanized *warfare*, industrial ambulance is at least as important as military *emergency*. The importance of industrial personnel to the military forces is indicated by the fact that it takes 10 or more people *behind the lines to keep one soldier fighting*. The importance of material to the military machine has been *demonstrated* tragically in several instances where unpreparedness has resulted in disaster for the democracies. Victory will be achieved by the United Nations when their industrial output in essential military and civilian requirements surpasses that of the enemy and overcomes the handicap of the VAST quantity of material that the Axis powers have been accumulating for years. The strategic position of the continental United States with regard to *resources, industrial development*, and present remoteness from the zone of actual combat makes it the logical arsenal for the democracies. The incidents of Pearl Harbor and Wake Island, the gallant defense of Bataan Peninsula and the whole struggle in the Southwest Pacific have increased tremendously the pressure on all loyal Americans for an all-out victory effort. This pressure is exerted more especially on persons working in the war industries.

The conflicting requirements of *manpower* for the military as well as the industrial war effort creates special problems in the field of production. As the war continues, the essential industries must be manned in increasing numbers by those who do not measure up to the physical standards required by the armed forces. Also as the military forces are expanded, these requirements probably will be lowered and industry will have to utilize the services of the less physically fit. Even now the tendency is to employ women, who have a higher sickness rate than men. The situation is complicated further by the demand for relaxation of restrictions on hours of labor and the speeding up of all industrial processes. Many of the new workers are untrained or have been long idle and are unfamiliar with the hazards of plant operation. Such workers, as well as the physically unfit, are more prone to suffer accidents and occupational reactions which lead to fatigue, inefficiency, and absenteeism with consequent reduction in production. For instance, in the three industries that have been expanded most severely—machine tools, aircraft production, and shipbuilding—the number of disabling injuries per million hours worked increased by 22 percent during the 11 months preceding 1941; a moderate increase in hours worked in the manufacture of explosives was accompanied by a great increase in the number of disabling injuries. (1) During 1940 disabling injuries caused the loss of 23,132,000 man-days or about 7,580,000,000 man-hours, and it is estimated that figures for occupational injuries in 1941 exceeded those of 1940 by 25 percent. (2) The 1,580,000,000 man-hours lost through accidents in the United States during 1940 are

[1]Presented at the All-Ohio *Safety Congress*, Columbus, Ohio, April 16, 1942.
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equivalent to the labor time required to construct 15,000 to 18,000 large bombers; 20,000 medium bombers; 75,000 to 90,000 fighter planes; 112,500 to 225,000 trainer planes (depending on type); the submarines, or 45 battleships. Illness is said (3) to cause 15 to 20 times as many cases of absenteeism as accidents and to be responsible for about seven times as much loss of time from work. Wage loss, medical expense and the overhead cost of insurance in the United States totaled approximately $20,000,000,000 (4) in 1940.

Prevention of this huge loss, especially of precious time needed for production of war material, is a tremendous task. What is being done to remedy the situation which no doubt under present conditions will grow worse if adequate control measures are not taken

**Efficiency of Existing Occupational Disease and Accident Control Measures**

The known measures for the control of health and safety hazards in industry are probably efficient enough when applied intelligently and adequately. The trouble lies in failure to apply them, which in turn is due largely to lack of necessary personnel and equipment. The lack of adequate facilities for instituting a comprehensive program to eliminate needless and illness in industry is indicated by the fact that of the 1,256 establishments surveyed by the National Association of Manufacturers (5) a doctor or registered nurse was employed in only 19 percent of plants having fewer than 250 employees. In the group of plants employing between 19,000 and 20,000, 98 percent reported having these services. For the survey as a whole 21 percent maintained a doctor and 42 percent a registered nurse. When it is realized that the group of plants having fewer than 250 employees comprises 38 percent of American factories and employs more than 50 percent of the 8,000,000 factory workers (5) the inadequacy of industrial medical service is self-evident.

The Council on Health of the American Medical Association (6) lists 241 establishments that employ more than 2,500 men and women; These large establishments employ only 10 or 11 percent of the total number of workers; 62 percent of this enormous group is working together in little groups of 500 or less. Approximately 1,400 or 1,500 physicians are listed in the American Medical Directory who either limit their work to the industrial field or who otherwise regard it as their special interest. The majority of American industrial workers receive medical care from physicians whose interest in this industrial work is, to say the least, secondary (6).

The following basic objectives of both industrial and military medicine mentioned by Bristol (7) indicate a scope of work that will require many more industrial physicians, engineers and other technical workers than are available at present in the United States.

The basic objectives of both industrial medicine and military medicine are much the same, namely:

1. To ascertain, by examination, the fitness of individuals for civilian work or military service, and to place individuals in activities consonant with their physical and mental assets and liabilities.

2. To maintain and improve the health and efficiency of those already employed or in government service.

3. To educate the worker of the service man on matters pertaining to personal hygiene.

4. To reduce lost time and absenteeism from industrial occupation or military duty because of illness or injury.

To reach these objectives of either industrial or military medicine a definite plan or program must be formulated under suitable medical direction, with the employment of qualified physicians, surgeons, nurses and other specialists and technicians as may be needed. Medical offices and adequate emergency, dispensary and hospital facilities are essential. Suitable physical examination and medical records are necessary. Medical supervision also should include all matters of general sanitation and environment hygiene, with the assistance of specialists, such as engineers and chemists, as may be required.

The war is speeding up industrial hygiene work as it is every other phase of activity. The question, however, is still broader than the development and application of an efficient industrial medical organization. The source of military and industrial personnel is the civilian population. Therefore healthy, efficient military and industrial organization requires that these important qualifications necessary to the preservation of the Nation be fostered in the general population. This is a problem for the public health and medical professions. It would seem that the health of the general public is important from a military standpoint and mental perfection must be present among the civilian



population before it can appear in the military. The difficulty of building a satisfactory military organization has already been demonstrated by the fact that almost half of the draft selectees have been refused for physical defects of one kind or another.

One reason for the scarcity of qualified personnel is that industrial medicine is a comparative newcomer in the field of medicine. Most of the organizations interested in this subject have developed since 1914. The Federal Bureau of Mines, which did the first work on dust diseases in the mines of the United States, was created in 1910 and the Division of Industrial Hygiene of the United States Public Health and the Section on Industrial Hygiene of the American Public Health Association in 1914. Only since 1937 has the Council on Industrial Health of the American Medical Association been operative in cooperation with committees or activities on industrial hygiene in 34 State Medical Societies, most of which have been organized during the past three years.

The whole specialty of industrial hygiene as we know it in the United States has developed almost entirely since the World War and is now only a little over 25 years old. Before 1936 only five State Departments of Health and two of three State departments of labor were conducting hygiene activities and these were of a limited nature (7). At present 38 States, 2 counties, and 4 cities have industrial hygiene units, mostly in departments of health. Of the 42,000,000 workers enumerated in the 1940 Census, 47,040,000 live in these States (7). State and local governments are becoming more and more aware of their responsibilities in industrial hygiene and the day is not far when all of the 48 States and the Territories will provide full-time industrial hygiene services. As it is, official industrial hygiene services are now available to almost the entire labor force of the United States. (8).

Another reason why forces trained in industrial medicine, public health, and sanitation are inadequate to serve our military, and industrial needs is the lack of training facilities in the educational system of the United States. Only a small number of universities and medical schools provide special courses for industrial hygienists. There are a number of independent agencies engaged in industrial health work, the more important of which are the Industrial Hygiene Foundation, the American Association of Industrial Physicians and Surgeons, the American Medical Association, the American Public Health Association, the American Industrial Hygiene Association, the American Society of Heating and Ventilating Engineers, the American Standards Association, the Illuminating Engineers Society, the National Safety Council, the National Tuberculosis Association, the Saranac Laboratory for the Study of Tuberculosis, the American Foundrymen's Association, the National Association of Manufacturers, the Portland Cement Association, laboratories maintained by many insurance companies, the Haskell Laboratory of Industrial Toxicology, and the health department of the International Garment Workers Union. These organizations, however, are not engaged primarily in training personnel for industrial medicine and hygiene although many of them afford considerable training through their meetings and publications. Also such publications as the Journal of Industrial Hygiene and Toxicology, the American Journal of Public Health, Industrial Medicine, and the Journal of the American Medical Association contain much valuable material for training qualified medical and other technical personnel in industrial hygiene and toxicology.

Steps have been taken by the Federal Government to assure adequate health and welfare services to meet the needs of the national defense program by the establishment by the President on September 3, 1941, of the Office of Defense, Health, and Welfare Services with the Federal Security Administrator as director who, with the approval of the President, has been designated by the Council of National Defense as "Coordinator of Health, Medical Welfare, and Related Defense Activities." The duties and powers of this office were outlined in the executive order as follows:

1. Subject to such policies, regulations, and directions as the President may from time to time prescribe, the Office shall:

a. Serve as the center for the coordination of health and welfare services made available by the departments and agencies of the Federal Government, and other agencies, public and private, to meet the needs of State and local communities arising from the defense program; and take necessary steps to secure the cooperation of the appropriate Federal departments and agencies relative thereto.

b. Make available to States and localities, upon request, the services of specialists in health and welfare activities to assist in the planning and operation of such local and State programs

c. Study, plan and encourage measures designed to assure the provision of adequate defense health and welfare services to the citizens of the Nation during the period of the emergency, and coordinate studies and surveys made by Federal departments and agencies with respect to these duties.

d. Keep the President informed with respect to progress made in carrying out this Order; and perform such related duties as the President may from time to time assign or delegate to it.

4. The Director may provide for the internal organization and management of the Office of Defense Health and Welfare Services. He shall obtain the President's approval for the establishment of the principal subdivisions of the Office and the appointment of the heads thereof.

5. In the study of problems and in the discharge of its functions and responsibilities it shall be the policy of the Office of Defense Health and Welfare Services to collaborate with and to utilize, in so far as practicable, the facilities and services of existing departments and agencies which perform related functions. Furthermore, it shall be the policy of the Office of Defense Health and Welfare Services in carrying out its functions and duties to work with and through the State and local defense councils and other appropriate State and local defense councils and other appropriate State and local agencies, and in this connection to cooperate and work in conjunction with the Office of Civilian Defense in its relationships with State and local agencies.

6. There shall be in the Office of Defense Health and Welfare Services a Health and Medical Committee to consist of a Chairman to be appointed by the President, the Surgeon General of the Army, the Surgeon General of the Navy, the Surgeon General of the United States Public Health Service, the Chairman of the Committee on Medical Research of the Office of Scientific Research and Development, and such others as the President may from time to time determine. The Committee shall advise the Director regarding the health and medical aspects of national defense exclusive of medical research and assist in the coordination of health and medical activities affecting national defense. The members of the Committee shall serve as such without compensation but shall be entitled to actual and necessary transportation, subsistence, and other expenses incidental to the performance of their duties.

7. The Director is authorized to appoint such advisory committees and subcommittees, with respect to particular aspects of health, welfare, nutrition, recreation, and related activities as he may find necessary or desirable to assist him in the performance of his duties. Such advisory committees may include representatives from Federal departments and agencies, State and local governments, private organizations, and the public at large. The members of advisory committees shall serve as such without compensation, but shall be entitled to actual and necessary transportation, subsistence, and other expenses incidental to the performance of their duties.

8. Within the limits of such funds as may be appropriated or allocated to the Office of Defense Health and Welfare Services by the President, the Director may employ necessary personnel and make provision for the necessary supplies, facilities and services through the Federal Security Agency. The Office of Defense Health and Welfare Services may use such statistical, informational, fiscal, personnel, and other general business services and facilities as may be made available through the Office for Emergency Management.

The Division of Industrial Hygiene of the United States Public Health Service, which was transferred to the Social Security Agency when that agency was created, had organized and developed industrial hygiene services in 31 State health departments with the aid of funds made available under the Social Security Act. Forty-two State and local units are now equipped for industrial hygiene services (9). The work of these State units has been so interrelated with that of the Division of Industrial Hygiene that there now exists a Nation-wide organization to serve effectively the workers in defense industries. The division has set up mobile units consisting of a physician, an engineer, and a chemist specially trained in the detection and control of industrial hazards. They are prepared to go anywhere in the country on short notice to provide technical consultation with State and local health agencies. Additional consultants will soon be available to the Army for safety program in Government operated or owned munitions plants. Cooperation has also been established with other Government agencies, particularly the Division of Labor Standards of the Department of Labor.

On May 8, 1941, in cooperation with the Office of the Surgeon General of the Army and the Ordinance department the Division began a systematic investigation of 38 industrial military establishments certified by the War Department for investigation. The medical and engineering studies of environmental health hazards have been completed. As soon as the reports on these studies have been prepared similar studies will be made in government-owned and privately operated plants.



On May 7, 1941, the President approved a Federal inspection bill enacted by Congress, authorizing and empowering the Secretary of the Interior, acting through the United States Bureau of Mines, to make or cause to be made annual or necessary inspections and investigations in coal mines the products of which regularly enter commerce or the operations of which substantially affect commerce—

(a) For the purpose of obtaining information relating to health and safety conditions in such mines, the causes of accidents involving bodily injury or loss of life in such mines, whenever such health or safety conditions, accidents, or occupational diseases burden or obstruct commerce or threaten to burden or obstruct commerce.

(b) For the purpose of obtaining information relating to health and safety conditions in such mines, the causes of accidents involving bodily injury or loss of life in such mines, or the causes of occupational diseases originating in such mines, as a basis for determining the most effective manner in which the public funds made available for the protection or advancement of health or safety in coal mines, and for the prevention or relief of accidents or occupational diseases therein may be expended for the accomplishment of such objects.

(c) For the purpose of obtaining information relating to health and safety conditions in such mines, the causes of accidents involving bodily injury or loss of life in such mines, or the causes of occupational diseases originating in such mines, as a basis for the preparation and dissemination of reports, studies, statistics, and other educational materials pertaining to the protection or advancement of health or safety in coal mines and to the prevention or relief of accidents or occupational diseases in coal mines.

(d) For the purpose of obtaining information relating to accidents involving bodily injury or loss of life in such mines or relating to occupational diseases originating in such mines, to be transmitted to the Bureau of the Census for use in connection with the preparation and compilation of the various Census reports.

(e) For the purpose of obtaining information relating to health and safety conditions in such mines, the causes of accidents involving bodily injury or loss of life in such mines, or the causes of occupational diseases originating in such mines, to be transmitted to the Congress for its consideration in connection with legislative matters involving health and safety conditions, accidents, or occupational diseases in coal mines.

To comply with the provisions of the new law the Bureau of Mines has organized a mine inspection division with a corps of more than 180 inspectors. These inspectors have been given an intensive training course and detailed to their positions through the coal-mining States to obtain facts about hazards to health and safety in coal mining that can kill or injure miners and impede defense production. The new inspectors will cooperate closely with State departments of mines, coal-mining operators, and mine workers' organizations. They have gone into the field to investigate conditions in the coal mines and to offer recommendations for eliminating hazardous practices and conditions so that man power and material will be conserved for the Nation's war efforts and for the peacetime production program to follow. The importance of this work to the war effort is indicated by the fact that injuries to coal miners in 1940 deprived United States defense and industrial plants of a potential ten and a half million tons of coal, according to Bureau statistics. In that period 59,721 miners were injured, and each lost an average of 25 working days, or a total of 1,321,459 days. Based on an average production of 4½ tons of coal per day for each miner, the staggering loss of 10,446,565 tons of potential coal can be charged up to accidents, most of which could have been prevented by observance of safety rules and practices.

In addition to the accident hazards, the coal-mine worker is subjected to strenuous activities and his working environment may be of such nature as to be detrimental to health. Therefore, in accordance with the provisions of the mine inspection act, the Bureau has reorganized and expanded the work of the Health Division, much of which has been in abeyance since the depression owing to lack of funds. Physicians, chemists, sanitary engineers, and other technical personnel under the direction of the recently appointed Chief of the Division,

a Senior Surgeon of the United States Public Health Service, will cooperate with the mine inspectors and with health departments of the various coal-mining States in ascertaining the atmosphere and other conditions that may affect adversely the health and safety of the miners (such as dusts, gases, temperatures and humidities, and methods of work). Laboratory facilities also are being expanded to handle the analytical work required to determine the hazards to safety as well as to health of the physical quality of mine air. Plans have been formulated for the preparation of detailed reports and the widespread dissemination of the information obtained from laboratory research and mine investigations.

It is hoped that the need created by the urgency of defense requirements for further study of health and safety conditions in industry and for increased work in this field, will result in a far more widespread use of trained personnel and equipment in the handling of industrial hygiene problems. Under present conditions, industrial hygiene is a war necessity, and the efforts to prevent and combat occupational disease and illness will become more important as the demands for military production increase, and it is hoped that combined adequate attention given to the many medical and social problems involved in the industrial life of the Nation will contribute materially to the ultimate victory of the United Nations.

It will require the combined efforts and the cooperation of all individuals and agencies concerned with war production and the health and welfare of workers to solve the many problems of industrial hygiene which are sure to arise.

## SUMMARY

*In the present-day* three-dimensional, mechanized warfare industrial supremacy is at least as important as military emergency. Victory can be more easily achieved by the United Nations when their industrial output in essential military and civilian requirements surpasses that of the enemy and overcomes the handicap of the vast quantity of material that the Axis powers have been accumulating with the avowed purpose of enslaving the world. The incidents of Pearl Harbor and the gallantry of the United Nations' troops in the southwest Pacific have increased tremendously the pressures on all loyal Americans for an all-out victory effort. This pressure is exerted more especially on the industries indispensable to prosecution of the war.

If the war continues industry will have to utilize the services of the less physically fit who are prone to suffer accidents and occupational diseases which lead to fatigue, inefficiency, and absenteeism with consequent reduction in production vital to the prosecution of the war. Experience in individual plants and industries show that the huge loss can be prevented by the application of proper measures.

Although much has been done in the application of well-known preventive measures much more remains to be done. The principal retarding influence has been the lack of trained medical and other technical personnel and equipment to conduct the necessary investigations and apply preventive measures to particular conditions. This lack is due partly to the late development of industrial medicine and hygiene and to the paucity of facilities in our educational system for training industrial hygienists.

The pressing need of "all-out" production of war supplies has given powerful impetus to industrial medicine and hygiene. Many governmental and private organizations are making strenuous efforts to provide adequate facilities for protecting the health and safety and increasing the efficiency of workers.

This paper discusses some of these organizations and the work they are doing to assist in achieving victory.

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Chairman Kefauver: Dr. Sayers has given us a very clear and apt historical, legal and physical problem in occupational diseases and industrial hygiene under *present conditions.*

Now, we will hear of some of the physiological aspects of industrial hazards. "Hematologic reflections and implications of some occupational hazards" by Dr. Charles A. Doan, Director of Medical Research, Prof. and Chairman Department of Medicine, Ohio State University, Columbus, Ohio. (Applause.)

## HEMATOLOGIC REFLECTIONS AND IMPLICATIONS OF SOME OCCUPATIONAL HAZARDS

DR. CHARLES A. DOAN
Director of Medical Research, Ohio State University, Columbus, Ohio

Dr. Doan: Mr. Chairman, Ladies and Gentlemen: Today, as never before, individually and as a nation, we are realizing that optimum physical fitness is the prerequisite for sustained effort and maximum output in industry.

Work, as performed by the average person, cannot be reduced to a simple formula. The fatigue of the *ordinary factory worker* is too subtle to yield to the ordinary tools of the physiologist. Nor do the tests of the psychologist, as suggested by Dr. Sayers, provide the answer. Neither has fully explained so-called **chronic industrial fatigue** with its decrease in productivity and increase in illness associated with long hours of light or moderate work.

This type of "fatigue," which sometimes is confused, as it was in the last war, with malingering and laziness, is a very definite state though, as has been suggested, it is difficult to measure objectively. We have seen evidence of it from the medical standpoint in the selection of donors for blood transfusions. When we—as we frequently have to do, we used to think we had to do—have a volunteer donor, after the end of a day's hard physical work, donate blood in the early evening, the recipient more often than not after receiving 500 c. c. of life compatible, presumably normal, blood feels very much worse than he or she did before the transfusion. There is transferred to the patient, by the blood from this tired worker, the same degree of fatigue that the donor was experiencing to further complicate rather than help the situation in terms of the illness. So, one may obtain an index of the degree of accumulated fatigue products, by noting the difference in the response of the recipient to two donations of blood from the same donor, one taken before and one after prolonged physical effort. Incidentally the "fatigued" donor cannot so safely lower his own blood cell reserves.

The social and economic conditions inside and outside the factory, in addition to the controlling of the hours of labor, are very important for the health of the worker. The psychologist and the director of personnel each have a good deal to contribute to the problem. The physician, since the time of Hippocrates, has known the importance of rest and diet in the treatment of disease, and still puts the patient to bed when he becomes ill. He also knows the value of rest, and diet, and recreation in the prevention of disease, which is our chief objective now, and which, rather than the cure of disease, has been for some time the principal goal of the alert scientific physician.

We cannot win the war with work alone. Physical and mental fitness must undergird "willingness" and "patriotism." The intelligent application of, at present known, medical facts will work wonders!

Now, there are several types of medical hazards. In the first place, infections, such as the common cold and influenza, are always a real epidemic hazard in any situation, where individuals live or work together in close proximity, particularly if optimum hygienic conditions do not obtain. Among the more subtle changes which may lower the resistance to infection of the individual during such pandemics, is anemia in some degree. The plant nurse should be on the alert for the appearance of unusual pallor or signs of abnormal fatigue in any worker. Aside from sub-optimal nutrition many other factors may contribute to anemia: chronic hemorrhoids, silent peptic ulcer, low grade hemolytic