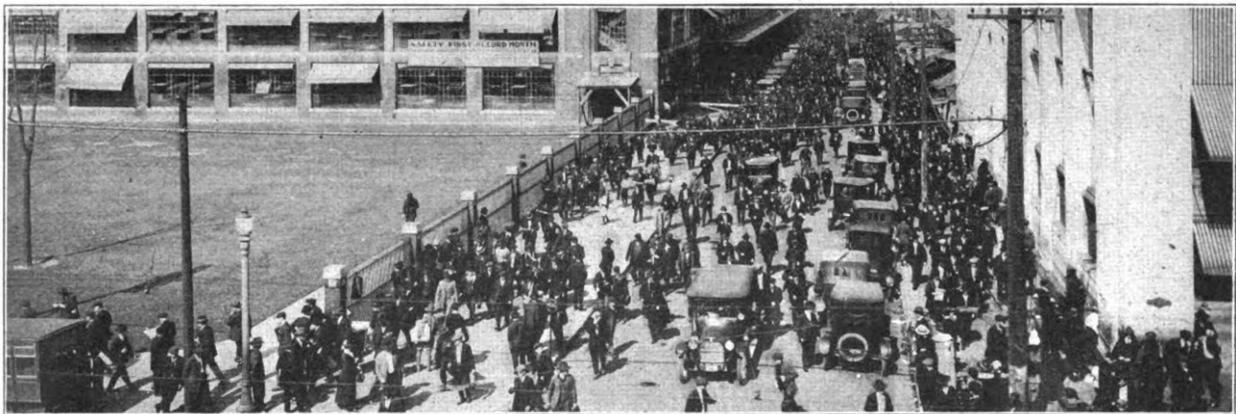


# How Henry Ford Saves Men and Money

The Story of a Trip Through The Ford Motor Company's Plant With the Man Who Guided 50,000 Employees Through a Year of Work With Only One Fatal Accident.  
By Louis Resnick. *National Safety News*, September 18, 1920

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There is one flaw in the story that follows. It does not mention the name of the man whose imagination, courage, and perseverance are largely responsible for the remarkable accomplishments described therein. The story was submitted to him for correction of possible errors in fact and when the manuscript was returned his name wherever mentioned had been carefully edited out and the name of the company or department placed in its stead. When we asked this man for his photograph, he sent instead a panoramic view of the plant. We admire nothing more than genuine modesty and plant spirit such as this man has displayed, but here is one instance where we feel justified in exercising the editorial prerogative of naming him against

his will. We refer to **Robert A. Shaw**, better known as "Bob," Director of the Department of Safety and Factory Hygiene of the Ford Motor Company.<sup>1</sup>  
—The Editor.

ABOUT six years ago the manager of the compensation department of the Ford Motor Company came to Henry Ford with a request for authorization to build a larger industrial hospital. No verbatim report of the conference was made, but I am told the conversation ran something like this:

Manager of Compensation Department: "We need a big hospital to care for our injured employees. We owe it to the men to take good care of them when they are hurt, and besides it will be a good investment because proper hospital attention will enable injured men to get back to work quicker than they do under present conditions."

Mr. Ford: "No sir, we will not go into the hospital business. We will eliminate accidents instead. If we owe it to our men to care for them when they are hurt, we certainly owe it to them to do everything in our power to keep them from getting hurt; and if it would be a good investment for us to build a larger industrial hospital, it certainly will be a better investment for us to get rid of accidents. That's your job from now on. **PREVENT ACCIDENTS, even if you have to redesign our machines or methods to do so.**"

There you have the beginning of one of the most effective pieces of safety work that America has seen. Machines—hundreds of them—were redesigned; equipment was thrown out;<sup>2</sup> buildings were remodeled ; processes were changed ; workmen were trained; and millions of dollars were spent by the Ford Motor Company during the intervening years—all to safe guard the lives and health of the workmen. With what results? Here is one. During the fiscal year of

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<sup>1</sup> Robert Shaw therefore deserves enormous credit as a pioneer in modern occupational health and safety (OHS), including the "can't rather than don't" safety principle. *National Safety News* (October 1922) includes an article, "48,000 Ford Employees Go Year Without Fatality." While "no fatalities" is taken for granted in the 21<sup>st</sup> century (with any kind of workplace fatality drawing immediate and unfavorable attention as an exception), this was not the case 100 years ago.

This also underscores a parable related to Sun Tzu's Art of War. Three brothers became medical doctors long ago. The youngest cured serious diseases, so he was known throughout the realm. The second brother cured diseases in their infancy, so his name never went beyond his village. The eldest prevented the diseases, so his name remained unknown. We will never know how many thousands of workplace injuries and fatalities were prevented by Robert A. Shaw's work, but it is past time that he got the credit.

<sup>2</sup> Henry Ford wrote of this (*My Life and Work*, 1922), "Machine safeguarding is a subject all of itself. **We do not consider any machine--no matter how efficiently it may turn out its work--as a proper machine unless it is absolutely safe.** We have no machines that we consider unsafe, but even at that a few accidents will happen. **Every accident, no matter how trivial, is traced back by a skilled man employed solely for that purpose, and a study is made of the machine to make that same accident in the future impossible.**" The need to take corrective and preventive action (CAPA) for incidents and near misses is consistent with ISO 45001 clause 10.2, "Incident, nonconformity and corrective action."

1918-1919, in the Highland Park plant (the parent of the company) —where 50,000 men and women were at work throughout the year, with 3,000 punch presses, 20,000 other machines and 70 elevators, with miles of loading docks where 60 giant cranes move at once, with 350 acres of foundries, heat treating works, drop forge departments, machine shops, chemical laboratories and railroad yards—in this plant during that entire year only one man was killed by accident. You will appreciate just what this means when I tell you that if this percentage of accidental fatalities were maintained by the industries of the country generally, the accidentally killed in these industries each year would be 760 men and women instead of 22,000, as is now the case.<sup>3</sup>

If you will ask the Director of the Ford Motor Company's Department of Safety and Factory Hygiene, to what he attributes the remarkable accomplishments of his department, he will say: "First, to the co-operation of our foremen; next to the fact that we endeavor to educate rather than order our men to be careful; finally—and without this the first two would hardly be possible—the backing of our General Superintendent."<sup>4</sup>

If you would ask him for a bit of advice regarding possible methods of developing an effective safety department within your own plant—whether it be large or small—he would answer: "Work on your equipment first; guard every dangerous machine and every unsafe spot in the plant. Then gradually work in your educational campaign. You cannot expect the co-operation of your men until you have shown them that you really mean to do your share in making the plant safe."

Let us look first into the organization of the Ford Company's Department of Safety and Factory Hygiene and its educational methods. In addition to his list of assistants, the Director has a standing safety committee of 100 workmen and foremen, each selected by his own department. The Director's immediate staff includes, at the Highland Park plant, two divisional safety supervisors, two chief inspectors, a chief of hygiene, a bacteriologist, and a follow-up man. There are also in his department twelve safety inspectors and ten sanitation inspectors. Of the former, one spends all his time inspecting cranes and elevators, one punch presses, one grinders, one construction, one operating equipment; six men are assigned to inspect general conditions, and one inspector is on duty at night. The principal function of the sanitation squad is to clean drinking fountains twice daily and to spray disinfectants throughout the plant once each day.

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<sup>3</sup> In other words, the Ford Motor Company was almost 29 times safer than its contemporaries. This was achieved through occupational health and safety (OHS) techniques that are easily recognizable today such as lockout-tagout.

<sup>4</sup> ISO 45001 section 5, Leadership and Worker Participation, stresses the importance of top management support.

**Ten Men Do This All Day.**



### **How Safety Bulletins Are Used at the Ford Plant**

Very early in a trip through the Ford plant one realizes that in the matter of posting safety signs and bulletins the policy is decidedly one of quality rather than quantity. All the National Safety Council's bulletins are posted in the office of the Safety Department immediately upon their arrival, and as a new batch comes in those of the previous week are filed in a system of swinging wall racks where they can be reached on short notice. Through the standing committee of 100 and with 110 bulletin boards, the Safety Department of the Ford Company conducts a continuous

propaganda throughout the year,<sup>5</sup> varied only from week to week by intensive campaigns against specific hazards as supplements to the general campaign.

In addition to the general bulletin boards on which the company carries alternately the Council's bulletins and those prepared by its own Safety Department, there are in many departments glass covered boards on which are posted permanently certain bulletins applying to the particular departments.<sup>6</sup> Thus in every department where high voltage current is used, there is posted permanently the Council's bulletin of illustrated instructions for the Prone Pressure Method of Resuscitation from electric shock. Wherever compressed air is used there is posted a bulletin showing how "horse play" with compressed air may lead to death. In each elevator there is posted 'permanently a bulletin illustrating the most common elevator hazards.

The educational program of the Safety Department includes daily noon hour meetings, nightly moving picture shows for new employees during the fall and winter months, the teaching of safety along with instruction in English at the plant's Americanization school, and the preparation and distribution to the workman of leaflets describing the safe and unsafe methods of the operations in which he is engaged.<sup>7</sup>

Every noon two of the Director's helpers go about from department to department, carrying with them small bulletin boards on which are posted photographs showing the cause and result of the most recent accident within the plant and also a bulletin or photograph illustrating an accident of the type against which that particular week's campaign is directed. Thus, on the occasion of the writer's visit a campaign against running was under way, and at each noonday meeting that week the workmen heard accounts of accidents that had been caused by running within the plant.

### **Typical Noonday Meeting**

These noon meetings last five minutes or less and are very informal. The safety man walks into a group of men at lunch and says "Hello fellows; I want to show you a picture of an accident that happened down here in Dept. Z-43" and the meeting is on. When the safety man is through talking some workman says "That guy ought to have known better than to run in a department of that sort"; another asks a question or two, and the safety man is on his way to the next group.

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<sup>5</sup> Propaganda is any form of communication whose purpose is to influence attitudes and behavior, and it may be honest or dishonest. A quality policy that is NOT propaganda, i.e. does not influence attitudes and behavior, is what W. Edwards Deming would call a meaningless slogan. Anti-smoking posters, and appeals for blood drives, also are propaganda whose purpose is entirely honest and constructive.

<sup>6</sup> This supports ISO 45001 Clauses 7.3, Awareness, and 7.4, Communication

<sup>7</sup> This exemplifies ISO 45001 Clause 7.2, Competence. How do we train employees in relevant OHS considerations that apply to their jobs?

The moving picture show is one of the most effective means of reaching the new workman with the safety message,<sup>8</sup> the Ford Motor Company has found. When the new employee checks out at the end of his first day at the plant, he finds on his clock card a ticket reading:

"YOU ARE REQUESTED TO REPORT AT THE SCHOOL BUILDING IMMEDIATELY AFTER RINGING OUT TONIGHT. THIS IS IMPORTANT." (Signed) General Foreman.

At the auditorium the work man sees a safety film, which is both entertaining and instructive; he hears a brief talk on the value of safety to himself as well as to the company; and he is invited to come again. Then he is given a ticket which reads : "To the Foreman—THIS EMPLOYEE HAS BEEN INSTRUCTED IN SAFETY PRACTICE—H E L P HIM START RIGHT."

So much for education. The Ford program of mechanical safety seems to be based on a few common sense principles. Here they are:

First, keep the place clean;<sup>9</sup>

Second, make the worker comfortable;

Third, make the machine foolproof, and so far as possible, accident proof.

Let us see how the Ford Company accomplishes each of these things. To begin with, the floors and windows of practically all the buildings of this huge plant are kept as clean as the floors and windows of the average American home. It takes 950 men to do this job alone. The floors are swept continuously, and once a week are scrubbed with boiling hot water and soda mixture. Sixty tons of rubbish are trucked away every twenty-four hours.

Nowhere is the fact that "light is a tool which adds to the efficiency of every other tool" more fully appreciated than at the Ford plant.<sup>10</sup> There every window is cleaned, every wall painted white, every windowless spot flooded with artificial light. The windows and skylights are washed as frequently as is necessary, every glass roof being equipped with rails for an especially constructed window washing truck.<sup>11</sup>

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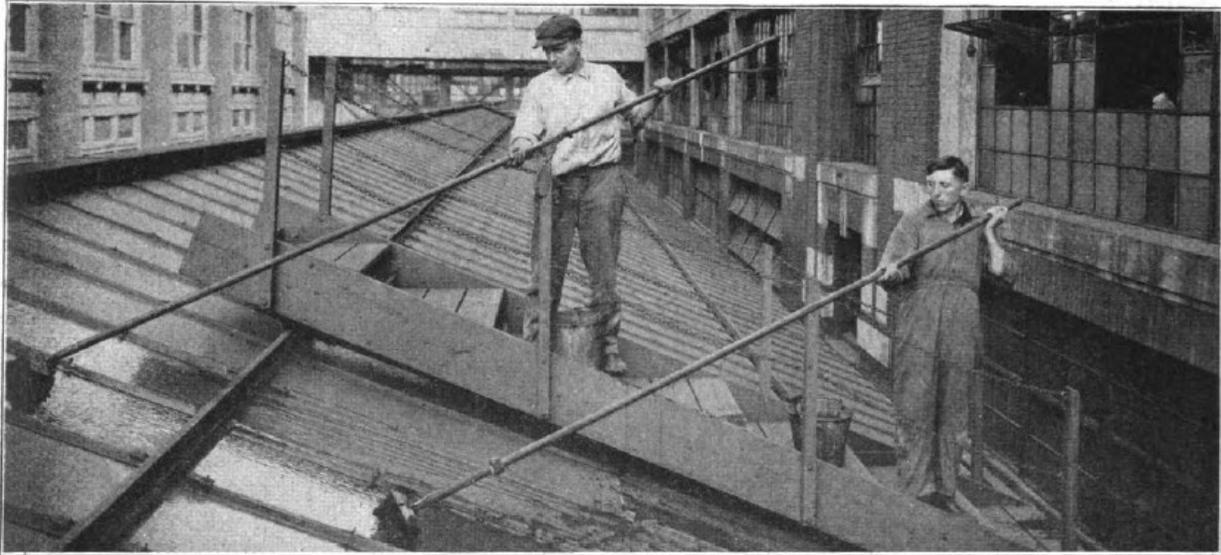
<sup>8</sup> Use pictures (e.g. before and after pictures that show how an unsafe situation was corrected) and videos to support the awareness and communication clauses (7.3 and 7.4) of ISO 45001.

<sup>9</sup> 5S can help here

<sup>10</sup> Frank Gilbreth (1911) pointed out that good lighting is the cheapest thing there is in a factory because of its effect on productivity.

<sup>11</sup> The window cleaning sponge on a pole, with a conduit for water inside the pole, apparently originated at the Ford Motor Company.

## Ford Spends \$2,000,000 A Year To Keep The Plant Clean and Says "It Pays"<sup>12</sup>



Eleven men in the sanitary department are continuously inspecting the plant. Insanitary conditions are reported and remedied immediately upon their discovery. The seven hundred sanitary drinking fountains are cleaned several times a day and all wash stands, waste cans, drains, sewers, and toilet rooms are sprayed with disinfectant daily.<sup>13</sup> Particular attention is paid to places where men gather in large numbers, such as the employment office and medical examination rooms, which are sprayed twice a day and fumigated every Sunday. The sanitary department also helps the hygienic laboratory in checking up the condition of fluids used for cutting purposes.

### **\$20,000 a Year for Paper Cuspidors**

One little detail stands out as typical of Mr. Ford's policy regarding safety and sanitation, which, by the way, is one of his personal innovations. Like most other plants, the Ford Company years ago woke up to the menace of the indiscriminate expectorator. Mr. Ford thought it over a while and then hit on this plan, which has been in effect for several years with entire satisfaction to all concerned. In each department there is a constant supply of paper cuspidors and sawdust. Each morning the man who is accustomed to spitting while at work fills a fresh cuspidor with sawdust and places it near his station. At the end of the shift, he throws his used cuspidor into the refuse can. It costs the company \$60 a day—\$20,000 a year—to provide the paper cuspidors, but Mr. Ford believes this money is well spent. It costs the company more than \$6,000 a day—close to \$2,000,000 a year—to keep the windows washed, the floors swept and scrubbed, and the plant generally clean, but it pays, Mr. Ford says.

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<sup>12</sup> Would some kind of fall protection be required for these workers under today's OSHA standards? It is to be noted, however, that the moveable stairs on which they are working does have rails (they look like ropes) that would prevent a worker from falling off and possibly falling through an overhead window.

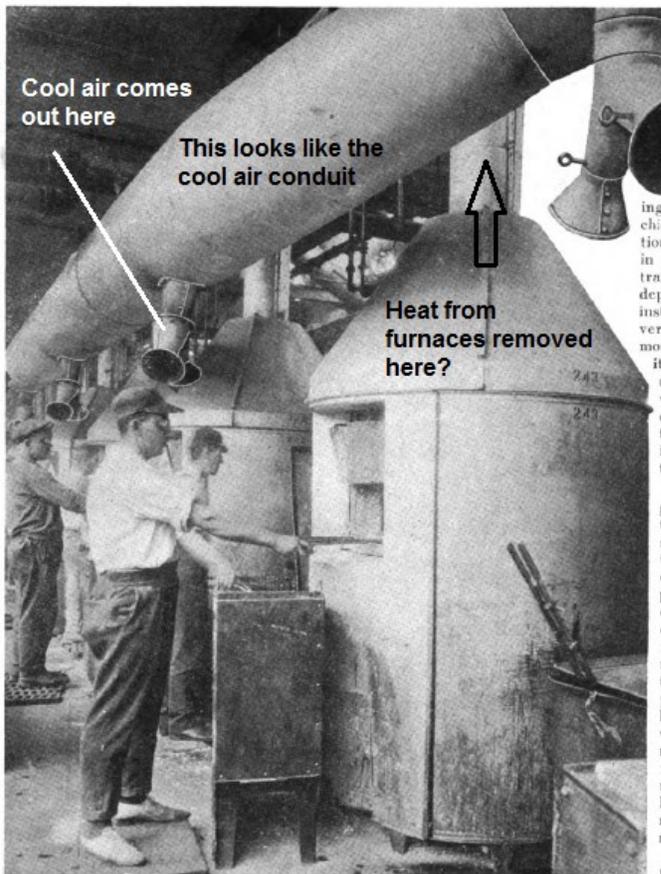
<sup>13</sup> The condition of the rest rooms may well reflect on the factory's (or restaurant's, or airport's) overall attitude toward safety and/or customer service.

How does the Ford Company make its workers comfortable? Principally by exhausting the hot or impure air and pumping in fresh, cool air by means of fans. There is scarcely a department in the plant that is not equipped with a ventilating system adapted to the conditions.

### **\$11,000 Safety Device Pays for Itself in Thirty Days**

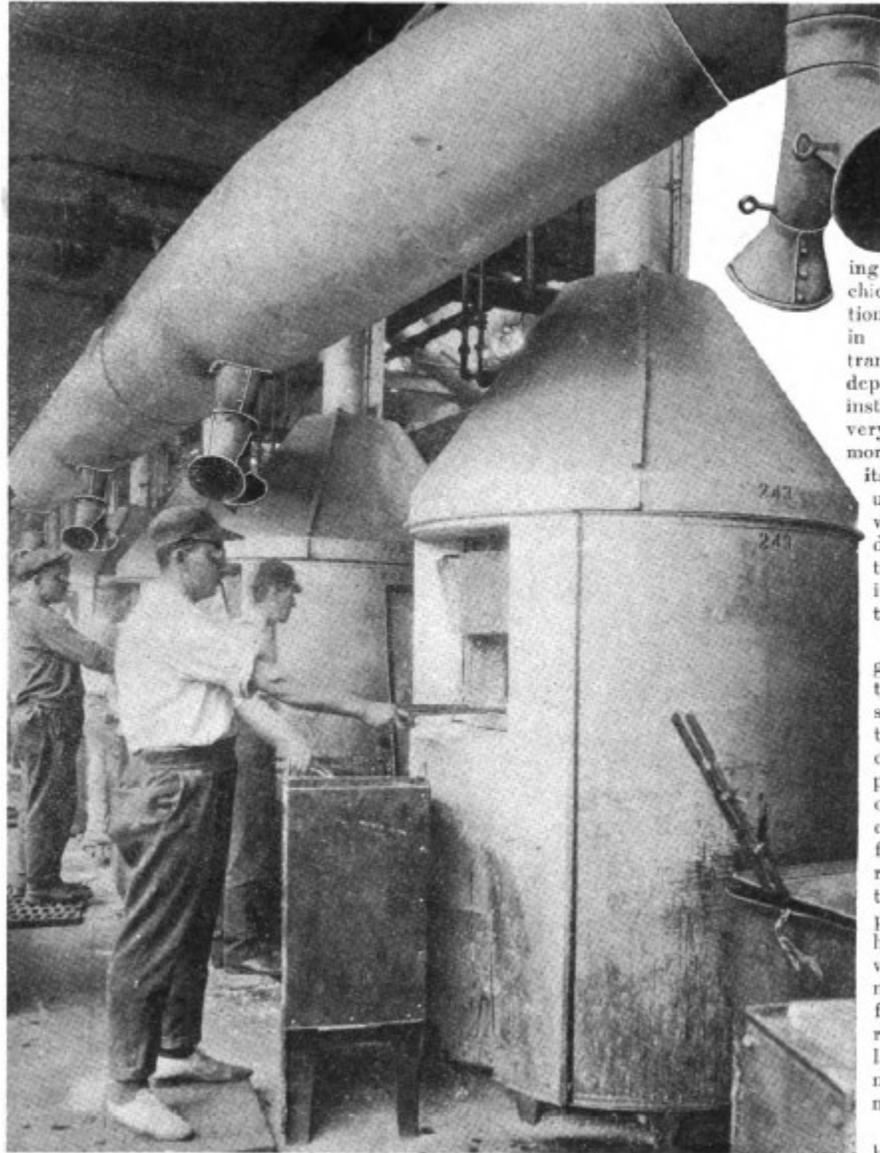
Let me tell you about one of the most interesting such installations. There is in one of the buildings at Highland Park a department including 97 cyanide furnaces and 17 annealing furnaces. Up to a few months ago this department was one of the most troublesome in the plant. The furnaces were heated to 1560 degrees Fahrenheit and it was necessary for the workman, standing directly before the open furnace doors, to work in a temperature of 133 to 135 degrees. It was impossible to keep men in this department for any length of time, and during the summer months 8 to 10 cases of heat prostration a day was a common experience. The situation became so serious that the general superintendent, P. E. Martin, made a special study of the department and as a result an eight inch metal canopy was placed around each furnace, making possible the continual exhaustion of the hot air. At the same time cold air was blown down on the heads of the furnace tenders, bringing the temperature where the men worked down to 80 degrees.<sup>14</sup>

This installation was completed last Spring at a cost of \$100 per furnace—\$11,400 in all. And this is how Frank Donovan, superintendent of the department, described the results to me. "The canopies have done away with heat prostrations in this department, the labor turnover has been reduced twenty-five per cent, the output has been increased, and our working force has been reduced fifty per cent. This ventilating



installation paid for itself the first month in the saving of labor alone, by enabling one man to take care of two furnaces instead of one as before."

TEMPERATURE IN FURNACE 1560 —TEMPERATURE WHERE WORKMAN STANDS, 80—SYSTEM TO DRAW OFF HOT AIR AND BLOW IN COLD CUTS WORKING FORCE IN HALF AND ELIMINATES HEAT PROSTRATIONS.



### Remodel Buildings for Safety's Sake

"We once tore down almost an entire building in order to make it safe," said the Director of Safety. "At another time we rebuilt a foundry roof, from a saw-tooth to a monitor type, at a cost of thousands of dollars in order to provide better ventilation. We spent \$9,000 for a suction system to remove dust from a piston turning operation and the immediate result, according to our

medical chief was a reduction of 22 per cent in requests for transfers from that department. This installation in a very short time more than paid for itself by enabling us to keep expert workmen in the department, thereby increasing the production.<sup>15</sup>

"We had a great deal of trouble retaining skilled men in the acid room of our radiator department because of skin troubles caused by the fumes. We raised the roof of this room and put in exhaust hoods over the vats which eliminated the acid fumes with the result that **the labor turnover is now practically nil.**"

It would take books to tell all that is being done at the Ford Motor Company's plant to make the workman comfortable.

### **Making the Machines Foolproof**

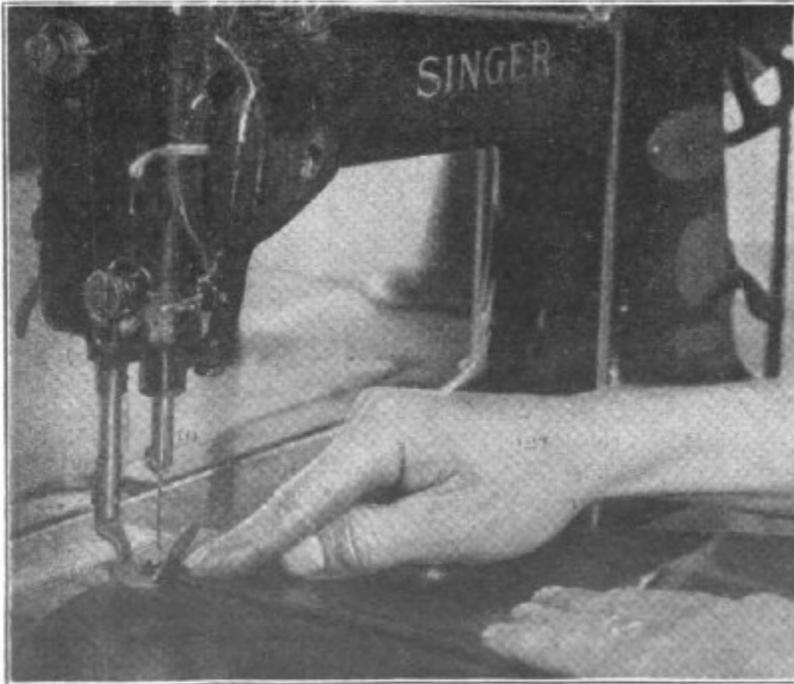
In guarding machines the Ford policy seems to be that no machine is too large or too small, too simple or too complicated to be guarded. Even the simple little sewing machine, of which there are 150 in one department, did not escape the watchful eyes of the safety department. Every now and then the needle of one of these high speed machines would run through an operator's finger. Sometimes the needle would break after perforating a finger and a minor operation would become necessary. **When such accidents began to occur at the rate of three and four a day, the safety department looked into the matter and devised a little 75 cent guard which makes it impossible for the operator to get his finger in the way of the needle.**<sup>16</sup>

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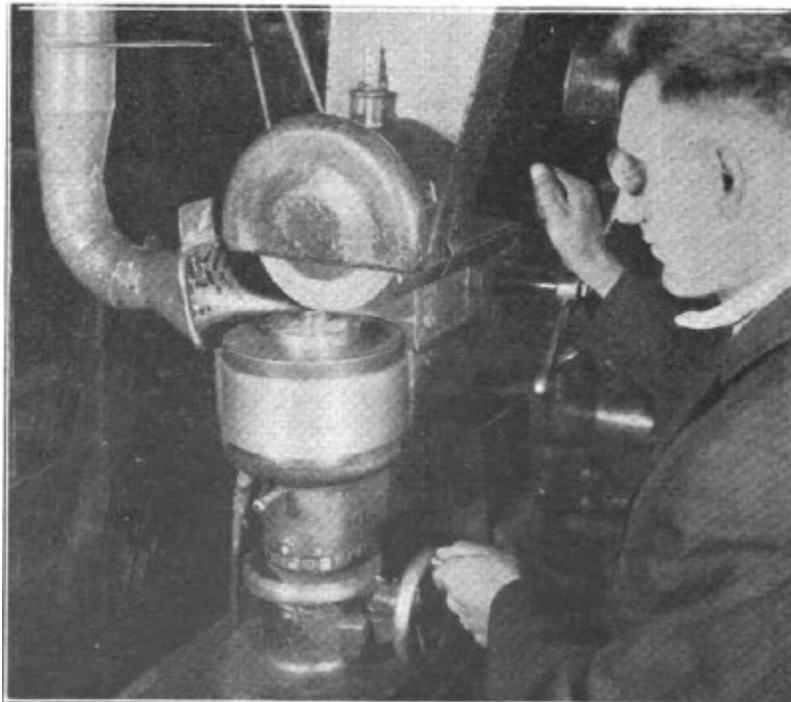
<sup>15</sup> Workplace safety is therefore synergistic with workforce morale and worker retention. An uncomfortable workplace—and note also the turnover in the furnace department prior to the improvement—may or may not be an unsafe workplace, but uncomfortable conditions could, as shown here, be symptomatic of a potential safety issue such as heat prostration, dust inhalation, or exposure to acid fumes. Correction of the problem not only removes the potential for actual harm, but also reduces workforce turnover.

<sup>16</sup> This exemplifies the "Can't rather than don't" safety principle. Instead of warning the operator, "**Don't** put your hand under the needle," the machine was redesigned so the operator **can't** put his or her finger under the needle. "Don't" → 3 to 4 puncture wounds daily, and probably more dangerous than it is now because there were no antibiotics and the tetanus vaccine was invented several years later, while "Can't" → 0 puncture wounds daily.

**A 75-CENT MACHINE GUARD WHICH KEEPS NEEDLES OUT OF FINGERS  
AND PAYS FOR ITSELF SEVERAL TIMES A DAY.**



**EVERY HAZARD GUARDED. NOTE EXHAUST SYSTEM, GUARD  
OVER EMERY WHEEL, BELT GUARD, AND GOGGLES.**



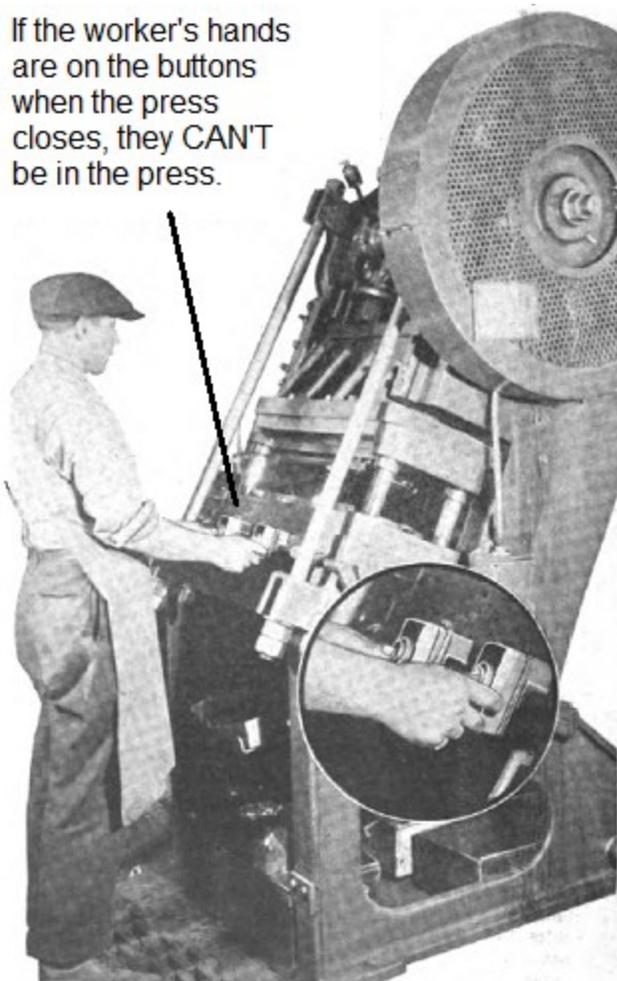
Probably the most notable accomplishment in mechanical safety work at the Ford plant has been the guarding of punch presses. Approximately 90 per cent of the 8,000 punch presses at the Highland Park plant are now operated by the two hand push button tripping device, developed by the Director of the Department of Safety and Factory Hygiene, which makes it impossible for the workman to get his hands in the way of the plunger while the press is in motion. To trip a press equipped with this device the operator must press two buttons, about a foot apart, so that it is necessary for him to use both hands. A two-man press so equipped will not trip until four buttons are pressed at one time; a three man press will not trip until six buttons are pressed simultaneously.<sup>17</sup>

The electric push button device on presses requiring two or more operators replaces the red and green light and the so-called tap-tap systems of signaling which each year takes a toll of thousands of fingers and hundreds of hands in less progressive plants.

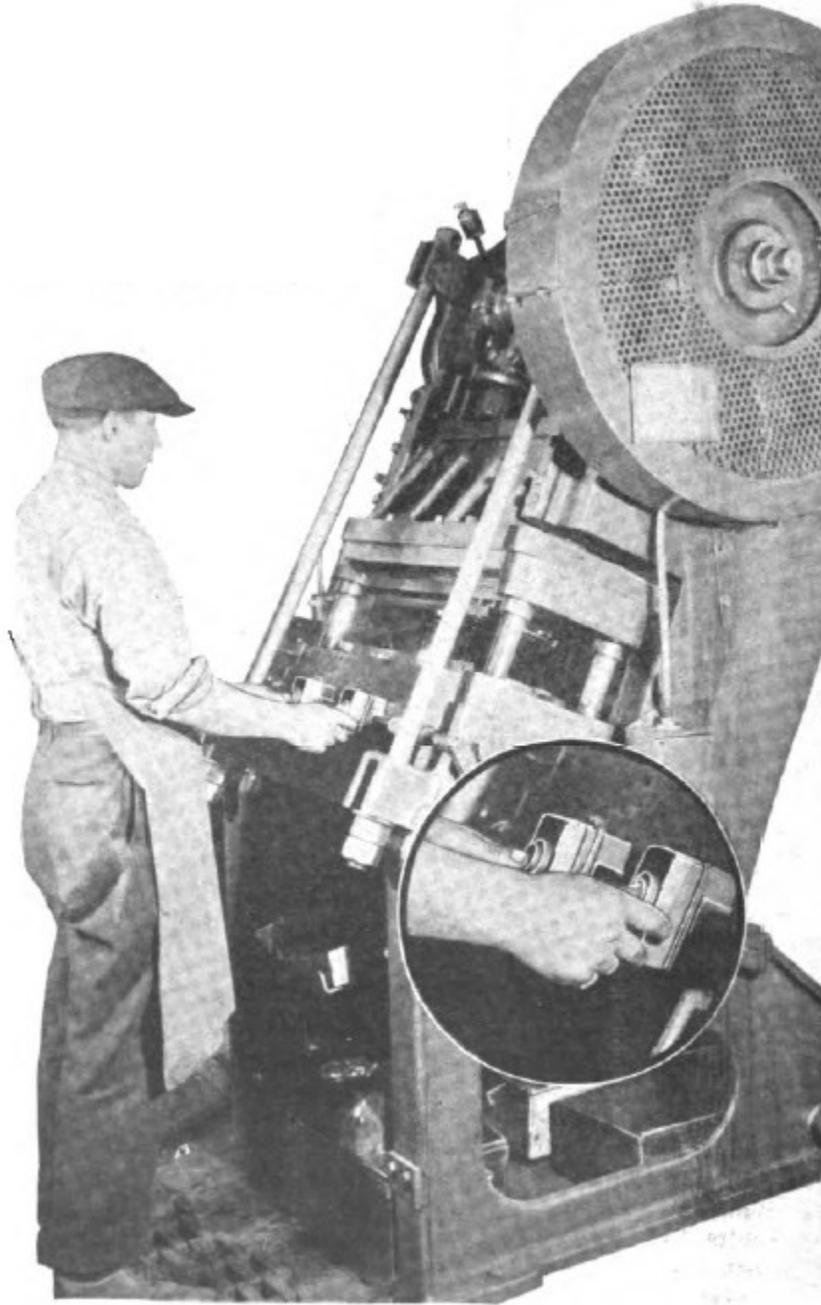
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<sup>17</sup> This also exemplifies "Can't rather than don't." The **administrative control** of tap signaling, i.e. "Don't put your hand in the press when it closes," failed to prevent thousands of amputation injuries a year throughout the country. The two hand push button tripping device made it so you **can't** put your hand in the press when it closes, which reduced the amputation rate to the nice round figure of ZERO.

If the worker's hands are on the buttons when the press closes, they CAN'T be in the press.



**PUSH BUTTON TRIPPING DEVICE USED ON 3,000 PUNCH PRESSES  
AT THE FORD PLANT SAVES FINGERS, HANDS AND DOLLARS.**



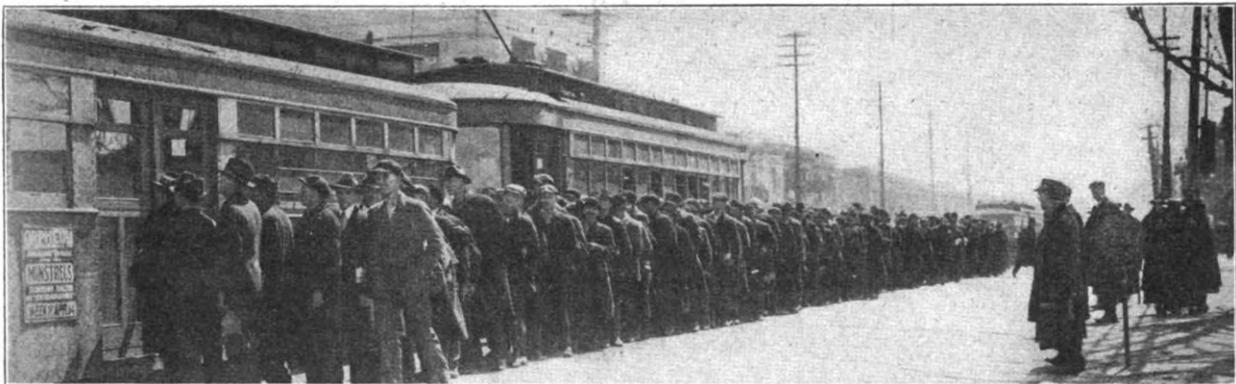
"This device has not only almost wiped out punch press accidents, but **has increased production on an average of ten per cent,**" said the Director. "It has done this largely by eliminating the fatigue resulting from the operation of punch presses by a foot trip. We require all punch press operators to use tongs for inserting metal and taking it out of the presses. We have shut down punch presses and redesigned dies by the hundreds to make them safe. Recently we made arrangements with the tool designing department for the inspection of drawings of dies before they go to the die makers, thus saving considerable time and expense and eliminating the danger at the source. Whenever we improve on a machine we send a drawing of the safety device to the

manufacturer and in most cases he redesigns the machine to incorporate the guard that we suggest."

In safeguarding the operation of cranes the Ford Company also has distinguished itself, for it is one of the very few companies that really keep workmen out of the way of traveling cranes. This is done largely by the use of powerful sirens placed just above the crane hooks and electrically operated as the cranes travel. The craneways are equipped on either side with steel enclosed loading balconies.

It would take several books to do justice to the Ford Company's safety work. And from another point of view the whole story of this work is told in the story of the Ford campaign against the upturned nail. Long before my trip through the Ford plant I had heard a great deal of this campaign. I had heard of the boast that the saving in reclaimed nails alone justified the company's policy of employing a number of men to do nothing but draw nails out of empty boxes and barrels and loose boards; I had seen a number of the Ford Company's bulletins on the dangers of the loose nail. But I did not expect ever to spend hours walking through a great industrial plant, through block after block of receiving and shipping rooms, through acres upon acres of railroad yards, through carpenter shops, through buildings under construction and others under repair, to spend an entire day in a plant where automobiles are turned out at the rate of one every thirty seconds, and throughout such a trip see only two upturned nails. That is exactly what happened during my visit to the Ford plant. And when I asked how it was done the answer was: "Simply by being everlastingly at it. We never let up in our safety work for a single day or minute."

#### **Ford Men Save Time and Bones Even In Boarding Street Cars<sup>18</sup>**



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<sup>18</sup> I can't see the safety or efficiency principle this picture is supposed to illustrate, but airport shuttle systems now use "Can't rather than don't." The shuttle trains are walled off from the platform, and the doors to the platform open to provide access only when the train is present and its doors also are open. This makes it physically impossible for somebody to fall off the platform onto the rails.