

NATIONAL SAFETY NEWS

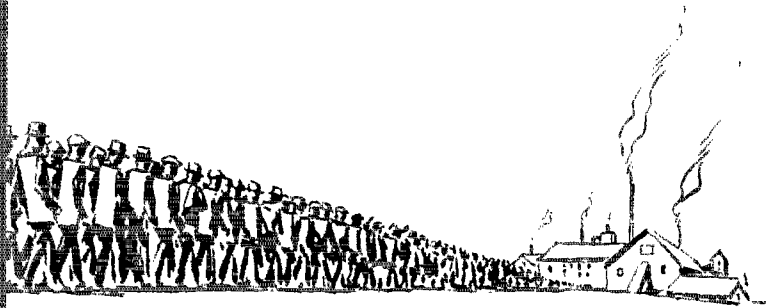
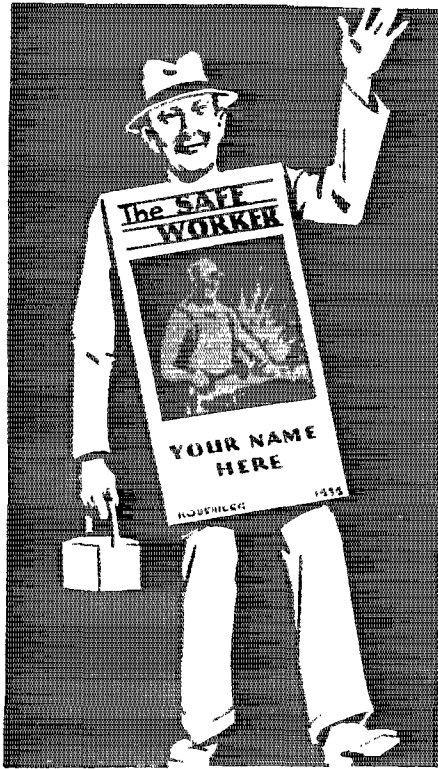
JANUARY
1977

PLAINTIFF'S EXHIBIT

NSC-131

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\$20,000 for safety or \$70,000
for accidents?"*





The SAFE WORKER Can Keep It Work, too!

EVERYWHERE old and new employees are returning to work. Industry is coming back to life. Production is starting once more.

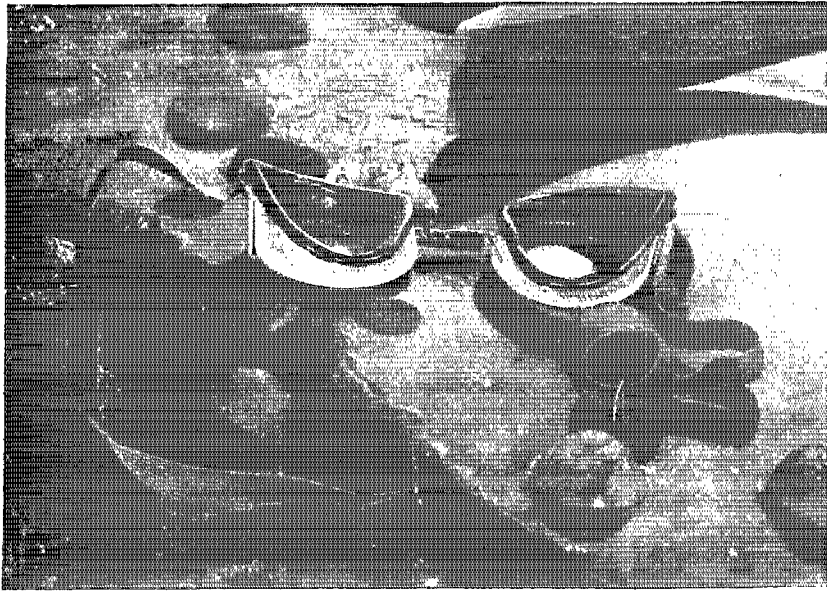
New battalions of "The Safe Worker" are also on the march, ever increasing in number. The circulation of this wonderful little magazine is reaching into new fields and increasing fast in old ones. It's a most hopeful sign.

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The January, 1934 issue is now off the press. Let us send you a copy. You'll quickly understand why it's so popular with the workers of more than 600 plants in the United States and Canada.

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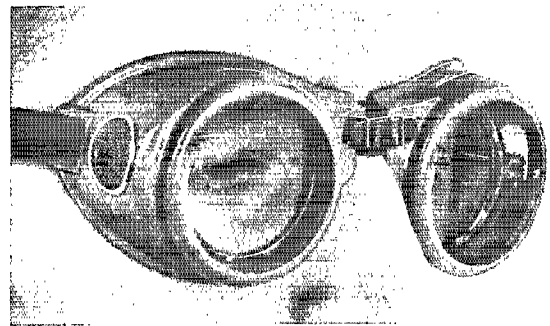


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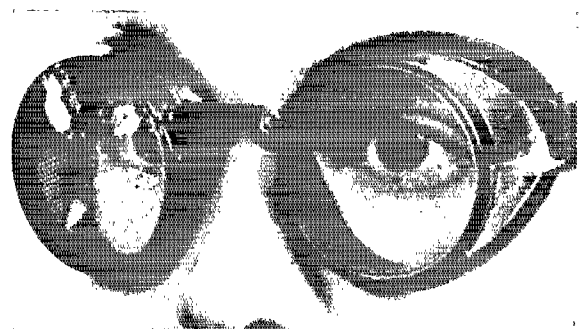
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Men are coming back to work. Whole industries feel the quickened tempo of the new order. But it looks as though costs will be harder to keep down . . . profits more dependent on good management than ever before. Hence the importance of vigorous action to prevent eye accidents from mounting with increased employment to drastically reduce the \$50,000,000 annual toll that such accidents now levy on industry's production cost.



This man costs you money !

USE THE EXPERIENCE AND RESOURCES OF PIONEER EYE PROTECTION SPECIALISTS TO HELP YOU ACHIEVE DEFINITE RESULTS

You know that profitable improvements in eye accident records are in direct proportion to the sincerity and vigor with which safety programs are developed and enforced. The actual wearing of goggles is only part of any successful plan. Conditions surrounding the formulation of rules, and application of goggle protection to meet the needs of specific jobs, vary with almost every plant and industry.

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National Safety News

Published monthly in the interest of accident
prevention and the health of industrial workers

VOL. XXIX, No. 1

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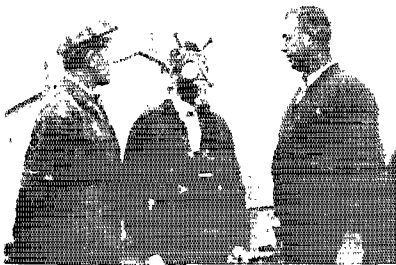
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*Deceased

DAVIS GAS MASKS

for those who give serious thought to protection.



1 Bill: "I see you are using the Davis Mask."

Tom: "You bet! And for very good reasons. The men like them—they're comfortable."



2 Bill: "Do the men like the red tubing?"

Tom: "They sure do! It's easy to see out. And the company likes Davis Masks—they last so long. Davis was the first to give us 'long life' rubber in Masks."



3 Tom: "Also Davis was first to give us free head motion—downward—the exhale valve tucked under the chin—no more guard to hit chest."

Bill: "I didn't know that!"



4 Tom: "Remember how the old elastic head straps went tight? Well, Davis was the first to give us the stretched Hango Straps—gone for the life of the Mask."

Bill: "You don't say so!"



5 Tom: "That bottom strap is low on the neck, making it hard to pull the Mask off chin in case it gets caught."

Bill: "Yes, I see!"



6 Tom: "Davis was also the first to give us quick adjustable buckles!"

Bill: "Is that so?"



7 Tom: "Smoother used to be on the outside of Masks. It was Davis who first recessed it in the rubber. Makes Mask easy to clean."

Bill: "You certainly know Masks!"



8 Tom: "And look at these clinting tubes—cemented in the face piece. Always in the same relation to lenses to give proper clearing."

Bill: "I see!"



9 Tom: "This clasp—only found on Davis Masks—gives a tight seal with the least pull on the head straps—so more comfort."

Bill: "That looks good!"

THIS IS A FACT, BILL! THERE ISN'T A BETTER MASK THAN THE DAVIS MASK. AND LOOK WHAT HE'S DONE FOR US IN THE WAY OF IMPROVEMENTS. SO I JUST FEEL DAVIS IS ENTITLED TO MY BUSINESS.

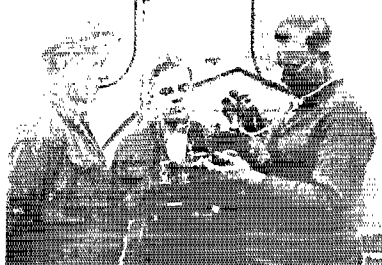
WELL, TOM, I GUESS I'D BETTER "GO" DAVIS ON MY GAS MASKS. I CAN'T LET YOU BE AHEAD OF ME!

DAVIS EMERGENCY EQUIPMENT CO., INC.
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CHICAGO, ILL.

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55 Van Dam St., New York City

Please send me copy of Bulletin No. 506 describing Davis Gas Masks.

Name.....

Company.....

Address.....

don't be an OSTRICH

The ostrich, sensing danger, and knowing it is near, hides his head forgetting that left and right and rear he's still as unprotected as is illustrated here. Now give the dumb bird credit for covering up the part that seems the most important, but that is just the start. He'd be a great deal safer, if he could find, instead, a hole to hide his whole darn hide . . . *plus* his silly head.

MORAL: An ostrich might think he could escape the hazard of broken, flying glass by hiding behind a Safety Glass windshield. But he can't. Neither can a motorist. Common sense tells you that windows, too, are liable to break. Children usually ride in back. Windows practically surround them. That's why it is important that every new car have Safety Glass all-around. Automobile manufacturers have done a great deal in providing Safety Glass windshields as standard equipment. It's up to the car-buyer to carry on from there. Safety Glass in the *windows* is essential, inexpensive and easy to get, if it is ordered when the car is ordered. Anything that can be done to impress these facts upon the public is certainly in the interest of public safety, for 45% of all motorists injured in automobile accidents are cut by broken, flying glass. That hazard will be reduced as more cars are equipped with Safety Glass *all-around*.

For prices on Safety Glass specially fitted to your present car, call the L·O·F distributor listed in the Where-To-Buy-It Section of your local telephone book.



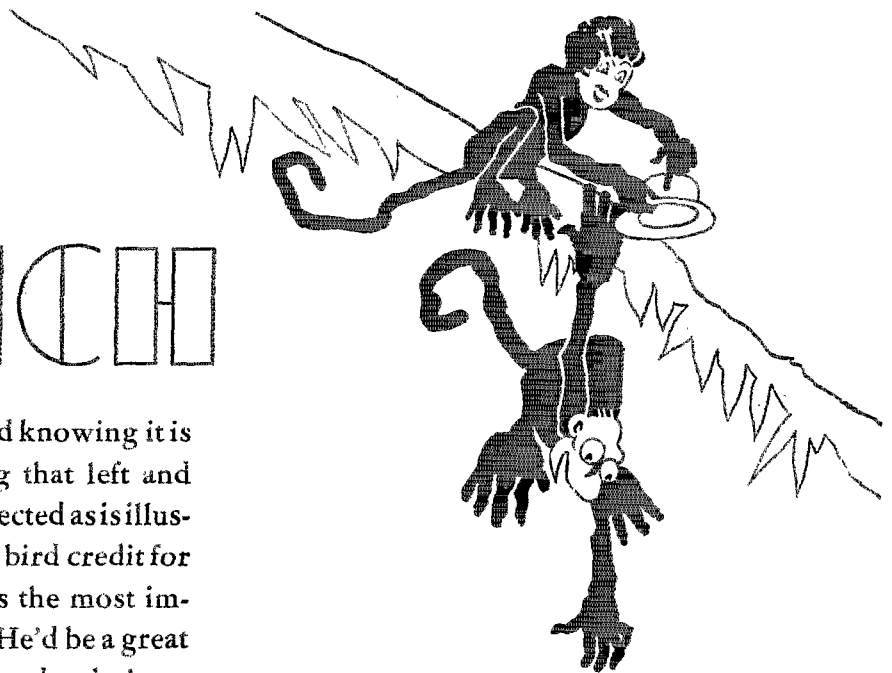
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LIBBEY·OWENS·FORD SAFETY GLASS



NATIONAL SAFETY NEWS



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Published by National Safety Council, Inc.

JANUARY, 1934

Vol. XXIX, No. 1

A Safety Program for the CWA

FOUR MILLION men working one billion man-hours is a stupendous measure for the relief of unemployment. But, as every safety man realizes only too well, man-hours mean exposure to accident. Such an exposure in a representative cross section of industry would mean some 500 fatalities. Under the stress of emergency conditions the toll might be even higher.

This is the problem confronting the Federal Civics Works Administration. The object of the CWA is to provide relief for the unemployed as quickly as possible, and as a result many of its projects have been launched under conditions which are far from favorable from the safety point of view. Inadequate preparation for a job and lack of training and supervision invariably mean high accident rates.

The projects sponsored by the CWA include road building, filling in swamps, cleaning up parks, and other work on public property. Some of the operations are decidedly hazardous, involving such risks as the use of explosives, and there is the widespread hazard in the transportation of the workers to and from their jobs by truck.

In planning a safety program for this vast enterprise, the CWA has asked for the cooperation of the National Safety Council, and Sidney J. Williams, director of the Council's Public Safety Division, has been called to Washington to serve as safety director of the CWA. The Council is contributing the services of Mr. Williams to the recovery program at the request of Harry L. Hopkins, director of the CWA. Mr. Williams was chosen because of his broad experience in both public and industrial safety with the National Safety Council, and previously with the Industrial Commission of Wisconsin.

The primary aim of the safety program is, of course, the protection of workers on the many projects, but plans for a public safety program are also under consideration. A start in this direction has been made in the employment of CWA workers in traffic counts and parking surveys, and further work along this line is contemplated.

Telegrams have been sent from Washington to state administrators of the CWA asking them to name safety directors for their jurisdictions. The Council has furnished lists of safety men in all parts of the country who might be asked to cooperate with the state directors. Local effort is needed to make the program effective, and it is recognized that organization and personnel are of more immediate importance than an elaborate paper program.

The essentials of the program have been made as simple as possible. These include: Daily inspections of the job, with a part or full time inspector on every job employing ten or more men; correction of physical hazards, compliance

with existing codes; placing men on jobs suited to their physical and mental qualifications; instruction of new men by foremen; adequate first aid facilities for every job, and immediate reporting of accidents to the state director.

From the point of view of national economy, as well as the appealing humanitarian aspect, effective safety measures are of the utmost importance. The appropriation for CWA projects is necessarily limited, and compensation benefits for the injured and their dependents must come out of the CWA payroll. The result of a heavy accident rate, therefore, would be to reduce the amount of employment available through the CWA.

The success of the program will depend upon the support given by the state organizations. The state administrators need the experience and help of the industrial safety men in their territories.

In This Issue

MOST of us can remember when timid persons regarded elevators with suspicion. Now elevators have a high rating for safety but stairs and ramps continue to claim victims. If the millions who now use elevators had to walk up and down stairs the accident toll would be much higher. The physical condition of stairways has something to do with accidents, but another reason is that many people do not walk correctly, James L. Gernon asserts. (Page 9).

When we compare the goggles available today with the crude and often uncomfortable "safety spectacles" that safety men tried to put on workers twenty years ago, we can realize the progress that has been made in eye protection. (Page 12).

"Trainmen are human" says G. A. Richardson, president of one of the large transit systems of the United States. The human factor is the largest element in providing safe transportation. (Page 15).

A chain is no stronger than its weakest link, according to a familiar proverb. L. W. Hopkins gives some practical suggestions which will prevent these weak links from endangering the workers who man the hoists. (Page 17).

How hazardous is ethyl gasoline? Dr. Robert A. Kehoe gives some authoritative information, based on research conducted at the University of Cincinnati, and describes the precautions which minimize hazards in connection with its handling and use. (Page 19).

Is dust receiving more than its proportionate share of blame for occupational disease? Dr. Carey P. McCord, whose work in the field of industrial hygiene is well known, points out that in our present attention to the dust hazard we must not forget the other sources of disabling illness. (Page 34).

The Managing Director's Page

Let's Advertise Safety!

BRUCE BARTON wants to stamp out war by advertising. At first thought the idea sounds fantastic, but even after discounting an advertising man's enthusiasm for his profession, we must admit the idea has some merit. We have all seen the amazing results of intensive and continuous campaigns for the molding of public tastes. It is not too much to believe that any idea or any commodity can be sold to the public with an ample appropriation and an intelligent use of the available media. Why can't we tell the story of safety as dramatically and constantly as we advertise Ivory soap?

The newspapers are lukewarm on accident prevention because the public is lukewarm. The public is lukewarm and tragically indifferent because it is ignorant. The facts must be told, with proper emphasis on their importance. The problem is to change mass thinking, to combat indifference, and to create action.

Advertising patriotism, selling health, and other desirable ends are not the primary concern of any one industry or group. The selling of safety must therefore be done in some collective way. Perhaps the government is the logical agency to conduct such a campaign.

The British government, through its ministry of roads, has recently contributed \$150,000 for a six-month campaign of public safety education. The campaign will be conducted

through the National Safety First Association, the counterpart of the National Safety Council in this country.

The annual cost of accidents in the United States is many times the British accident bill. Automobile accidents alone cost \$650,000,000 a year, and the total money paid for all of the cars sold was \$1,750,000,000. Our national bill for all accidents has been between two and three billion dollars a year.

The records show that 175,250 lives have been saved since 1913. The National Safety Council has invested \$1.13 in each one of these lives saved.

If we could stretch a billboard from the Atlantic to the Pacific Ocean and advertise the simple requirements of safety to our entire population for *just two minutes each day*, we could guarantee to get attention and sympathy for ways and means of stopping accidents that would bring quick results.

For example, if we could adequately advertise the totally unnecessary menace of icy sidewalks, and get just one town in one state of these United States to insist on complete protection from icy sidewalks, we would be demonstrating the real meaning of safety. We would be demonstrating it in a way that would gradually correct thousands of similar accident causes so that in time our citizens would be protected from most of the dangers that claim nearly 100,000 lives a year.

Why do we permit this terrible and unnecessary waste day after day and year after year when we know how to stop it?

Why don't we advertise safety? Because we cannot pay the advertising bill. Yet if we had the means we could put on an effective advertising campaign by outdoor billboards or by any other medium at a very small fraction of our total accident losses.

Although the United States has done more in a quiet way to advertise safety than has any other country in the world, the effort so far has been pitiful. The money invested in the conservation of life has been a mere pittance compared with the tragedy of one day's accidents.

Reno is famous (or notorious) for its easy divorce; Detroit has become synonymous with automobiles; intriguing advertising has made California suggestive of perpetual sunshine. So why not, for a starter, have one single community in the United States that will actually make a business of protecting each life within its jurisdiction. Let it make a real application of safety on the street, in the home, in every public building until all the hazards—the causes of accidents—are removed.

Then accidents would become a rarity, just as they have become in industrial plants with effective safety organizations. The community would become famous for its real human concern for the lives of its citizens, just as Bethlehem has for centuries been associated with the Christian religion. Then, and then only, would we have a real model city in the truest sense of the word.

INTERESTING ITEMS

JUST before going to press the Council's Committees decided that the Twenty-third Annual Safety Congress shall be staged in Cleveland. The date will probably be the first week of October, 1934.

* * *

It is worthy of mention that eleven of the Council's twenty industrial sections have already held meetings of their executive committees, and plans are rapidly crystalizing for similar meetings of the remaining nine sections. The number of members attending these meetings and the quality of their work is indicative of the forward looking attitude of our industrial safety leaders.

* * *

You have received, or will shortly receive, the new *Service Guide* of the National Safety Council. This 64-page book gives full details regarding all Council memberships and extra services with helpful information on getting the most out of membership. A careful study of membership service questions and answers was made before the *Service Guide* was written. We believe it includes an answer to every question that might be asked on the subjects covered. As the book will be serviceable one or two years hence we suggest that you keep it for reference.

* * *

Industrial members are now reporting last year's injury rates, and city and state officials are being requested to bring up to date their 1933 accident reports, so that the Council can prepare accurate national estimates for the annual statistical summaries. The preliminary edition of *Accident Facts* is now planned for release February 1. The final edition will be ready about May 1.

* * *

Did you receive your sample of the new safety booklet for workers, "You and Your Job?" If not, write to the Council for a copy. Thousands of copies have already been distributed.

M. J. Amers

Management must watch the physical condition of stairs and ramps, and the individual must watch his step and walk correctly when using them



Watch Those Steps

By JAMES L. GERNON*

WHEN we attempt to analyze the causes of injuries we are at once confronted with the difficulty of learning the basic causes. With the development of compensation laws we now have more complete information as to the number and cost of industrial injuries than we have about basic causes. For instance, the report of an injury may indicate that a person fell down stairs. It may state that he slipped or tripped, but it will not often give the real cause of slipping or tripping. Was it the condition of the stairs, the shoes worn, or some other cause?

Accidents on stairs and ramps will be included almost entirely in the classification "falls to a different level." Because of inadequate information contained in the reports of such accidents it is impossible to obtain complete data regarding the real cause.

I make this statement as a result of having examined personally 76,800 employers' reports of accidents to the Compensation Division of the New York State Department of Labor. Included in these reports were 14,500 cases of falls, including falls to a different level and to the same level.

Of the 89,100 accidental deaths

occurring in 1932 the most important types and their percentages were as follows:

Motor vehicle	15.1
Falls	23.9
Drowning	8.7
Burns	6.9
Other classifications	47.4

Considering all the injuries in homes, public places and industrial establishments, falls occupy second place in the list of causes of injuries, both fatal and non-fatal.

Falls to a different level are fewer in number than falls to the same level but result in a larger proportion of fatalities and permanent disabilities. When we consider the number and causes of injuries resulting from falls on the same level, we can understand why people fall on stairs. We may even wonder sometimes that the number is not larger.

The accompanying table shows the relative severity of falls on stairs to all falls as indicated by the compensation cases closed in New York State for 1932. These figures indicate that falls on stairs and steps were 15 per cent of the total number of falls, 12 per cent of the weeks awarded, and 10 per cent of the amount of compensation paid.

Where elevators or escalators are not used, stairs are the common means of reaching the different floors or levels used in connection with residential, public and industrial buildings. Although the injuries resulting on stairs are numerous, we may be thankful that the millions of people who are carried safely each day by elevators and escalators are not compelled to walk up and down. If they were required to use the stairs, the fatalities and injuries and the cost of such injuries would increase considerably.

Ramps are a more recent development. Their substitution for stairs is not as general in permanent locations as might be. What has militated against

SEVERITY OF INJURIES DUE TO DIFFERENT KINDS OF FALLS

	New York State, 1932			
	Total No. of cases	Total No. of weeks	Total Amt. Compensation	Death and Permanent Total
All falls of workers	13,791	538,455	\$7,341,274	222 (27)
Falls on stairs and steps	2,111	70,021	\$68,750	27 (66)
Percentage	15	12	10	11

Figures in parenthesis show number of permanent total disability cases included.

*Director, Division of Inspection, New York State Department of Labor.

a more general use of ramps is the amount of floor space necessary to construct them with a proper gradient.

Ramps or runways from story to story of a building used as a walkway only, and not for trucking or handling material, should be of the same standard width required for stairways, and should be provided with a gradient that will not cause strain on the feet or leg muscles, or cause a person to slip when descending. Many ramps have a gradient far too steep for safety.

The New York State Labor Law provides in Section 267 that a horizontal exit from one factory building to another shall not have a gradient of more than one foot in six and be capable of sustaining a live load of not less than 90 pounds per square foot with a factor of safety of four. If we applied this ratio to a ramp between ten-foot floor levels the ramp would be 60 feet in length.

In connection with construction projects temporary ramps or runways are in more general use. Where the ramp is used either permanently or temporarily and is properly designed and constructed, it is less hazardous than the littered stairway so often found on construction work. A proper ramp requires far less physical effort to travel to a different level than does a stairway improperly constructed, and is a far safer means of travel from one level to another than the type of ladder very generally used on construction work.

Obscure Causes

If we hope to make a real reduction in injuries on stairs the first essential is to instruct all people in the art of using normally the muscular functions of the human body so they may stand and walk properly, and be able to use the normal movements of the body to protect themselves from falls. The injuries resulting from falls demonstrate this most forcefully. To make headway we must learn the basic cause of the fall by securing better reports of injuries. To make better reports, those responsible for the reports must study the basic cause of the fall before they can apply preventive measures. To make this point clear, we might consider why reports show so many falls where the stairs are in perfect condition as to construction, and apparently nothing on stairs to cause a fall.

When we know the basic causes of falls, we can with ordinary intelligence adopt the proper measures to prevent them. What is it that causes falls?

"Some violation of the laws of gravity." At this point we might ask: do the persons responsible for the construction or maintenance of stairs, or the person using them, know that it imposes fourteen times as much strain on the heart to walk up a stair as it does to walk on a level surface?

In traveling stairs what causes a fall? Are the stairs improperly constructed, are they worn or broken, are they free of refuse, were they wet or slippery, are they improperly lighted? Was the stair crowded at time of injury, was person who fell pushed or jostled, was the injured person physically able to properly use his feet and leg muscles in order to properly ascend or descend a stairway? These are but a few of many more reasons for falls on stairs, but they are seldom mentioned as a cause in the report.

It is obvious that if the feet and leg muscles perform properly it is easier to descend a stair than to ascend it. It requires much physical exertion for the heart, also for the feet and legs to ascend stairs correctly. Many persons, unfortunately, are not physically fit to climb stairs. While the falls in ascending stairs are numerous, the injuries are not as serious as when a person loses his balance while descending.

If all stairways were properly designed and constructed, there would be fewer injuries. In numerous instances, the stairways in homes, public places and industrial buildings have been improperly constructed because of the failure to allot sufficient space to construct a stairway of proper pitch and without winders. Too many stairs have treads far too narrow for safety.

Some architects, engineers, and builders apparently fail to understand why a nosing is necessary on a stair tread. It is remarkable how many stairs are built minus the nosing and with a solid riser face. Such stairs are a constant hazard, and it is criminal to build them in this manner.

Some of the best architectural and engineering authorities hold that the riser of a stair should not be less than 6 $\frac{1}{2}$ -inch or more than 7 $\frac{3}{4}$ -inch. Stairs with risers within these limits will permit persons to safely ascend or descend with the least physical effort, provided their feet and leg muscles are in physical condition to enable them to travel a stair properly.

The New York State Labor Law, Section 270, has established a standard for stairs, it provides that all exit stairs

in factory buildings constructed since 1913 "shall not be more than 12 $\frac{1}{2}$ feet in height between successive landings. Treads shall be not less than 10 inches wide exclusive of nosing, and the rise shall be not more than 7 $\frac{3}{4}$ inches. No stairway with "winders" shall be permitted as a required exit. The treads shall be constructed and maintained so as to prevent persons from slipping thereon." These dimensions of treads and risers will provide a stairway about 37 degrees from the horizontal. Every stair tread should have a nosing extending not less than $\frac{7}{8}$ -inch beyond the face of the riser. This is an added factor of safety in providing heel clearance when descending the stairs. Every stair should be provided with a balustrade or handrails.

No doubt many people fail to realize that falls occurring in industry are greater in number, more serious in results and cause a larger loss of money than injuries resulting from all mechanical apparatus. If people could realize the vast number of dangerous mechanical apparatus in use in the average industrial state they would know how serious falls are. There are no figures available for the entire country that might be used as a comparison; however, the figures for New York State will to a degree serve the purpose. In that state "handling objects and tools" is first in the causes of industrial injuries, "falls" are second, and "mechanical apparatus" third.

Do You Know How to Walk?

To reduce falls we will have to do more than provide safe stairs and walk surfaces. Much of the contributing causes of falls rests with those who travel on stairs. Some people do not, others can not, walk properly. If all the people could walk correctly, or if we could teach them to, we would reduce the number of falls on level surfaces, from elevations, and on stairs. In making this statement I am not excusing those who are responsible for failing to provide or maintain safe stairs or walk-



ing surfaces. Nearly half of our people reaching adult life fail to walk as nature intended. You may have reason for believing that this is not the correct proportion of the people who can walk properly, if so, go where a number of people walk on level surfaces and on stairways and observe them, and you will realize the proportion of those walking improperly.

To walk correctly on a level surface, a stair or a ramp the feet should be spread about six inches apart pointed straight, not fan spread. If they are fan spread, the danger of slipping, tripping or striking objects increases. When arches are weak or feet or legs ache, the feet are not properly placed to walk or stand correctly. It is important that the shoes be wide and long enough to permit the foot to spread normally at the ball of the foot and without causing pain in the feet or legs in order that the ball of the foot can bear the weight of the body.

If the feet are fan spread or when a person steps improperly, the heel strikes the surface first and at an angle which increases the chance of slipping and falling. This is clearly illustrated in the number of crooked heels found on shoes.

Public education has not succeeded in teaching our people to wear shoes that fit, and permit the normal action of the foot and leg muscles. Apparently, we are vain enough to buy shoes for appearance.

Safety treads used on stairs are designed to prevent slipping. They do this, but if they have grooves in the tread running parallel with face of riser the grooves should not be too close to the edge of the tread. A person who places the heel flat on the tread catches the front of the shoe heel at the instep in the groove and may be thrown forward.

After we have provided properly constructed stairs, including balustrades and handrails, we must see that they are kept in good repair, clean and free from rubbish or obstruction, and properly lighted. If more people had a wholesome respect for the handrail of a stairway and used it when descending, many falls would be prevented. Then the people using them must have the ability to use their heads, legs and feet to ascend or descend a stair safely.

Shoes must fit and be in good repair, not too short or too long. They must be wide enough to permit a person to bear the full weight of the body on the ball of the foot with the heel slightly raised and bearing no weight. While



By W. W. WILLIAMS*

“WELL Bill, this sure is one tough break. A hospital bed is a bum place to start the New Year. The Doc says he'll get you patched up in time, but you sure had your nose right up against the pearly gates.

“When I saw you doing a pinwheel around that line shaft, it took the snap out of me. I didn't think you had a Chinaman's chance. After we got you untangled and sent you away in the ambulance, I actually went over to the morgue looking for you.

“Your job? Sure, it'll be there for you as soon as you get back. No, never mind whose fault it was, though I don't mind saying you were a horrible example.

“I hope you'll never cause as much excitement again. The shop just blew up. Not a mother's son was worth a tinker's dam the rest of the day. I was jumpy for a week. But we're all mighty glad you're making it O.K.

“Well, here comes your Mrs. and little Mary Jane. So long, Bill, I'll be in again in a couple of days.

“How do you do, Mrs. Bill. Hello, Mary Jane. Your daddy is getting along fine. Good bye.

(“Wonder if that woman knows how close she and the kid came to being a widow and an orphan. It's a shame for any sane guy to take the chances Bill takes—or used to take, I hope.”)

*Assistant to the President, Employers Reinsurance Corporation, Kansas City, Mo.

doing this they should feel no pain in the feet or legs. This is important in order to properly control the body balance. If a person's feet hurt as he stands or walks, he is not safe when traveling up or down stairs.

Possibly with the exception of the hands, the feet and legs are more constantly used in our every day life than any other part of the body. They provide the means of moving from place to place with safety. Nevertheless it is no extreme statement to say that a large

percentage of our people give far too little attention or care to their feet, to say nothing of the abuse imposed on them.

From my experience, and the examination of many reports of injuries, I am convinced that the inability of feet and legs to properly function subjects many people to injury, and that this is the basic cause of a large percentage of falls. Have you noticed how easily a person whose legs and feet function properly may fall if he steps on a piece of paper lying on a dry cement or wood floor or on a wet floor? If you have, you can understand that the person whose feet or legs fail to perform their proper function has a poor chance to keep free of injury.

To travel up a stair properly the foot is placed on the tread with the ball of the foot about two inches beyond the edge of the tread nosing, this permits the toe of a shoe to clear the nosing of the tread above. A stair tread 9½ inches, including the nosing, will permit the average shoe worn by men to have about 3 inches clearance if the person steps properly. We should remember that as the dimension of the tread is reduced the danger of falling increases. If the heel of the shoe is placed on the tread the possibility of striking the nosing or face of riser increases when stepping to the tread above, and this danger increases as the dimension of the tread is reduced.

When descending the stair the ball of the foot is placed on the front of the tread just back of the nosing. The proper placing of the foot provides the space for the heel of the shoe to clear the nosing or face of riser. Here again if the dimension of the tread is reduced, the danger of the heel striking the nosing or face of the riser increases. As the ball of the foot is placed on the tread the heel of the shoe is just off the tread, so it strikes the tread immediately after the weight of the body comes on the ball of the foot. When this is done properly, should the foot slip for any reason, the heel of the shoe will strike the tread and act as a brake and prevent falling. But if the heel or back of the shoe strikes the nosing or face of the riser the person is thrown forward off balance, perhaps down the stairs.

We should keep in mind that in the homes, public buildings and industrial establishments the stairs contribute a large share of injuries. Because of this fact, stairs and ramps are of the utmost importance in any campaign for the reduction of accidents.



Courtesy American Optical Co.

This Eskimo goggle, made of wood, bone or well-cured hide, protects him from snow-blindness.

THERE are three outstanding points of view in a study of protective goggles and goggle problems, and these are of progressive importance to the safety man. (1) An understanding of the history and development of modern goggles. (2) When and where does the worker's safety require that goggles should be worn? And (3) Getting the worker to wear his goggles is the final problem.

It is my purpose to discuss these three points of view briefly, and yet sufficiently to outline the salient points of each problem, in a series of articles appearing in the NATIONAL SAFETY NEWS.

Looking back, then, to a period something over twenty years ago, it is interesting to note that eye protection for the worker was one of the first subjects tackled by safety men. The pioneers of the safety movement did not have records to show (as they have today) that some two thousand workers were losing the sight of one or both eyes in industrial accidents every year; but they did see in their own plants the gruesome results of frequent eye injuries and they realized that these in the aggregate must mount to enormous losses.

Crude and hasty efforts began to be made in some plants to devise ways of protection. In a few of the larger industries some kind of study was begun to meet the problem. One of the first to undertake systematic efforts was the American Steel Foundries. And here, perhaps for the first time in American industry, an organized plan was undertaken to get the worker to wear goggles.

It must be borne in mind, however, that the so-called goggles available at

Pioneering in Eye Protection

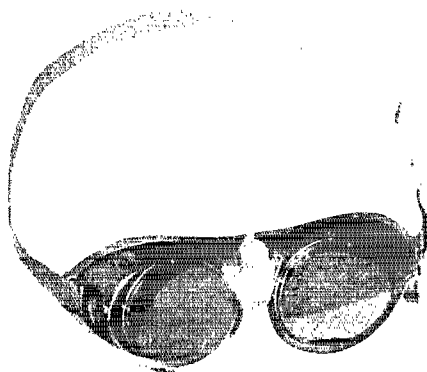
By G. M. BRIGGS

that time were of the crudest type. They were, in fact, at first only the flimsiest of sun glasses, to be picked up in any ten-cent store, and intended originally only to shield the eyes from dust, wind and sun rays. Many had been devised for automobile comfort in a day when the windshield was not standard equipment. The glass was often distorted,

later became one of the founders, and also the first director, of the National Safety Council. His paper had been prepared for delivery before the first cooperative safety congress, held in Milwaukee, in 1912. He outlined the experience of his organization during the two previous years, and for the first time placed on record results in the use of goggles, or "safety spectacles," for eye protection. He said:

"In one large steel foundry where spectacles have been in use for about two years, 48 pairs were collected in one month with lenses broken by flying pieces of steel, and 297 pairs have been collected among several foundries of the company over a period of six months. During this period there were no serious eye accidents in these plants."

Thoughtful men began to wonder if these makeshift devices could not be improved, if some specially designed, tougher and entirely adequate protection could not be devised. One or two manufacturers were approached and the suggestion made that here in industry there might be a field for a new product—safety goggles.



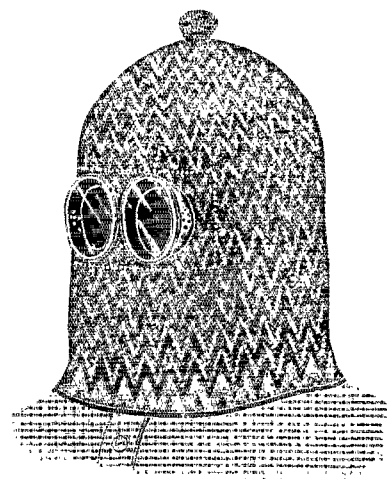
Courtesy Willson Products Co.

A close-fitting light weight modern goggle, molded to the face but fitting over the worker's own correction spectacles.

brittle and easily broken, and the frames inadequate.

Yet, remarkable as it may seem, they did save some eyes. Safety men, experimenting with the heavier types, attempted to adapt them to the needs of industry. Some workers in the more hazardous trades were prevailed upon to wear them. Dust, wood chips, incandescent sparks, even the smaller flying particles of steel, if not too heavy to crush the goggle frame or splinter the glass, were stopped; and when the glass was shattered, sometimes the eye escaped. Sight was preserved.

There is of record in the April, 1913, issue of the Bulletin of the American Iron and Steel Institute a singular paper entitled "Saving Eyes in the Steel Industry," written by W. H. Cameron. At that time Mr. Cameron was manager of the casualty and welfare department of the American Steel Foundries, and he



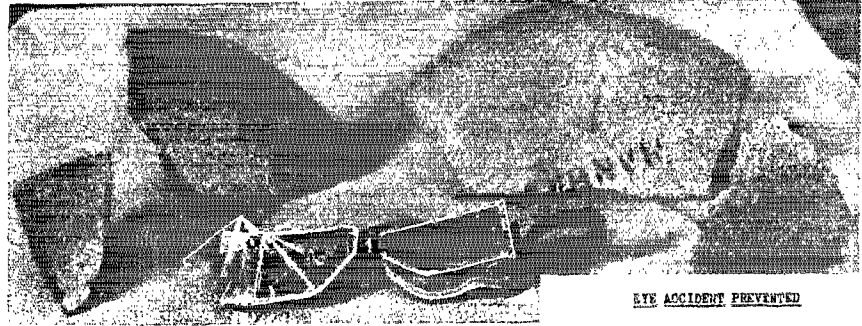
Courtesy Chicago Eye Shield Co.

An early type of blast-furnace mask. It was a heavy woolen mask-cap, fitted with aluminum eye-cups set in a flexible leather frame.

Nearly three decades ago safety men began to organize in defense of industry's eyes. Here is sketched the background of that long struggle to provide adequate protection and convince both worker and management of its paramount necessity

It must not be held against the manufacturers that no one was yet ready to put time and money into the development of a new product. This was twenty years ago. The safety movement was so young that nearly all safeguards and safety methods were still only experiments, with each plant following its own ideas. There was no compelling force of organization or conviction behind accident prevention work. Most workers considered it effeminate to wear protective clothing, use safeguards or take precautions against accidents; most plant executives believed they could not be made to do so.

The swing about to another point of view came gradually through a decade and many factors contributed to the education of both the employer and employee in safety methods. It is not the part of this discussion to trace these in detail, but one of the most powerful, of course, was the passage of the workmen's compensation laws in many states. Men



Courtesy Chicago Eye Shield Co.

This photograph shows the result of a bursting emery wheel. The worker suffered no eye injury and only a few superficial cuts and bruises to the face.

suddenly realized that accidents were costly. We must not fail to mention also, however, the growing moral conviction, fostered throughout industry by the National Safety Council and other national bodies, that the worker must be shielded from injury during his employment.

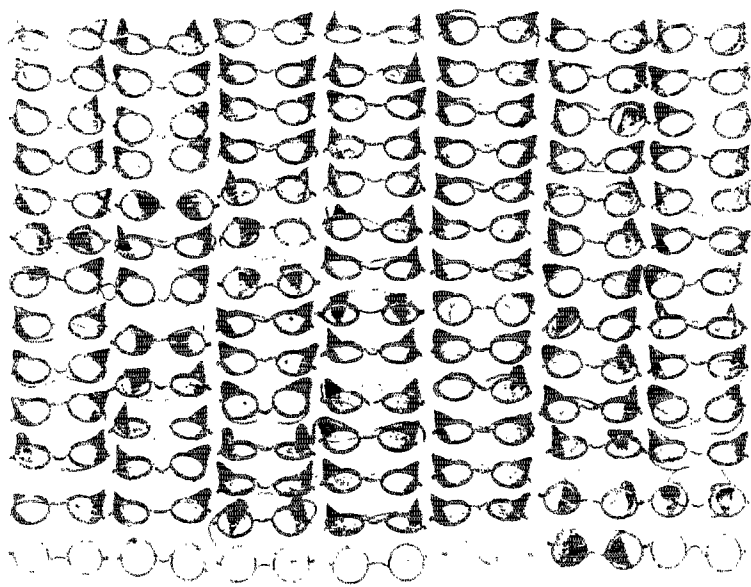
Under the stimulus of this movement safety goggles began to be developed, and various other articles of head and eye protection made their appearance. The goggle glass was increased in thickness, toughened, set in a heavier frame and fastened about the head with a stout band. Gradually the frame was enlarged, widened and fitted with shields at either side. Successful efforts were made to harden or still further toughen the glass, to remove optical inaccuracies and perfect a satisfactory lens, to build a frame that protected the wearer from

heavier blows. Laminated, or so-called shatterless, glass was developed. Tinted glass appeared in the goggles of welders and furnace men, and masks, hoods and helmets of curious design attempted to meet the special hazards of various occupations.

It is true that most of the goggles and other face and head protection of a decade ago seem strikingly crude and inadequate today. Not the least deficiency was their annoying weight and discomfort to the wearer. Efforts to convince management of the high value of goggle protection in hazardous occupations were often nullified by the opposition of workers to wearing the protection available. Manufacturers therefore exerted themselves not only to produce more efficient articles of protection, but to fit them to the personal comfort and characteristics of workers. The publication, early in 1921, of the National Safety Code for the Protection of the Heads and Eyes of Industrial Workers was a stimulant to the industry and a long step forward in the movement for adequate eye protection.

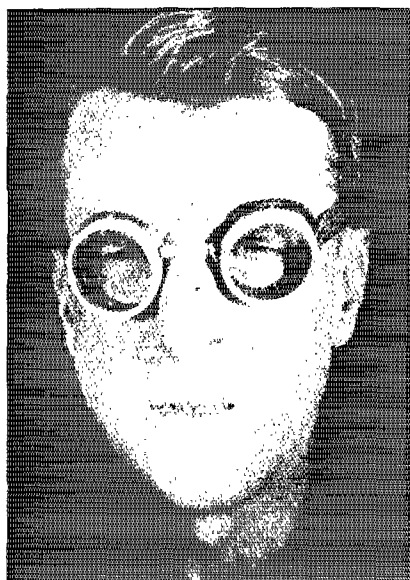
The Code, to a large extent, had the ultimate effect of standardizing the eye protection industry. Another outstanding value has been the ability of the safety equipment producers to use it in pointing out to all industry the enormous savings in eyes and in injury costs to be made by following its protective recommendations. The Federal Government also issued a group of specifications covering its own needs in certain classes of eye protection that have had a wide influence. These include chipping goggles, welding goggles, arc welding helmets, arc welding shields, metal frame goggles, and rubber acid goggles, and copies of these specifications, obtained from Washington, are frequently consulted.

All the problems of the goggle manufacturer were not quickly solved, how-



Courtesy American Optical Company

This display of goggles broken while protecting eyes is probably the first of its kind ever made. The original photograph was shown at the first cooperative safety congress, Milwaukee, in 1912.



Courtesy American Optical Co.

Goggles cannot do effective work unless correctly adjusted; poorly adjusted goggles cause eye-strain.

ever, in these intermediate years of the industry's development. In fact, the more recent years have seen greater advances than all the others combined. Although a considerable number of companies manufacture more than one hundred different types of goggles and other eye protection, the field is continually broadening. Changes in industrial processes as well as new ideas in efficiency call for new types of protection.

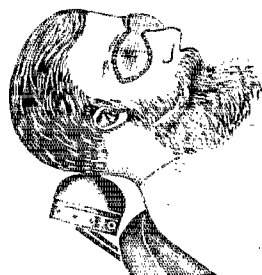
It is of absorbing interest to step into one of these modern factories and follow through some of the processes of goggle manufacture. The mechanical operations of lens grinding, hardening, polishing, testing, frame molding, assembling, etc., are intriguing enough, but the planning and experimental part of goggle building is of vastly more interest. Producing companies are not only experimenting continually with new designs, but are closely following the experience of goggle users throughout industry and frequently are asked to produce some new device to meet new eye protection problems. This calls for original drawings, the molding of forms in rubber, wax or plaster, manufacture of a single tentative sample, the tryout for a time in the plant under actual service conditions, and finally, perhaps, numerous improvements and the careful production of the finished article in quantity.

The competition between producers to provide the best possible goggle is very keen. This is well illustrated by their efforts to make goggles fit more

comfortably. Studies of the facial contour of workers included not only the external bony and muscular structure but also a scientific location of the tiny but very sensitive nerves surrounding the eye cavity. Scores of wax impressions of workers of all nationalities were taken, and after months of experimentation the result has been the production of a standard goggle frame closely fitting the eyes and face of the average person.

All of this effort has been so well worth while that a comparison of goggles and other eye protection as manufactured today with those of a decade ago is very much like visiting an old curiosity shop. Improvement has been along the line of safety and also of increased comfort and efficiency everywhere.

Although not so well appreciated, by goggle wearers, perhaps, as certain improvements in comfort, vision, and ventilation, the modern goggle is a far safer protection than the goggle of four or five years ago. In addition to the development of laminated, or so-called



Courtesy Chicago Eye Shield Co.

In the days of luxuriant beards, the barber used this to protect his customer's eyes from flying bristles.

shatterless glass, in the goggle frame, the hardened un-laminated lens has also been brought to a very high point of efficiency. This hardened glass is approximately one-third stronger than similar lenses manufactured a few years ago and about five times stronger than ordinary glass.

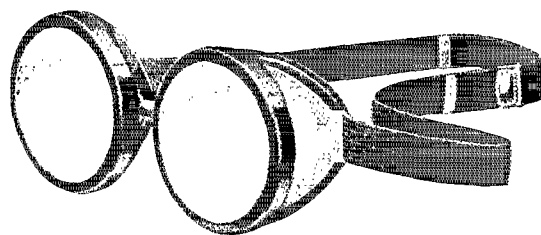
In all modern goggles the lens, in addition to being extremely strong, is so constructed, beveled, and clamped into the frame, that the tendency of the glass, if broken, is to fly forward should it leave the frame at all. Many a blow that formerly cracked the lens will bounce off today and do no damage to lens or wearer.

Increased comfort is also comprised in the factors of weight, overcoming fogging and steaming of lenses, and increased side and down vision. Although goggle weights have been reduced little (because of the demand for more durability, strength, freedom from bending or warping, and ability to stand sterilization) goggles have become more comfortable. This has been accomplished by studies of facial contour (already referred to) and by making goggles with right and left eye-cups. Formerly the two cups were identical, which was very much like asking a man to wear the same shoe on both feet. The facial contact is now so shaped or molded that the weight is evenly distributed around the eye socket, giving a close, safe and comfortable fit with no openings and no uneven pressure on the face.

It was not uncommon a few years ago to see workers wearing goggles with openings alongside the nose large enough to allow quite large particles to enter, and with red marks on the cheek bones where all the weight of the goggles rested. Modern goggle frames are usually molded of composition material and have a broad, smooth, rounded facial contact which makes unnecessary the use of the old-time pads and bindings that often became soggy and sticky and unsanitary with perspiration and accumulations of dirt. The eye-cups are connected by various ingenious methods which permit a simple and permanent adjustment.

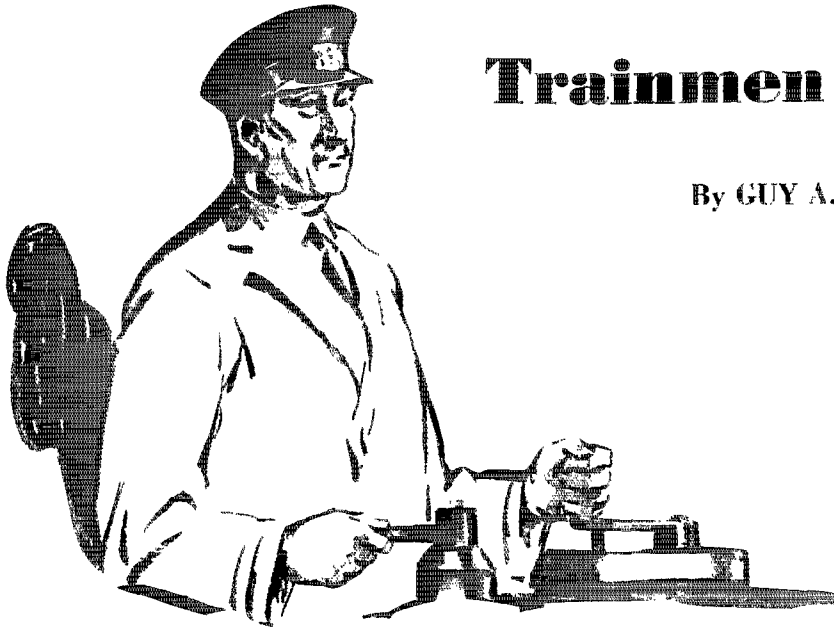
Fogging and steaming of lenses are due to several causes, sudden changes of temperature, perspiration running down from the forehead, difference in temperature between the outside and inside of the lens, etc. Methods of preventing this annoyance may be controlled largely by the wearer and will be discussed more at length in a later article; but improvements in the goggle frame also make it easier to control. One of these is to permit a free circulation of air back of the goggle lens. This usually consists of cross ventilation, up and down venti-

(Please turn to page 48)



Courtesy The Safety Equipment Service Co.

Goggle with strong frames to withstand extra heavy blows. The lenses of modern goggles are so clamped into the frame that they tend to fly out, if broken, rather than toward the eye.



Trainmen Are Human

By GUY A. RICHARDSON*

After providing safe equipment and cooperating with public officials in traffic regulation, the prevention of accidents in local transportation resolves itself into a problem of psychology

MOST of us can remember when city councils worried about the speed of trotting horses. We can recall how they wrinkled their brows over speeding bicycle riders: "scorchers" they were called in those days. Eight or ten miles an hour in city streets was a menace to humanity.

Even in the early days of the automobile our ideas of speed were crude. Ten or 15 miles an hour was regarded as the safe limit, and even on the open road cars could not exceed 35 or 40 miles an hour because of their mechanical limitations.

Recall this picture, contrast it with the traffic on the streets of the modern city and you get a very clear idea of the reason for the existence of such an organization as the National Safety Council. You will also understand better what has been accomplished in accident prevention in spite of the huge accident total. You will wonder, perhaps, that this total is not larger than it is.

Much has been accomplished, but much remains yet to be done. Accomplishment has come through several channels. There is a growing tendency to diversify and segregate traffic according to speeds. This has helped materially and will be even more helpful as time goes on.

Improved equipment of all vehicles also has been most helpful. Indeed, without the improved brakes, the sturdier construction and the greater ease in handling of all classes of vehicles, the traffic flow and the speeds maintained today would be an impossibility. The

resultant accident toll would be so shocking as to require most stringent legislative and police regulation.

Another helpful improvement has been the widespread education and agitation against recklessness on the part of operators of vehicles and the tendency to require some evidence of a driver's fitness before he is permitted to operate an automobile. This regulation should be extended. In every state there should be some system of licensing automobile drivers and requiring them to establish their ability to drive before they are given a license.

Electric railway trainmen who operate on fixed tracks with precise clearances, and therefore fewer hazards, are selected with great care and are thoroughly trained before being allowed to operate a car. Something of the same requirements should be made in the case of those who operate private automobiles which are relatively more dangerous than street cars, since they are free agents, weaving in and out of traffic and starting, stopping and turning at the will of the driver.

Federal Licenses for Drivers

I am not so sure that there should not be some form of federal license for drivers who go from one state to another. At present the state with drivers' license provisions is not protected from unlicensed drivers from other states. With our great system of national highways interstate traffic is general, and interstate driver regulation seems to be the only feasible way to secure uniformity.

In this problem the electric railway

operator is vitally interested because street congestion and traffic hazards have a direct and most important bearing on his business. He should assume a position of leadership in his community in every movement which has for its purpose the improvement of traffic conditions and the prevention of street accidents. He is better informed perhaps than anyone else in the community, both as to traffic needs and as to methods of bettering conditions. He has under him a staff of trained men whose chief concern is, or should be, to provide safe, convenient and speedy transportation through city streets. If anyone knows what can be done toward relieving congestion or increasing safety these men know it, and it is not only a service to the community but a service to the local transit industry as well to have them active in traffic planning.

So much for the general traffic problem. We are vitally interested in it, but, except to the limited extent of indirect effort, it is beyond our control. Our principal concern, therefore, is to improve our own operating practices.

In the development of safety appliances we must admit that the electric railway industry did not keep pace with the automotive industry. There has been little improvement in braking efficiency since the invention and application of the air brake, and until recent years little attention has been paid to the weight of cars. Instead of building a car with complete equipment adjusted to the unit as automobile manufacturers do, we have followed the practice of assembling cars with equipment purchased from various manufacturers.

The individual companies have had too much pride of authorship. A car body is designed to satisfy some local ideal and then the purchasing agent shops around for equipment.

Fortunately we are now on the road to a better understanding of equipment needs. The President's Car Conference Committee has focused attention on weight, braking equipment, motors and drive, as well as on quietness of operation. Out of these experiments there is reason to hope that the electric car of the future will be on a comparable basis with the automotive vehicle in quick acceleration, smooth starting and stopping, braking efficiency and riding comfort.

Likewise, the industry is making long strides in the selection, training and management of men and this is the most fertile field of accident prevention. In any discussion of man power, the selection of employees of course has first place. In the early days of electric railway operation, trainmen were selected without much regard for their adaptability to this class of service. If they were healthy and physically fit and could establish a reputation for honesty, little thought was given to their other qualifications. We have now discovered that there are men who are physically fit and who have a good reputation for honesty, but who are incapable of making good trainmen because of temperament or other personal limitations.

Street car operation, either as motorman or conductor, requires a certain type of personality. The motorman must be alert, quick to comprehend the traffic situation and do the right thing at the right time. The conductor must be even-tempered and well-balanced enough to attend to all of his duties and at the same time be courteous and obliging. Consequently the better operated systems have built up some form of examination and inquiry for the employment of men which seeks to discover not only their physical condition, but their mental alertness and their temperament. A period of trial is generally required during which the man is given ample opportunity to show the stuff that is in him. If he fails to measure up to the standards of the company he is not employed.

The efficacy of this employment system naturally has a great deal to do with the accident prevention record of the

company. It reduces to the minimum the number of new employees who are "accident prone." It provides a foundation for the building up of the right kind of personnel.

Unfortunately, the industry does not have at the present time any adequate, standardized system of preliminary examination to determine the fitness of men who apply for positions. The examinations on a number of properties are good, but little effort has been made to co-ordinate them and get a system based on the best experience of all properties. It is not sufficient for the prospective trainman to show that he knows how to perform all the perfunctory duties of his position. An effective examination should

try him out in typical emergencies and see how quickly and how efficiently he reacts to them.

In some states, the applicant for an automobile driver's license is placed on the front seat of an automobile body in front of a motion picture screen. On this screen is shown a picture taken from an automobile proceeding down the street, thus giving the driver the impression of proceeding through congested traffic. Various emergencies are flashed on the screen in front of him, such as a child darting from the curb, an automobile turning without signal and the sudden stopping of a vehicle in front of him. His reaction to these emergencies and the time required by him to apply the brakes or make the necessary turn of the wheel are properly registered and they determine his fitness to drive in traffic.

Selecting Safe Operators

Some such test could be made for prospective trainmen. Various other mental alertness tests also can be adapted to this particular problem. We measure the man seeking a job to determine his height, we weigh him and test his lungs and kidneys, why should we not also measure his mind and test his nerves?

As an indication of what can be accomplished by proper selection of operators, the experience of the Chicago Surface Lines with its trolley bus service is worth mentioning. When this service was inaugurated in 1930 the operators were selected from the younger men in the train force on the basis of their records. Last year these one-man opera-

tors of trolley buses, operating in traffic without the advantages of fixed clearances such as rail operators have, made a remarkably good record. Compared with two-man cars on street car lines, they made about 50 per cent better showing on miles per accident.

Important as good employment practices are, however, they can change the character of the train force only by slow degrees. In the period prior to the depression the annual turn-over in train forces on large properties was about 10 per cent, and since that time it has been negligible. The big problem in dealing with the human factor, therefore, is to build morale and a sense of individual responsibility in the operating personnel. Many of these men have been in the service for years. They entered it when the life was not nearly as strenuous as it is today, and some of them have not adjusted themselves to the changed conditions. These men must be brought to see that most accidents are preventable and that they must train themselves in accident prevention.

Fixing Responsibility

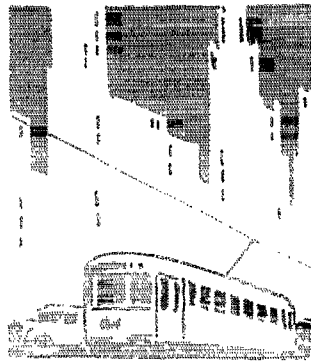
The first step in any system of accident prevention is to provide accurate and detailed information on every accident, fixing the responsibility squarely where it belongs. On the Chicago Surface Lines we have had such a system in operation for the past six years and the decreased number of accidents seems to indicate that we are on the right track.

Under this plan accidents are classed as chargeable or nonchargeable. The supervisor of accident prevention gets a report of every accident immediately after it occurs, makes an investigation and places it in the classification where he believes it belongs. The man involved in the accident has a right to appeal to the supervisor for a change in classification if he does not agree with the decision, and he also has the right to appeal from the decision of the supervisor to a committee on accident prevention consisting of the heads of the operating departments.

When the classification is determined it is made a part of the man's record. In this way it is easy to spot the accident-prone men—those who have a number of chargeable accidents—and also to give credit to the men who have no chargeable accidents marked up against them.

The proof of any system is in the results and we are very well pleased with the results obtained by this method.

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By L. W. HOPKINS*

Competent methods of repair, annealing and normalizing insure longer life and service from hoisting chain

Guarding Against the Weakest Link

THERE are seven important elements to be considered in the maintenance of hoist chains in safe operating condition. Outlined briefly, they are:

1. *Recognition of the defect or chain condition.* Such defects may be classified as follows:

A. Obvious defects.

B. Defects recognized as a matter of judgment based on experience with chain of a particular type used in a particular installation.

Obvious defects include raised scars or defective welds, chain links which have been distorted or hammered out of shape or which have deep gouges, or which show evidence of excessive interwear, chains which have been exces-

sively stretched or elongated, rings which are distorted from a true circular shape, and hooks which have been distorted.

The less obvious defects which must be classified on basis of judgment are:

A. Inter-link wear to the extent that such wear should be measured for the purpose of retreating the chain.

B. Evidence which indicates that distorted hooks or links have been straightened by workmen.

C. The stretching of chain to the point where it no longer works freely on pocket or sprocket wheels.

D. Evidence that chains have been excessively shot or hardened by hammering, peening or quenching would result in the formation of surface cracks and the concentration of impact stresses, which in turn often results in sudden failure.

All inspection of chain must be predicated on the simile that "a chain is as strong as its weakest link." The problem therefore is to find not only the weakest link but to recognize the condition of all links and attachments which reduce the gross strength of the chain. Considerable weight must be given to the judgment of the inspector, and the inspection of chain is not an operation which should be passed over lightly by anyone responsible for the safety of workmen.

2. *Repairs shall be made at once and with no compromise with safety or cost.* The inertia of human nature often seems to be magnified in relation to the making of chain repairs. Many accidents have occurred after chain has been found defective but continued in service. Two very definite rules can therefore be established with respect to chain repairs:

A. Remove all defective chain from service at once.

B. Repair before using again.

3. *Removal of chain from service* is often delayed because no substitute chain can be found. Often this is a matter of careless operation and misplacement of necessary equipment. The proper method of keeping spare chains, especially slings, is to hang them on a chain board or rack at some convenient place in the room or department in which they are used. This simple housekeeping rule will in the long run result in saving much time and minimize accidents. The persistent cry for economy is unfortunately often the deciding factor in returning to service chain which has long outlived its usefulness.

4. *The marking and tagging of defective links* is desirable as it sets the responsibility for repairs upon the inspector who presumably has the knowledge and judgment necessary for this important job. If the chains are returned to a chain repair specialist it is best to allow him full swing in making repairs. In this way the responsibility will be well defined and clear cut.

5. *The use of the proper replacement material.* This is a factor of some importance. When repairs are

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made to a chain of crane or dredge chain quality and a link made of common bar iron or mild steel is inserted, that chain is no longer in fact a crane or dredge chain. The repaired link should have the same properties as adjacent links both as to the elements of design and the physical properties of the material. A hook having elliptical, round, or square section cannot replace a hook of the same weight having a trapezoidal section and be expected to carry equal loads without dangerous deformation. This is a rather obvious comment but cases have come to the attention of the writer where serious chain failures have occurred as a result of such make-shift replacements. A knowledge of chain materials is therefore essential.

6. *The service of a skilled chain-maker* is possibly the most important consideration in the repair of chains. The making of a scarfed end weld in a chain link is a work of art and not all blacksmiths are capable of making such repairs. It is easy to make a good-looking weld with the scarfs fully and properly hammered and which appears sufficiently strong but nevertheless has a large percentage of its area in the center of the weld unfused and filled with scale and slag. Granting that the services of a skilled blacksmith can be obtained, one who realizes the importance of little things in the art of welding, he still must keep within reasonable dimensional tolerances. This is especially so when the chain operates on sprockets. In order to do this properly he must have equipment which is not ordinarily found in the average shop.

7. *Adequate equipment for annealing* consists of a furnace of sufficient heat capacity to thoroughly heat the charge in as short a time as possible. Pyrometer control is desirable and the thermocouple should be located as near to the work as possible.

Few industrial plants, large or small, have equipment for the proof testing of hoist chains. This is considered to be of prime importance in the manufacture of new chain and it would seem reasonable to expect the same vigilance in the handling of repaired chains. It is considered good practice to proof test steel chain to 1/2 of the nominal breaking strength, and crane and dredge chain to 1/3 of the nominal breaking strength. The safe working load is then set at 1/3 of the proof load in the case of steel and 1/10 of the proof load respectively in the case of iron.

In case of slings the complete unit including hooks, rings and all attachments should be tested to the maximum safe working load for which the sling is designed.

The history of proof testing all chain by the chain manufacturer dates back to 1879 and since that time it has been universally considered to be an important part of the manufacturing process.

Annealing and Normalizing

Within the past six or seven years some excellent papers have been written on the subject of annealing and normalizing chains and it has been given the close attention of engineering societies in preparing safety codes, recommended practices, etc. The excellent research conducted by the National Safety Council and concluded with the final report in the 1930 Transactions is the outstanding investigation reported in this country. The excellent and thorough work conducted by Dr. Gough entitled "Causes of Failure of Wrought Iron Chains" issued by the Department of Scientific Industrial Research of the National Physical Laboratory, England must be mentioned. Dr. Gough is still actively engaged in research work on the subject of heat treatment of chain, particularly small chains for chain hoists¹. A bibliography on the subject of chain repairing is appended.

As a result of this work one reason for the very occasional sudden failure of iron chains is now recognized as being tied up with the theory of a cold work hardened skin formation caused by the hammering and peening of link surfaces due to ordinary handling. This skin of hardened metal has increased in hardness and tensile strength and has been reduced in ductility by a proportionate amount. Its energy absorption capacity has likewise been reduced in proportion to these changes. In other words, it tends to be brittle under suddenly applied loads. Upon the application of a shock or impact stress this skin fractures, producing a fine crack which extends possibly only 3/1000 or 4/1000 of an inch to the soft ductile material directly underneath. The fracture is usually retarded at this point for the time being as the ductile material has high energy absorption capacity. Repeated overloading concentrates stress at the base of the crack and this gradually propagates itself deeper and deeper into the ductile material. The final

application of a heavy load, particularly a shock or impact load at the base of the crack (the point of reduced cross section) results in sudden and complete breakage. Failure of this type by impact is characterized by a crystalline fracture as the material does not have an opportunity to flow or elongate under shock load. It is often stated that the material has, in some mysterious way, crystallized. This description of this type of fracture has so fastened itself in people's minds that we occasionally still see references to failures caused by crystallized metal in technical reports.

The purpose of annealing is to restore the ductility of the work hardened surface thus preventing the formation of the fine surface cracks which ultimately cause all the damage. It has been demonstrated that if cracks are already present but that if they are superficial in nature, that annealing will tend to prevent any further propagation of cracks. The reason for this is that the material at the base of the crack becomes overstrained and cold worked due to the concentration of stress at this point. Subsequent annealing restores the metal to its original ductile or normal condition by the mechanism of retransformation or recrystallization. This prevents the continuation of the crack or at least steers it off into another direction where its capacity to do damage is much lessened.

Annealing Practice

We must first distinguish between the two chain materials, namely, wrought iron and steel. Wrought iron has been called a fibrous material because the normal fracture of wrought iron is fibrous in appearance. This is due to the large number of slag inclusions which are elongated in the direction of rolling, breaking up the ferrite or iron into definite layers and strata. These slag inclusions serve another useful purpose—they prevent excessive grain growth during heating. The phenomena known as "Stead's brittleness" is comparatively unknown in the case of well made wrought iron free from admixture of steel.

The annealing treatment for iron is aimed at restoring the cold work hardened surface to its original condition and to relieve the internal stresses which may have been set up due to the distortion of links. Experience has proved that this can best be done by

¹Progress Report, Engineering Volume 136 No. 3525.

Problems in Handling

Ethyl Fluid and Ethyl Gasoline

By ROBERT A. KEHOE, M.D.*

TO CLEAR the way for a detailed consideration of potential dangers in the handling of ethyl fluid, I shall deal very briefly with the hazards speculatively associated with the distribution of ethyl gasoline as distinguished from other gasoline. Ten years of experience and of critical investigation have failed to reveal the existence of danger to any group of workmen or to the general public from the presence of small amounts of tetraethyl lead in automobile fuel. Various aspects of the question are being further investigated at present, but only two matters deserve mention in a practical discussion of safety problems.

1. *Exposure to Lead Compounds in Cleaning Storage Tanks.* Tetraethyl lead alone or dissolved in gasoline slowly decomposes to yield crystalline triethyl lead compounds. Under normal storage conditions this decomposition is almost inappreciable, but over a period of years variable amounts can be found in the scale on the sides and at the bottom of storage tanks. If the sides or bottom of such a tank are cleaned in a dry state, finely divided dust containing triethyl lead salts may be inhaled by unprotected workmen who may enter the tank. Inhalation of these compounds causes irritation of the respiratory mucous membranes and the skin, accompanied by violent sneezing, weeping, and burning of the skin. Further exposure may result in rapid lead absorption and acute intoxication.

It is a simple matter to prevent lead exposure of this type either by cleaning the tanks in a wet state, or by the use of air line masks. Actually, these two safety measures are employed in routine cleaning at refineries in guarding against the inhalation of gasoline vapors. Nevertheless, since the lead hazard would not be considered of itself, the attention of refinery personnel has been directed toward it through instructions which coincide with or supplement the current practices of tank cleaning. It

should be pointed out further, that materials of this type, removed from ethyl gasoline storage tanks should be buried or otherwise disposed of so that they may not be resuspended by air currents.

2. *Lead accumulation on the surface of the earth.* Through a variety of avenues lead compounds are being brought out of the earth and distributed upon its surface. The deposition of finely divided lead bromide by way of the exhaust gases of automobiles and airplanes which burn ethyl gasoline is only one aspect of this process. I mention the problem in this connection, not because the use of ethyl gasoline is the most important factor—for it is not—but rather because the whole question arose out of the investigation of the public health problems associated with the distribution of ethyl gasoline. There is no present reason to believe that it involves danger to the public health. However, it must be recognized that a sufficient general increase in the gross daily human intake of lead from any and all sources could result in widespread damage to health. It becomes a matter of some importance, therefore, to know how much lead we are taking into our bodies through our food materials and otherwise, and to keep a critical eye on the factors which affect such lead intake. This, my associates and I are attempting to do in the Laboratory of Applied Physiology in the University of Cincinnati.

Hazards of Handling Ethyl Fluid

The general character of the hazards in the handling of ethyl fluid is determined by the properties of the lead compound which is its principal constituent. Tetraethyl lead is an oily liquid which shows a decided tendency to creep through the seams or joints of containers and pipe lines, thereby supplying abundant opportunities for leakage. Moreover, it is a heavy material, of almost twice the weight of water, so that packages of suitable size for mixing with gasoline are handled with some difficulty, and with the ever present danger

of physical injury to the worker, as well as the likelihood of bursting if dropped or subjected to violence.

Tetraethyl lead has an appreciable vapor pressure at ordinary temperatures, and if exposed to heat, the vaporization of the fluid develops a pressure within containers, which under extreme conditions (conflagration) may result in the bursting of the container with ignition of its contents, and which in the hot sun's rays causes a sudden escape of vapor when the container is opened. The oily (fat soluble) and somewhat volatile character of the material gives it a peculiarly hazardous quality among lead compounds in that absorption takes place into the human body by way of the unbroken skin through contact, and by way of the lungs through inhalation.

The saturated vapor of tetraethyl lead in air at ordinary temperatures contains approximately 5 mgs. of lead per liter of air, a concentration which is lethal for experimental animals after a few hours of exposure.

With these characteristics in mind, it is possible to visualize the chief difficulties which attend the manufacture, transportation, storage, and handling of ethyl fluid. The necessity for the avoidance of leakage and spillage of fluid, and for prevention of skin contact or inhalation, is apparent. And not only must safety precautions be designed for the prevention of rapid absorption and acute illness, but also for the avoidance of repeated slight exposure which may result in chronic plumbism.

1. Hazards in Manufacture

The preparation of ethyl fluid consists essentially of the blending of tetraethyl lead with a sufficient amount of an organic halogen carrier to convert the lead to the corresponding halide when combustion occurs, and with an oil-soluble dye to give the fluid a deep color. The materials must be thoroughly mixed, and checked by chemical analysis for correctness of the quality and proportions of the ingredients. The finished fluid is stored in tanks, or introduced into

*Cincinnati, Ohio. A paper presented before the Petroleum Section, Twenty-second Annual Safety Congress.

drums or into tank cars for shipment.

The control of the dangers of manufacture is relatively simple, since all the operations are carried out by a single isolated group of men who are under constant supervision. The solution of the problem of safety is found in the use of carefully constructed closed systems of pipes, pumps and tanks, with the necessary vents carried well outside working areas. General and local ventilation is employed as a supplementary precaution. The filling of barrels for shipment necessitates a break in the closed system. This operation is carried out, therefore, in a specially constructed, highly ventilated hood, equipped with safety devices which care for any accidental spill. The difficulty is increased by the necessity for accurate measurement of the fluid.

Skin contact with the materials, and inhalation of vapor is obviated through detailed regimentation of the technique of all plant operations, including the carrying out of repairs, and the maintenance of meticulous housekeeping. The adequacy of precautionary measures is checked by regular medical supervision.

An integral part of the manufacturing and shipping procedures is the cleaning, testing and repainting of metal drums before refilling, and the testing of refilled drums for leaks before shipment. The hazards of the cleaning operation are essentially negligible, since it is done by equipment enclosed in highly ventilated hoods and operated from the outside. Cleaned drums are given an air pressure test, and filled drums are tested in a specially ventilated room, by setting them with the bung down for a period of 12 to 48 hours. The slightest leak becomes readily apparent because of the spread of the deeply colored fluid into the bright new aluminum finish on the surface of the drum. Suitable warnings are pasted on each drum, with instructions for caring for accidents, or leaks. The recognition of such dangers was responsible for the use of a specially designed metal drum, and later a special type of tank car for shipping ethyl fluid.

2. Hazards in the Transportation

Difficulties in transportation arise largely from the fact that the fluid may pass into the custody of persons who have not been instructed adequately as to the nature of the dangers and the means to employ in avoidance of such dangers. There is the greatest necessity, therefore, for anticipating the type of handling which is given to ordinary com-

modities in transit. In fact, every effort must be made to see that no opportunity occurs for contact or exposure from the time of shipment until the material arrives at its destination, where it can be taken in charge by properly trained persons. For this reason shipping of drums, with rare exceptions, is carried out in full car load lots, or at full car load rates, so that the drums may be safely fastened in place in the car at the manufacturing plant and removed by the trained personnel of the purchaser. Where shipment occurs by boat, the drum cargo is under the supervision of a representative of the shipping plant, until it is fastened in place on an open deck of the vessel, from which it is removed at destination under the supervision of the shipper's or purchaser's trained agent.

From time to time drum shipments of fluid have been made by truck. This has been done usually to avoid a transshipment of less than carload lots by rail. Thus a car load of fluid, shipped to some central point has been split among neighboring purchasers, each of whom has transported a number of drums by truck. This again, merely represents the attempt to maintain the responsibility for the handling of drums in the hands of persons who are fully informed as to the proper method of handling.

3. Handling of Fluid at Refineries and Bulk Mixing Points

The above paragraphs have dealt with the precautions which must be taken by the distributor of ethyl fluid, in order to see that the product reaches the purchaser without the likelihood of any injury to anyone in transit. From this point on it is necessary for the purchaser to see that the fluid is handled only by the proper persons, that it is mixed with gasoline in proper amounts and by acceptable procedures, and that the emptied containers are returned to the distributor with the same care that was observed by the distributor.

Storage. Hazards in the case of drum storage include the mechanical difficulty of handling heavy packages, the possibility of leaks and spillage, the development of pressure in the drum with high temperature, the partial solidification of the fluid at low winter temperature, and the occurrence of fire. Theft of the fluid, and tampering must also be prevented. Obviously the fluid should be stored where the containers can be handled with ease, where vapors will not be confined, where spilled fluid can be

readily washed away, where there is protection from direct sunlight (in warm or temperate climates), and from the spread of fire, and where there is security from handling by unauthorized persons. When fluid is shipped in tank cars the chief storage problems have to do with the transfer of the large amount of heavy fluid from the tank cars to a fluid storage tank without allowing exposure, the prevention of leakage of either liquid or vapor from the storage tank, and provision against excessive cooling or heating.

Mixing. The hazards of mixing with drums of fluid arise in moving heavy drums to the mixing site, in removing the bungs, in emptying out accurately measured amounts of fluid, in mixing the fluid with gasoline, in rinsing out the drums when emptied of fluid, and in replacing the bungs. All this should be done without leaks or spills, and it must be done without exposure, on the part of the handler, to the liquid or vaporized fluid. Moreover, any implements or equipment used in the process must be cleaned up so as to remove any opportunity for subsequent contact with liquid or vapor at the mixing site.

The most serious aspects of the problem of handling fluid out of a storage tank are concerned with accuracy of measurement, the prevention of leaks in the pipe lines, and the carrying out of repairs if and when leaks develop.

It is inevitable that there should be differences of opinion among the large number of persons who have purchased and used ethyl fluid in the preparation of ethyl gasoline, as to the requirements for safety. It is equally certain that if the manner of mixing were left to the discretion of gasoline distributors, there would be a wide variety of methods, equipment and precautionary measures.

Especially at the beginning of this new industry, it was necessary to make a careful appraisal of the hazards. To do this some type of centralized responsibility for the manner of mixing had to be established. This was achieved through regulations and instructions to the purchasers of ethyl fluid, together with specifications for mixing equipment. Compliance with these regulations was made an obligation to which purchasers were bound by contract. Under this regime a high degree of uniformity has been maintained.

Mixing plants are built to satisfy not less than minimal specifications supplied by the distributor of ethyl fluid. These specifications cover the storage facilities for ethyl fluid, the mixing equipment.

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Stainless Steel Equipment

Its Inspection and Repair

By CLAYTON E. PLUMMER*

SELECTING the proper materials for the construction of stainless steel equipment is one of the important duties of the engineer. In order to select correctly a stainless steel for a particular application, a knowledge of the most commonly used stainless steels and their properties is essential. Such preliminary information may be obtained from a study of: (1) published lists of materials; (2) data supplied by the manufacturers; (3) tables showing the physical and chemical properties of stainless steels; and (4) books on the subject of corrosion-resistant alloys.

But, because of the many trade names and apparently large number of alloys, this preliminary study is often perplexing to one not a trained metallurgist. The problem of selection is greatly simplified, however, by the fact that, because of similar characteristics, stainless steels may be divided into three main groups: martensitic, ferritic, and austenitic. Hence, two-thirds of the work may be eliminated by *first selecting the proper group* rather than attempting to choose a specific alloy. The proper group may be determined by selecting specimens from each, and testing them under actual operating conditions. Laboratory tests can be employed as an alternative, but are not recommended because of the uncertainty of adequately duplicating actual conditions. Some of the characteristics of each of the three groups are as follows:

Group I—Martensitic Steels

These steels are composed principally of chromium, iron and carbon. They air harden intensely, are magnetic, and are subject to heat treatment like carbon steels. Typical combinations are 4 to 6 per cent chromium, and 12 to 15 per cent chromium, both with low carbon.

Type—4 to 6 per cent Chromium.
Low Carbon

The 4 to 6 per cent chromium alloy, used extensively in the oil industry may be obtained

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in plates, sheets, squares, octagons, flats, strips, tubes, wire, forgings, blanks, ingots, castings, etc.

In the fully annealed condition this steel is stronger than soft steel with the same carbon content. Addition of ½ per cent molybdenum or one per cent tungsten gives a stronger steel at elevated temperatures.

Type—12 to 15 per cent Chromium.
Low Carbon

The 12 to 15 per cent chromium steel is stronger than soft steel, takes a good polish, and in this condition resists atmospheric corrosion indefinitely. It is not apparently affected by fruit juices and resists oxidation at temperatures up to 1400 degrees F. It is a fair stainless steel where strength, toughness and high impact value are required. To obtain the best properties this steel should be heat treated. Like the 4 to 6 per cent chromium steel it air hardens. Applications are golf club heads, valve parts, automobile parts, etc.

Group II—Ferritic Steels

These steels are composed of chromium and iron with the chromium in excess of 18 per cent. They are non-hardening, and in the annealed condition are relatively strong and ductile.

Type—18 to 23 per cent Chromium.
Low Carbon

The 18 to 23 per cent chromium steel combines ease of fabrication with better corrosion resistant properties than the 12 to 15 per cent chromium steel. Chromium steels with chromium content higher than 18 per cent will not air harden, provided the carbon is low. This analysis finds application in nitric acid equipment, condensers and evaporators, fans and blowers, and plays an important part in chemical plant equipment.

Type—26 to 30 per cent Chromium.
Low Carbon

The 26 to 30 per cent chromium steel shows remarkable resistance to many corrosive influences, including nitric acid and acid mine waters. Because of its resistance to oxidation at temperatures up to 2000 degrees F. it finds application in furnace parts, supports, rabble arms on roasting furnaces, etc., when brittleness is not a factor.

At elevated temperatures the higher chromium steels are susceptible to grain growth which cannot be prevented or corrected by heat treatment. When these steels are heated for a long period at about 800 to 1000 degrees F. and cooled slowly they become brittle when cold. This brittleness is only partly relieved when the metal is reheated.

Steels containing 16 to 30 per cent chromium show considerable weakness if a notch or a

change in dimension is present. This should be taken into consideration when bolts are used. The chromium alloys are used at elevated temperatures where sulphur is present in large amounts.

The addition of two per cent nickel gives a steel that is not so brittle when cold.

Group III—Austenitic Steels

Nickel is added to chromium-iron alloys to produce a steel of suitable austenitic type, possessing toughness, ductility, non-hardening properties by heat treatment, and high resistance to impact. The nickel also increases resistance to scaling at high temperatures, reduces grain growth, and at the same time lessens embrittlement after long service. These steels are non-magnetic. Like other alloys, proper processing is necessary to put the metal in its best corrosion resistant condition. In contrast to ordinary iron and steel, these austenitic steels are softened by cooling quickly from above their critical range.

Four characteristic chromium nickel steels have been selected for discussion here:

Type—18 per cent Chromium.
8 per cent Nickel

Since this analysis takes a high polish, will resist indefinitely the attack of atmospheric air or a weak organic acids, it is used extensively for equipment in food manufacturing and processing, creameries, fruit and vegetable canneries, meat packing plants, refrigerator linings and trim, soda fountains, chemical plant equipment, etc. This alloy is easily fabricated, provided proper precautions are taken.

Much has been written concerning the failure of welded stainless, due to inter-crystalline corrosion. When this alloy is heated in the range of 800 to 1500 degrees F., carbides are precipitated which, probably due to an electric potential difference, results in corrosion at the grain boundaries. Elements such as columbium, titanium, vanadium and molybdenum have been added in an attempt to prevent inter-crystalline corrosion. A theoretical discussion of the subject is beyond the scope of this article. Welds should be heat treated to put the metal in its best condition for resistance to corrosion.

There are many applications where heat treating after welding and the use of modified analyses are not necessary, but where corrosive conditions are severe, heat treatment is absolutely essential. Many failures have been observed in the paper pulp industry due to corrosion by sulphite liquors where there was no heat treatment after welding.

Type—24 per cent Chromium, 12 per cent Nickel

This steel is used for its strength value and oxidation resistance at elevated temperatures. Because of its higher chromium content, it is more resistant to sulphur atmospheres at high temperatures than an alloy containing 15 per cent chromium and 35 per cent nickel.

Type—21 per cent Chromium, 22 per cent Nickel

This analysis combines strength at 1500 to 1600 degrees F. with excellent resistance to oxidation.

Type—15 per cent Chromium, 35 per cent Nickel

Since this steel can be forged or rolled only with considerable difficulty, it is used mostly in the cast condition where both high strength and corrosion resistance at elevated temperatures are desired. This steel is not recommended for use at elevated temperatures in the presence of sulphur, since the lower chromium and higher nickel result in breakdown due to attack of the sulphur at the grain boundaries.

Although there are many alloys, classified as corrosion and heat resistant, this article has been limited to stainless steels where the iron content is 50 per cent or more. The heat resistant alloy is a field by itself.

Many times the steel manufacturer's request for information about the use of stainless steel is misunderstood. However it is to the benefit of all, but particularly to the user, that the steel manufacturer be informed of the use to which the material is to be put so that he can follow its course with the ultimate use in mind.

Inspection of Raw Materials

By raw materials, of course, are meant plates, strips, forgings, castings or other shapes from which are fabricated equipment or structures.

The inspection of such material follows the same principles, for the most part, as the inspection of ordinary carbon steel. However, due to its greater cost, the extreme care with which the material must be produced, and the importance of the effect produced by the various alloying elements, as well as the treatment in shaping, inspection must be more diligent and critical than would be required for ordinary steel.

The chemical composition is of utmost importance if the desired properties are to be attained. Therefore, check analyses are advisable so that inspector and buyer may both be satisfied that the alloying elements are present in the specified amounts, and that in general the material conforms to specifications.

Particular attention should be paid to the chromium content, the nickel content, or any other alloying element desired. At the same time the carbon and

sulphur content should be watched so that they do not exceed prescribed limits.

Because the effect of too high or too low a temperature would prove detrimental to the ultimate efficient and safe use of any equipment, it is essential after the rolling or working of the alloy into the proper shape that the heat treatment of such shapes be carefully conducted. The only means of determining the correctness of the heat treatment is for the inspector actually to witness this operation and check both the time and the temperature used. Actual witnessing of the heat treatment should be supplemented by corrosion tests on test pieces.

As in ordinary steel, the finished material in the shape of bars, plates, etc., should be thoroughly checked for surface defects, such as laminations, seams, cracks, blisters, blow holes, pipes, etc. Since the making of alloy steel is a more delicate operation than the making of ordinary steel, the chances of mishaps and consequent defects are also greater. Finally, if there is to be a further finishing operation involving the use of heat, as in the manufacture of rivets, this too should be witnessed by the inspector to make sure that the proper temperatures are maintained.

Inspection of Fabrication

The fabrication of the raw material into such equipment as tanks, pressure vessels, pumps, centrifugal machines or soda fountains likewise requires competent inspection to insure safe and satisfactory performance.

The range of products into which the raw materials may be fabricated is vast, and since the particular method of inspection in each case must vary in detail, no attempt will be made to set forth each condition. It will be sufficient to outline rather briefly some of the major considerations which should guide the inspector.

If the stainless steel is to be fabricated into tanks or equipment of similar nature requiring fitting of parts and subsequent riveting or welding, it will be the inspector's duty to check the laying out of the component parts. He must make sure that they fit absolutely, that edges are planed and not bevel-sheared, that rivet holes (if needed) are sub-drilled and reamed rather than punched.

If the equipment is to be welded, additional precautions are necessary. Corrosion or embrittlement must be guarded against, and in addition the type or class of parent metal will be an important factor in the particular method used. Various welding methods are used today,

such as the metallic arc, carbon arc, resistance, seam or butt, spot, line, atomic hydrogen, alternating current arc, and oxyacetylene. If the metallic arc welding method is used, reverse polarity is recommended, the work being the negative and the welding rod the positive.

Before welding, the inspector should be sure that the parts are clean, since grease may cause pits or hard spots. The selection of the welding rod is very important; coated rods are recommended for metallic arc welding, and uncoated for oxyacetylene welding. The gage of the material influences the method used. For economic reasons one method may have an advantage over another. There are so many influencing factors that the selection of the welding method should be left to the advice of an expert. It is axiomatic, of course, that before any welding is done the inspector will want to make sure that the fabricator can produce satisfactory welding work. It is imperative that every precaution be taken.

As a check on welding, the X-ray is recommended as an ideal method of non-destructive inspection of the finished product. This is particularly desirable where pressures or stresses are to be resisted, or where corrosive substances are encountered.

After welding, annealing is generally required to remove embrittlement and prevent corrosion at or near the weld. Both would weaken the equipment and lead ultimately to its destruction. The proper temperature for annealing is necessary, and it is the inspector's duty to see that these temperatures are maintained. Thus, austenitic steels will require a temperature of 1850 to 2000 degrees F., the 4 to 6 per cent chromium steels 1550 to 1600 degrees F., the 12 to 15 per cent chromium steels 1450 to 1500 degrees F. Since the 24 to 30 per cent chromium steels are non-hardening, annealing after welding is not required. The atmosphere should be slightly reducing. The rate of cooling also differs: in the austenitic groups rapid cooling is desirable, while in the chromium-iron alloys the temperature should be lowered slowly at a rate not exceeding 50 degrees F. per hour.

The shearing of austenitic alloys differs from ordinary steel in that more power must be used, and the material must be cut completely through. The principal consideration in this operation is to guard against work-hardening of the metal, which may be deleterious to its use and certainly increases the fabrication cost.

In blanking and punching austenitic

alloys more power must be used than for mild steel. A necessary precaution is to keep a neat clearance between the punch and the die. Too great a clearance will cause the material to work-harden.

Machining of austenitic steels is best accomplished at a speed about one-half that used for mild steel. A tool with design similar to that used in machining dead soft brass is recommended. Austenitic steels have been machined successfully in automatic machines when they have a brinell hardness between 200 and 240.

Forming and drawing require heavier lubricant, slower press speeds, and greater clearances between punch and die than with mild steel.

Drilling, as mentioned, should be done by a high-speed tool, adequately backed up. Sawing requires high-speed hacksaw blades with wavy teeth.

The types 4 to 6 per cent chromium and 13 to 15 per cent chromium have been found to machine better when they have a brinell hardness of approximately 220. Slightly lower speeds are recommended. In machining types 13 to 18 per cent chromium and 24 to 30 per cent chromium, a tool similar in design to that used on semi-hard brass is recommended. When used on automatic screw machines, manufacturers can furnish special free-machining grades.

Austenitic, martensitic and ferritic steels may be cold or hot riveted. If hot riveted, the temperature of such rivets should be 1900 to 2100 degrees F. for austenitic (finishing above 1600 degrees F.); martensitic steels 1450 degrees or less; ferritic 1500 degrees F. The temperature of the rivet furnaces should be thermostatically controlled. Electric furnaces are preferable.

Brazing is not recommended for these types of steel. Its tendency is to decrease corrosion resistance.

Stainless steels can be soldered provided the metal is properly treated. Uncut muriatic acid is recommended as a flux. Because of lower thermal conductivity a larger iron is needed. Care should be taken not to have the iron too hot as embrittlement may be the consequence. To prevent buckling, chill plates may be used, and with the austenitic group these should be of copper. Another precaution is to wash with ammonia water after soldering to inhibit further action.

Rightly fabricated and intelligently used, stainless steels are safe and satisfactory. If rules are not observed in fabrication or use, a dangerous situation will exist. Equipment will be called upon for functions for which it is no longer

Trainmen Are Human

(Continued from page 10)

Last year 8,040 men out of the total train force of 12,000 had no chargeable accident during the twelve months. Of this number 1,895 had had no chargeable accidents in the six years since the system was established.

A comparison of certain types of accidents during this six year period as against the previous six year period shows a decrease of 20 per cent in car or bus and person accidents, of 53 per cent in car or bus collisions, 12 per cent in car or bus collisions with vehicles and 16 per cent in fatalities. The number of motormen who had six or more accidents in one year has decreased 50 per cent as compared with 1930.

Whatever success in accident prevention has been attained on this property has been the result of keeping eternally at it. Under the direction of the supervisor of accident prevention, the staff committee with whom he ad-

vises and the heads of all operating departments, there is a constant hammering at this problem. The results of the study of all accidents are passed on to the men for their information. They are shown how certain types of accidents could have been prevented. Intersections which have proved particularly dangerous, because of the number of accidents occurring there, are spotted and the men are warned to be unusually careful at these points.

Accident prevention contests are carried on throughout the year among the various divisions and suitable awards are made to the division with the best record. Eye tests are required and the men must wear glasses when they are needed. Group meetings are held at which all types of accidents are discussed and helpful suggestions are requested.

Especially do we make it a point to recognize good records. I am thoroughly convinced that more can be accomplished by a word of appreciation for the man who has done a good job than by harsh disciplinary measures and the general attitude of taking it for granted that those with good records have only done their duty.

When you have provided the best type of equipment and have done all you can in cooperation with public officials to secure satisfactory regulation of street traffic, the prevention of accidents in local transportation simply resolves itself into a problem of psychology. Our trainmen are human, like the rest of us. They have the same reactions to praise or blame; they are just as anxious to earn the good opinion of those about them and they enjoy the same satisfaction in going home to their families at night with a feeling that they have done a good day's work.

The destiny of any transportation company is in the hands of its operating employees; they can make or break it. They can be driven by the lash of discipline to perform their duties, but servile obedience to rules destroys self-respect and initiative. On the other hand, they can be made to feel that they have the confidence and respect of the management, that they are relied upon for intelligence and loyalty, and that they will receive congratulations for work well done as well as censure for neglect of duty.

In short, it's easier to lead men than to drive them. Invariably, the operating organization with an exceptionally good morale also has an outstanding accident prevention record.

fitted. As a consequence, the safety factor of such equipment is unknowingly exceeded and perhaps life is endangered.

Causes of Failure

A few of the more common causes of failure of stainless steel equipment are:

- Improper selection of stainless steel
- Inadequate inspection during fabrication
- Failure to heat treat after welding
- Material of too thin gage
- Galvanic action resulting from dissimilar metals in contact in an electrolyte
- Mechanical failures.

Repairing Equipment

Many failures are attributed to abuse in service. If thin gage material is used, accidental piercing of the equipment may make repair necessary. If repairs must be made by riveting or welding, the precautions set forth under "Fabrication" should be observed. Careful consideration should be given to the selection of the method of welding, both from the standpoint of corrosion resistance and economy. The location of the weld is important. It should be placed so that any breathing action or motion of equipment will not place the stresses at the weld, but at a place where the material is less liable to failure.

If the right type of stainless steel is selected for a definite application and proper precautions are observed during fabrication, there will be little need for repair of stainless steel equipment.

Measuring Light with the Electric Eye

By E. C. SCHNURMACHER

THE photo-electric cell, which to the general public is still a scientific toy known as an "electric eye," for many years has been quietly serving an extremely useful mission in experimental and industrial work, in controlling the operation of apparatus and equipment in various processes. Its applications vary from guarding the crown jewels of England to preventing workmen from being crushed in the jaws of giant power presses. Recently it has been developed along an entirely new line—as a sight meter or visual thermometer, by means of which illumination may be checked directly in degrees upon a dial a little bigger than a watch.

Perfected by Earl Canfield, a young New York scientist, the new sight meter has already demonstrated many possibilities in the prevention of accidents due to insufficient illumination, as well as in the increase of worker efficiency due to sufficient and well placed illumination. It has become a reliable instrument in the hands of insurance adjusters in determining negligence due to insufficient illumination in accident cases.



Faulty lighting in hallways is often a contributory cause of accidents. A new adaptation of a photo-electric cell in a "sight meter" is more reliable than the eye in gaging illumination.

In his investigations and experiments with the sight meter during the past several months, Mr. Canfield has discovered many contributing causes to accidents which, if illumination could be accurately measured by the layman, might be promptly and effectively checked.

In outdoor lighting, for example, it was found a survey of 42 cities revealed that wherever street lighting had been decreased—or wrongly located—there was a corresponding increase in fatalities during evening rush hours.

"Undoubtedly, the number of accidents could be reduced without increasing the total power bill," Mr. Canfield revealed. "There are many cases in which the sight meter shows a glare on one side of a light and little illumination on the other. This may be due to obstructions, reflected glare from store windows or white painted buildings and other contributory causes which the sight meter can check by determining the degrees of illumination, either direct or reflected."

In indoor lighting in plants and factories where employees were required to use their eyes intensively over a long period of time, Mr. Canfield found that illumination averaged 15 foot-candles in many establishments where a minimum recommended level was 30 foot-candles and the probable level of greatest efficiency was 50 foot-candles.

Normal eyes require from 35 to 50 units of light for prolonged close work, yet it was found that the plant was exceptional indeed which on a dark day provided more than 15 to 20 units of light. When it is also taken into consideration that 71 out of every 100 people over 50 have varying degrees of defective vision and that 23 out of every 100 have eye difficulty of some sort, it may be seen how accident hazards or inefficiency can be prevalent in an underlighted plant.

"In one of the plants tested with a sight meter," states Mr. Canfield, "the management had put considerable faith in the reflective quality of the walls for diffusing and spreading adequate light. When I checked those walls everyone



Teachers can now determine by means of the sight meter whether or not pupils have sufficient illumination for their studies.

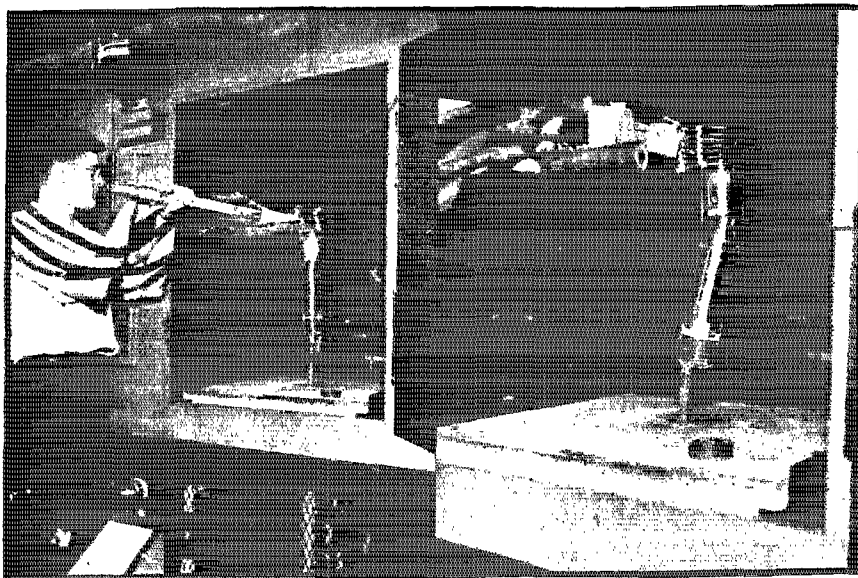
was surprised at the low reflection factor of the buff, glazed tile brick which had been specified for the laboratory walls, especially for the conservation of light.

"Further tests were made throughout the plant with the result that all 200 watt lamps were changed to 300 watt lamps and additional outlets were installed."

In carrying his investigations into the home, Mr. Canfield discovered that the outside doorway, the hall, kitchen and bathroom were the most frequent locale of accidents. While many of these accidents were due to negligence, faulty illumination was found to play a contributing part either directly—as evidenced by failure to see an obstruction clearly—or indirectly through causing inefficiency and consequent inattention.

"We determined that the amount of light in the home should measure an amount of from 15 to 20 foot-candles or 15 to 20 times the light furnished by a standard candle at the distance of a foot," stated Mr. Canfield. "This amount of light is sufficient for ordinary or 'social illumination' and when it is utilized in that amount the possibility of accident in the home is lessened. For intensive work, of course, that illumination should be increased to between 30 to 50 candle power. From 20 to 30 candle power is adequate for reading fine print or sewing while any amount of illumination under 10 candle power is inadequate for critical seeing."

The sight meter, itself, incorporating the photronic photo electric cell, weighs but eight ounces. It is compact in form and simple in operation. Tests have shown it to function without deviation from accuracy over a long period of time with no replacements required.



Testing an X-ray tube with a high frequency coil is a simple task, but the slightest movement of the coil—caused perhaps when the operator touches the coil and is burned, or makes a sudden jerk—the tube cracks under its own weight. Only a minor first-aid case but the breakage cost is \$200.

The “Acorn” of a Major Accident

By HILTON E. WRIGHT*

INDUSTRIAL management today is prone to investigate thoroughly only those accidents severe enough to necessitate compensation payments. Too little attention is given to the minor injury—the “acorn” from which a major accident grows. Yet the cause of the minor injury can easily produce a serious accident and should be removed. The surest way to do this is to investigate every accident, no matter how insignificant.

Preventing serious injury falls in the province of human welfare, but it also has a direct influence on the cost of industrial processes. Reducing these costs is the second general benefit to be derived from thorough investigation of minor accidents. Let us look first into the human side of the experience which the Westinghouse Lamp Company has obtained since this practice was begun.

The department head in charge of all machine shops in the equipment and development division at Bloomfield, undertook in a very determined manner to remove the major accident evil by in-

vestigating each and every minor accident. He made a ruling that a report of every accident must pass over his desk. When an employee was responsible for a number of accidents over a given period, even though they were minor in character, he was called into the superintendent's office for questioning. He was shown how a minor injury might easily have had more serious consequences and then was cautioned to be more careful in the future.

The reaction to this procedure was encouraging and constructive. The employee showed no tendency to cover up facts; instead, he freely described the details. In return he was told that the management was insistent in its demand for a reduction in the number of minor accidents, not only to prevent injury but also to eliminate the waste of time and material generally accompanying every accident.

After adopting this system of accident supervision the division worked 2,246,874 man-hours during a period of seventeen months without a lost-time accident. During the last two and one-half years, the accident frequency rate, which includes all accidents, has been reduced about 70 per cent. Giving more attention to the minor accidents helped

Too little attention is given to minor accidents—the “acorns” from which major injuries grow. Westinghouse Lamp Company investigated the minor mishaps and found ways of preventing many of the more serious cases

to reduce the number of major accidents and in the end helped to bring about this 70 per cent reduction in the frequency rate.

In the Base Works at Belleville, where the hazards are common to the metal forming industry, a similar vigilance over minor injuries has also brought about a definite reduction in the number of all accidents. As a result, they were able in this plant to establish a no lost-time accident record of more than 600,000 man-hours worked during two years.

Another instance where the investigation of minor injuries has reduced the probability of serious injuries occurred in the Bloomfield plant. A supervisor once allowed a minor accident to pass with only meager inquiry. Later, deciding to investigate further, he found that the accident was caused by the use of a wrong fixture. Glass tubing was being forced over a fixture too large in diameter, and as a result breakage occurred. It was a hand operation which might easily have resulted in serious injury. Correcting this condition unquestionably prevented minor injuries on this job.

The job of examining the reports for all minor accidents would seem to make serious inroads on the time of a busy executive. It did require a lot of time when the plan was first inaugurated. Almost immediately, however, the number of accidents began to decrease, and it was not long before the time required to examine reports was regarded as negligible. For example, in one plant where the employees numbered 400, and where the plan of investigating all minor accidents was adopted, there were 11 minor injuries and no disabling cases over a period of a month. Less than three reports per week had to be examined.

The fact that an injury is minor does not always mean that it represents no cost. Also, the fact that this cost is not as large as that for a major accident is not an adequate reason for underesti-

*Safety Engineer, Westinghouse Lamp Co., Bloomfield, N. J.

inating its presence and importance as an expense item.

Many accidents have hidden costs which do not appear on the books as insurance cost factors. Overtime work on a job, made necessary because of an accident or to fill an order for an important customer, is a good example of hidden costs. The manufacturing cost bears that additional burden, but an analysis will show that the accident was actually the cause.

In one of our divisions there was once a minor accident which entailed no lost time other than a few treatments in the plant hospital, but it represented a cost of more than \$200 for spoiled work. The accident caused an operator to pull her hand away from the job so suddenly that she broke an expensive X-ray tube which was under test.

In another instance, an operator was taking a short-cut across the manufacturing floor when she tripped and fell. The injury was a minor one, requiring only a few hospital treatments, but, as she fell, she dropped and broke a special-size lamp which represented a spoilage cost of \$5. In one year 600 minor injuries were reported in this division. If 10 per cent resulted in spoiled work, averaging \$5 for each accident, the annual spoilage costs of these accidents were \$300. This is for one division only, but it is a good indication that the spoilage costs for an entire factory might easily reach a considerable amount over a period of a year.

Fifteen or twenty minutes a day in the plant hospital to receive accident treatments may seem very little for one accident. During that time, however, the operator's machine is idle. A thousand such treatments in a month would amount to 300 lost-man-power hours and idle machines. Over a period of a year it would be the same as adding two people to the payroll for which there would be no return, not to mention the depression cost represented by two idle machines.

Workmen's compensation insurance will not cover those losses, nor the loss of a customer's good-will for failure to make delivery on the product spoiled. The belief of some employers that a compensation insurance policy, carefully tucked away in the company safe, ends their duty is short-sightedness, pure and simple.

A statement once made by one of our superintendents whose division investigated all minor accidents and as a result obtained an enviable record of over 1,000,000 hours worked without a lost-

time accident, hits the nail on the head in regard to this business of investigating all accidents. He said:

There are a few accidents I can countenance for a first occurrence, but I cannot afford to permit the same accident to happen again. Therefore, I insist on a careful study of all accidents in my division.

In the final analysis, the primary reason for industrial safe practice is to keep operating costs at a minimum. Since it is the serious accidents which require compensation payments, there has been a tendency to assume that the only way to assure low compensation costs is to keep major accidents under control. Experience shows, however, that in spite of rigid supervision to prevent recurrence of major accidents, new ones always pop up again. Tracing back these major accidents to their cause will frequently disclose that they have grown from a minor accident. Regular investigation of the minor mishaps might have prevented the major accidents.

Device Lessens Danger of Gage Glass Breakage

By FRANK A. RUMATZ

WATER column gage glass breakage and wear have for many years been considered inevitable. The hazard to employees might be guarded satisfactorily, but excessive gage glass breakage in many plants made the cost of replacements almost prohibitive. I was led, therefore, to undertake some research work in an effort to improve the gage glass, and I found two outstanding contributing causes of breakage.

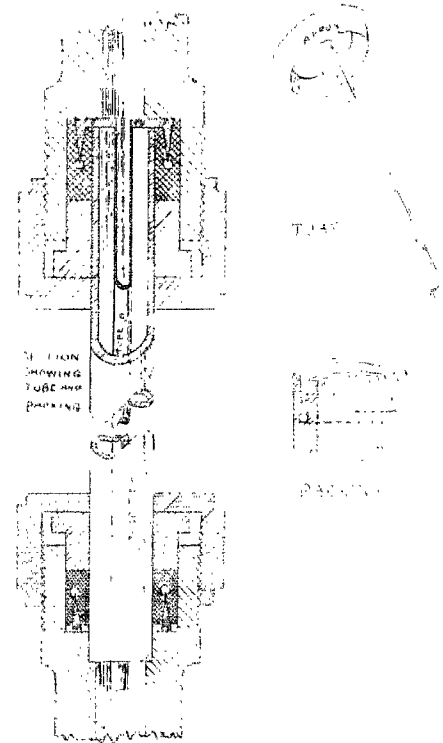
1. That portion of the upper end of the glass projecting from the packing devitrified quickly. The glass dissolved rapidly up to the upper end of the packing; below this it was somewhat slower due to the encasement of the glass by packing. This was due to high temperatures, condensation and presumably to the fact that the boiler water is chemically treated.

2. The periodic blowing down of the water column, with the attendant impingement of steam, grooves the glass internally and weakens it.

To overcome these objectionable factors, a novel packing combination was devised, consisting of the integral nozzle, wedge, and packing shown in the accompanying drawings.

Chief Engineer, Tecumseh Power Station, The Kansas Power & Light Co., Topeka, Kansas.

The nozzle is planned to prevent steam impingement. It is plain that since the nozzle extends beyond the bottom of the glass the steam will never come in contact with the glass. The apron and the special packing hermetically seal the upper end of the glass and thereby prevent erosion. The apron wedge also per-

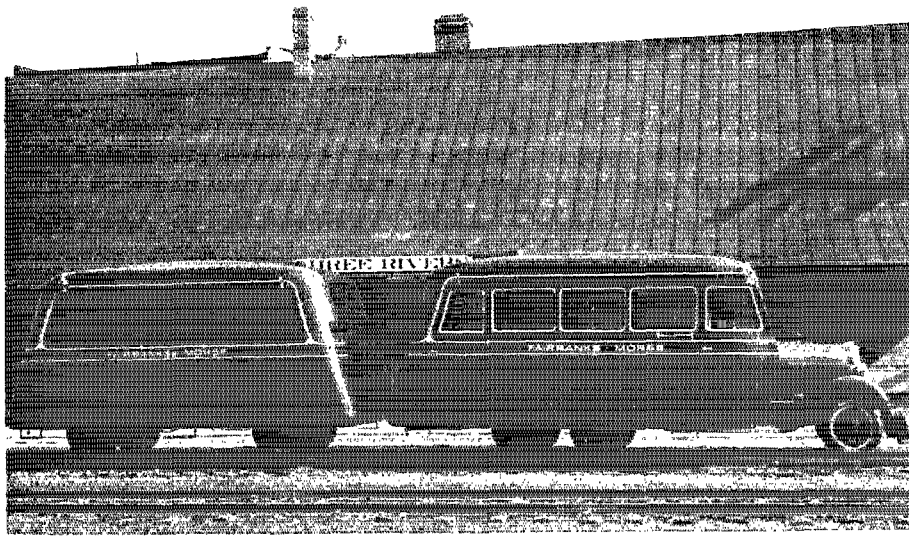


mits a more uniform compression and a greater packing contact area with the walls of the stuffing box and the glass. High rubber packing will be used for pressures up to 225 pounds and asbestos and rubber for those still higher.

This invention, which has been patented, has been tested under 400 pounds steam pressure and under all operating conditions over a period of 24 hours and the results obtained show that the life of the glass should be doubled, tripled, and even quadrupled. In many cases the glass should last indefinitely unless broken by other causes. The device is practical and can be applied to all stationary, locomotive, and marine boilers; it will also find a practical application in connection with refineries.

First-Aid Talks To Be Broadcast

Beginning January 5, 1934, Station WMAQ, Chicago, will broadcast a series of talks on first aid to the injured. Capt. G. R. G. Fisher, formerly with the Illinois Manufacturers Association and well known as an instructor of first aid, will conduct the programs which will go on the air each Friday at 12:15 p.m.



The Automobile Takes to Rails

FOR many years attempts have been made to adapt standard type automotive vehicles to railroad service. It has been evident that railroads have been handicapped in providing low cost transportation by the heavy capital investment in rolling stock as compared with that of the truck and bus operators. The handicap of the railroad in getting this short-haul business was also evident in the difference in operating costs of the two types of transportation.

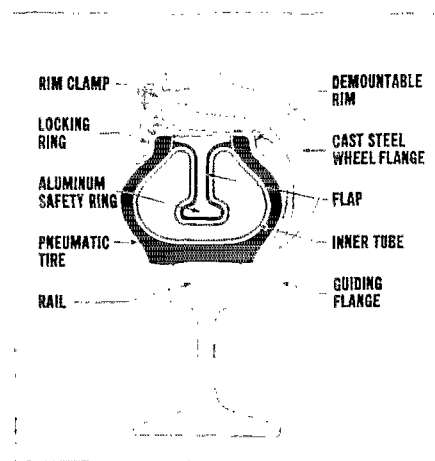
Accordingly, Fairbanks, Morse & Company, pioneer builders of railroad equipment, two years ago initiated a co-operative effort between themselves, the Goodyear Tire & Rubber Company and the Chrysler Corporation. All three companies under the agreement contributed the services of members of their engineering staff to form an engineering "pool."

It must be borne in mind that one of the essential differences between automotive vehicles and standard railroad vehicles lies in the type of axle. Railroad equipment employs a solid type of axle in which the whole assembly of axle and wheels turn. Automotive type equipment employs a stub axle for the front wheels—the rear axle, of course, being divided at the differential.

Attempts to put flanged steel wheels on the automotive type of equipment proved over a period of years that stub axles under such service would be liable to develop molecular disturbances and consequent fracture. Steel wheels could

not be used safely on automotive type of equipment without such extended redesign that the advantages of standardized low priced automotive vehicles would be lost.

The use of pneumatic tires to solve the "crystalization" problem of the stub axle was accordingly studied. Here again definite problems arose. Railroad safety standards demanded complete protection from the consequences of "blow-outs." Dissipation of heat from the tire was also a major problem. Anyone who has casually stepped on a railroad rail in midsummer will appreciate the heat obstacle and its effect on rubber.



Cross section of a railmobile tire. A guiding flange keeps the vehicle on the track and the aluminum safety ring prevents derailment in case of a blowout and also conducts excessive heat from the tire.

A "railmobile" and trailer

To this problem a combined railroad, automotive and tire experience was applied by the engineering pool. A wheel was developed using a high pressure pneumatic tire.

The safety and heat dissipation difficulty was solved by the use of an aluminum alloy "safety ring" secured to the wheel rim and within the tire. The high heat conductivity of the aluminum alloy serves to withdraw heat from within the tire to the wheel proper where it is quickly dissipated. In addition, if a blow-out or puncture should occur, there is no danger of the vehicle leaving the rails. A safety ring rests within $\frac{1}{8}$ inch of the inner surface of the casing tread. Consequently deflation of the tire results in a dropping of only $\frac{5}{8}$ inch. Such a drop, of course, drops the flange $\frac{1}{8}$ inch, giving just that much more protection.

In a recent test before railroad executives this safety feature was demonstrated by running a railmobile at 70 miles an hour, and while at that speed causing a blow-out by discharging a shot-gun within five inches of the tire, after which the vehicle proceeded down the rails in perfect safety.

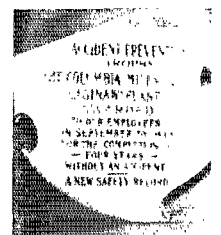
While these tires may be changed as quickly as on any automobile or truck, it is also possible to proceed on a "flat" without discomfort to passengers.

It thus becomes possible for a railroad to utilize motor trains quickly flexible to traffic requirements. Where trailers are employed, braking takes place on both the motor car and on trailers. This is accomplished by means of a hydraulic braking system with booster pump through suitable coupling devices on both vehicles.

Award Trophy to Plant for Four Safe Years

ON September 30, 1933, the Saginaw, Michigan plant of The Columbia Mills completed four years without a disabling injury. The plant, which

is engaged in woodworking and metal stamping operations, employed an average of 150 workers during this period for a total of more than 1,250,000 man-hours. In recognition of this safety achievement the plant was presented with the trophy shown in the accompanying illustration.



Cities Enroll in 1934 Safety Contest

By CURTIS BILLINGS

PLANS for a greater National Traffic Safety Contest in 1934, which will recognize the work done by state officials to gain the participation of eligible cities, are being pushed forward. As in the previous two contests, the main competition will be between cities, but next year those states whose cities make the best aggregate showing will also receive bronze plaques.

The state contest will be based on the percentage of eligible cities in the state which enroll (an eligible city is one of 10,000 or more population), the percentage of eligible population which these cities represent, and the final scores of the contesting cities. The states have been divided into two groups of 24 each, the first consisting of those with 14 or more eligible cities and the second of those containing 13 or fewer eligible cities.

One important change has been made in eligibility. The lower limit for competing cities has been set at 5,000 population, and the group of cities between 5,000 and 10,000 population will not be graded on their engineering, enforcement, and educational work, but the cities in this group which go through 1934 without a motor-vehicle fatality will be listed on a special honor roll.

The grading of cities over 10,000 will be on the same basis as heretofore, except that starting with the 1934 Contest there will be no Item G, that is, a city will no longer receive points on its organization for safety—its local safety council or committee. The reason is that the effective organizations already receive credit for their work elsewhere in the grading schedule.

Prospects for the contest are better than for either of the previous ones. With governors signing entry forms for their states and appointing state officials or representatives of statewide organizations to help solicit entries, an increase in participating cities is confidently expected. A great deal of this work has been done before by progressive state officials, notably in Massachusetts, New Jersey and Minnesota, but next year awards will be given and that will stimulate even more activity. A considerable

number of states have already indicated their desire to enroll.

While plans for the coming contest are being completed, the work of finishing up the 1933 Contest has been started. Already tentative standings, based on the *accident record alone* have been calculated and the ratings sent to all contact men. These ratings are, of course, not final because the accident record used is only for nine months and the score on activities cannot be computed until final reports are received in January. These provisional scores for the three leading cities in the seven groups are as follows:

GROUP I (Over 500,000 Population)		
Rank	City	Contest Score
1	Milwaukee, Wis.	59.3
2	Pittsburgh, Pa.	57.8
3	Baltimore, Md.	56.8
GROUP II (250,000 to 500,000 Population)		
1	Oakland, Cal.	40.4
2	Dallas, Tex.	40.5
3	Houston, Tex.	39.8
GROUP III (100,000 to 250,000 Population)		
1	New Bedford, Mass.	46.4
2	Wilmington, Del.	45.8
3	Grand Rapids, Mich.	45.8
GROUP IV (50,000 to 100,000 Population)		
1	Davenport, Ia.	47.1
2	Montgomery, Ala.	46.8
3	Lakewood, Ohio	46.6
GROUP V (25,000 to 50,000 Population)		
1	Evansburg, Va.	46.0
2	Fond du Lac, Wis.	45.6
3	Green Bay, Wis.	45.0
GROUP VI (10,000 to 25,000 Population)		
1	La Grange, Ill.	50.0
2	Gardner, Mass.	50.0
3	Owosso, Mich.	50.0
4	Albert Lea, Minn.	50.0
5	Mankato, Minn.	50.0
6	Butler, Pa.	50.0
7	Pampa, Tex.	50.0
8	Salina, Kans.	50.0
(Tied for first place)		
GROUP VII (Under 10,000 Population)		
1	La Grange Park, Ill.	50.0
2	Two Harbors, Minn.	50.0
3	Peru, Ill.	50.0
(Tied for first place)		

The same Committee of Judges that served last year have consented to serve again. They are Thomas H. MacDonald, chief, U. S. Bureau of Public Roads;

Dr. Miller McClintock, director of the Erskine Bureau for Street Traffic Research; and Robert I. Catlin, assistant vice-president of the Aetna Life Insurance Company, and vice-president for public safety of the National Safety Council. The committee will meet early in March and the announcements of the winners will be made immediately after. The presentation of the bronze plaques in the various cities will be attended by luncheon meetings and a national radio broadcast.

In the opinion of many public safety authorities in the United States, the National Traffic Safety Contest comprises the outstanding feature of the movement.

Reading Safety Committee Holds Conference

AN all day safety meeting and exhibition was held on November 23 in Reading, Pa., by the Reading Company Safety Committee. Sessions were held in the Reading Company Y. M. C. A., and the railroad's safety committee, which is also known as the Reading Booster Committee, secured the cooperation of many organizations interested in safety and several manufacturers of accident prevention equipment.

The Reading Chamber of Commerce took an active interest in the exhibit and street cars carried notices of the meeting. The Keystone Auto Club, with headquarters at Philadelphia, sent a motor patrol man with one of the club's emergency repair and first aid motorcycles. These patrol men are kept on the highway ready to assist members when in need or in trouble. They are experienced in administering first aid to both human beings and automobiles. The Reading A.A.A. Automobile Club also had an exhibit, and with the assistance of O. C. Beacraft of the Automobile Club of Pottstown who brought 37 of his school patrol boys, giving exhibition drills before more than 10,000 school children in the high and junior high schools of the city.

J. Russell Craig, of the Pennsylvania Indemnity Corporation, gave a brief talk, and Joseph T. Pratt, supervisor of safety for the Reading Company and his assistant, J. L. Rice showed a model flasher signal as used at highway grade crossings and explained its operation to the children. In the evening Harry D. Immel, safety executive of the Highway Department of Pennsylvania, and J. Russell Craig addressed the gathering.

NATIONAL SAFETY NEWS



Left: a two-lane highway with the familiar single stripe. Right: an experiment in highway marking in which two stripes mark a neutral zone in the middle of the road.

Safety Striping on the Highways

By ERNEST MCGAFFEY

WHEN motor vehicles began to complicate traffic, many highways were barely 15 feet wide. This provided only a limited area in which vehicles could pass one another. To improve this condition, states and municipalities began to add shoulders on each side of the highway which made travel considerably safer. But as the tide of traffic, both freight and passenger, began to crowd the highways, the need for still wider highways became evident. Highway widths were increased in many cases to 25 feet or even more.

Another innovation introduced in the interests of safety was the painting of a strip of white or black in the center of the road to guide drivers and divide the flow of traffic into two well-defined streams going in opposite directions.

Indisputable evidence showed that numerous accidents, many of them fatal, occurred on perfectly straight lines of highway. Sometimes these were caused by drivers failing to slow down when approaching the crest of a hill and running into vehicles traveling in the same direction, and others by what seemed to be unexplainable recklessness when cars were approaching from opposite directions. Still other accidents occurred when motorists attempted to pass heavily loaded trucks and failed to see approaching traffic.

The center stripe had the advantage of being a continuous warning to all motorists. Even at night white stripes are easily discernible in clear weather, and

drivers who become accustomed to obeying these stripe warnings get in the habit of staying on their side of the road.

As highway widths increased, double stripes were applied, dividing the highway into three lanes of equal width. This was a distinct improvement over the single stripe, as it enabled drivers to turn into the central lane when they wished to pass vehicles ahead of them.

The latest and most noticeable improvement is the highway in which three stripes separate the pavement into four lanes. If drivers use a modicum of common sense, there should be a sharp reduction in accidents on such highways. The four-lane highway, however, is practicable only where justified by the volume of traffic.

A novel experiment in highway striping has been introduced in Iowa. This consists of a double stripe in the center of the pavement, with two lanes of equal width extending from each of the stripes, as shown in the photograph at the right. The space between these stripes is in reality a narrow safety zone. The purpose of this double stripe is to concentrate the attention of drivers on the stripe next to their own side of the road. It is intended to put every driver on his guard, since, if a collision occurs and one car has gone over into the safety zone, or has crossed both stripes into the wrong side of the pavement, it would be strong evidence that he was at fault.

It is claimed by those who have installed this double stripe system that no

confusion arises by reason of the double stripe. The natural inclination of every driver, it is argued, is to keep away from the stripe close to his tires. Even if by chance he should for a moment get into the narrow safety zone on the left-hand tires, a car approaching from the opposite direction would quite likely be outside of the other stripe.

Display Harriman Medal on Reading Lines

THE employees of the Reading Company are being given an opportunity of viewing the E. H. Harriman Memorial Medal and Certificate of Merit awarded to the Atlantic City Railroad, which until the end of June, 1933, was a part of the Reading System, with safety meetings conducted at various points by J. T. Pratt, supervisor of safety. Considerable interest has been manifested by the employees in this award by the American Museum of Safety for the record made by the Atlantic City Railroad.

There are 66 railroads in the group with the Atlantic City Railroad, operating between one million and ten million locomotive miles each. The Atlantic City Railroad during 1932 operated 107,000,000 passenger miles, with but two slight injuries to passengers, both caused by alighting from moving trains.

The Atlantic City Railroad operated its first train from Camden to Atlantic City in the year 1877. For many years, it maintained the fastest schedule of any railroad in the world. With the advent of train control, the speed was somewhat restricted, but they continued to operate trains from Camden to Atlantic City, a distance of 55 miles, in 50 minutes, and ran them on time.

SAFETY INSTRUCTION CARDS

Practical Safety Information for the Man on the Job

THESE cards are intended for individual distribution. They may be carried in the pocket conveniently; they will slide into most pay envelopes easily. If tacked on the wall over a work bench or machine they will not tear off when a little wind strikes them; several of them can be displayed in a small space and they will fit in a standard card file.

The same information is not put on posters, as many members have suggested, because in a vast majority of instances workers do not have the time to study it when presented in this way.

Posters serve most effectively when they are used to transmit messages that can be read and understood quickly. It should be remembered that these cards are primarily intended for individual instruction on a specific job.

Where data appearing on the cards is needed for permanent posting and the cards do not seem to be quite large enough for the purpose, or it is desired to include it with operating instructions issued on standard letter size paper, the cards may be photographed or planographed.

The following list will serve as an index to the cards issued previously. All have been published in previous issues of the NATIONAL SAFETY NEWS.

1. Dependable rope hitches and slings.
2. A well designed horse.

These "Safety Instruction Cards" are printed on white card stock, 3 by 5 inches, slightly heavier than government postcards. In any quantity the price is one cent per card (all of one kind or a selection) with a minimum order of 25 cents. This minimum charge is necessary to cover the cost of handling, mailing, etc. Stamps or cash may be sent with order, or an invoice will be rendered.

The order should specify "Safety Instruction Cards," and give the numbers of the cards selected.

3. To detect flaws in chain links, hooks, castings, etc.
4. To test rubber gloves for leaks.
5. Crane signals.
6. To fit hammer heads to handles for safety.
7. To stack cylindrical objects.
8. To put a belt on a pulley.
9. Underwriter's knot.
10. To check peripheral speeds of grinding wheels.
11. To skid a cylindrical object safely.
12. Opening tank car dome covers.
13. Safe carrying capacities for electric wires.
14. Care of manila rope when not in use.
15. To test a scaffold plank.
16. Safe angle for ladder.
17. To operate a soda-acid fire extinguisher.
18. To operate a one-quart pump type extinguisher.
19. When to discard wire rope.
20. Identification of piping systems.
21. To drive long rods.
22. To sharpen linemen's clippers.
23. To put out a clothing fire.
24. How the angle of a sling alters its safe carrying capacity.
25. Working beneath a car.
26. Fastening plugs to extension cords.
27. Setting timbers in mines.
28. The proper shape for a cold chisel, cutter or punch head.
29. Housekeeping inspection list.

30. Poison ivy.
31. Hammer hints.
32. Identifying scaffold planks.
33. Discs for hand protection.
34. Roll scraper (for cleaning power driven rolls).
35. Suggestions for watchmen.
36. Cable clamps.
37. Stairways, ramps and fixed ladders.
38. Push tools for joiners and circular saws.
39. Carrying long materials on shoulders.
40. Kite flying.
41. Advice to elevator operators.
42. Protection against chemicals.
43. Operation of power trucks.
44. Handling drums.
45. Dismantling rotted or defective poles.
46. Link and pin couplings.
47. Safe loads for ropes.
48. Suggestions for motormen and conductors.
49. Uncoiling and unreeling wire rope.
50. Mounting grinding wheels on spindles.
51. Climbing ladders.
52. Pneumatic hammers and chisels.
53. To avoid crushed hands.
54. Circular saw "don'ts."
55. How to lift.
56. Sunstroke.
57. Heat exhaustion.
58. Advice to crane and hoist operators.
59. Grinding wheel flange dimensions.
60. Starting electric motors.
61. Lifting capacity of tackle.
62. Protecting rope from chemicals.
63. Safe loads for chains.
64. Poison oak and poison sumac.
65. Advice to power press operators.
66. Grinding wheel flange dimensions.
67. Portable extension lamp don'ts.
68. Advice to electric arc welders.
69. Lifting capacity of tackle.
70. Cleaning oil storage tanks.
71. Hand hooks.
72. Manila rope.
73. Practical first aid—a simple tourniquet.
74. Advice to oilers.
75. Practical first aid—acid and caustic burns.
76. Gasoline blow torches.
77. Office accident causes.
78. Suspended scaffolds.
79. Maintenance and repair men—general suggestions.
80. Loading tank cars—flammable liquids.
81. Grinding wheel flange dimensions.
82. Garage mechanics.
83. Clothing for men.
84. Clothing for women.

(Please turn to page 40)

CLEANING MACHINE PARTS

MANY a maintenance and repairman and garage mechanic have been fatally burned because they used motor gasoline to clean machine parts.

When the gasoline is in an open vessel and the hands are more or less saturated with it, there is little chance of getting by without a serious burn if it is ignited—and it is easily ignited by flame, spark or static electricity generated by the washing of parts. When one's clothing is partly saturated it is just too bad.

There are a good many kinds of non-flammable cleaning materials, some of these are patented. Others are, sodium carbonate, caustic soda, sodium hydrogen phosphate, sodium silicate and carbon tetrachloride.

When using sodium carbonate and caustic soda care must be exercised to protect the eyes by wearing goggles and there is danger of injury to the skin of the hands when strong solutions are used.

Kerosene is less dangerous than gasoline because it is not so easily ignited, but if the hands and clothing are saturated there is always the risk of a serious or perhaps fatal burn.

Some of the oil companies manufacture solvents having flash-points in excess of 100 F. especially for cleaning purposes. There is little danger of them becoming ignited at normal temperatures.

The space on this card is too limited to give more detailed information but by inquiring around a little you can easily determine which kind of cleaner is safer and most suitable for your purpose and how to use it.

FOR YOUR OWN SAFETY DO NOT USE MOTOR GASOLINE FOR CLEANING



NATIONAL SAFETY COUNCIL No. 137

WEIGHTS OF MATERIALS

(Dry Materials)

Material	Weight per cubic foot in pounds	Material	Weight per cubic foot in pounds
Aluminum cast	168	Rubber, manufactured	95
Aluminum hammered	165	Salt, granulated, pure	42
Asbestos	97	Sand, dry, loose	100.00
Asphalt	143	Sand, dry, packed	100.115
Babbitt Metal	175	State	175
Brass, cast rolled	524	Snow, fresh fallen	5
Brick, common	112	Snow, compacted by rain	15.50
Brick, pressed	115	Steel	490
Brick, fire	145	Stone, crushed	175
Bronze, 78 to 14% Sn	509	Sulphur	175
Cement, Portland	94	Wood, cedar, white—red	32
Clay	137	Wood, cypress	30
Coal, piled, anthracite	47.50	Wood, fir Douglas	32
Coal, piled, bituminous	46.54	Wood, spruce	25
Coke	25.27	Wood, fir Eastern	25
Concrete, plain	145	Wood, hemlock	29
Concrete, reinforced	150	Wood, hickory	40
Copper, cast rolled	556	Wood, maple hard	33
Cravel, dry, loose	10.005	Wood, maple white	11
Cravel, dry, packed	100.115	Wood, oak red-black	41
Cravel, wet	110	Wood, oak white	36
Gypsum	140	Wood, pine, white	29
Hay and straw in bales	20	Wood, yellow pine	30
Ice	55.57	Wood, yellow pine—dry	31
Iron, cast pig	720	Wood, yellow pine—green	31
Iron, wrought	485	Wood, yellow pine—white	31
Lead	710	Wood, spruce white—black	24
Leather	70	Wood, walnut hard	33
Lime, quick in bulk	35	Wood, walnut, white	29
Limestone, piled	145	Zinc, cast rolled	140
Magnesium	167		
Manganese	175		
Marble	170		
Paper	58		
Rubber, continuous	97		



NATIONAL SAFETY COUNCIL No. 138

POURING BABBITT

1. Always wear goggles to protect your eyes or better still a face mask to protect your face and eyes.
2. Make sure the babbitt melting pot, ladle and the mold or machine part into which the babbitt is to be poured are free from moisture. To insure this preheat them thoroughly.
3. Inspect all babbitt pigs for blowholes that might contain moisture.
4. Avoid inhaling the fumes from the melting pot and ladle.
5. Slip the ladle into the lead pot edgewise to avoid splash.
6. Do not allow anyone to distract your attention while handling the molten metal.
7. Wear good shoes. Keep them laced tightly turning down your trouser cuffs may help to keep hot lead out of your shoes in case of a spill. Keep your sleeves rolled down to protect your arms and your collar buttoned to prevent hot metal getting inside your shirt.
8. Keep a clean and orderly work place. Slumbling while carrying molten babbitt is serious business.



NATIONAL SAFETY COUNCIL No. 139

PILING MATERIALS

General Suggestions

If you have occasion to pile materials, remember this—materials well piled aid your work—materials poorly piled are cumbersome and dangerous. Many the man who has awakened in a hospital wishing he had taken a little more care in piling the material that fell on him.

Keep these simple precautions in mind:

1. Start each pile right. Give it a firm and even foundation.
2. Allow ample room for passageways. Observe all clearance rules at aisles and railroad tracks.
3. When piling heavy materials on floors of buildings if there is any doubt that the floors will stand the load ask someone who knows the safe limit.
4. Whenever materials are of a shape that will permit it cross-tie the tiers so they will support each other.
5. For awkward shaped pieces use slids or other special measures to keep the tiers interlocked to prevent them falling.
6. Always lift with your leg muscles never your back.

A safe pile is not too high. It is not too near a passageway. It has no ragged ends. It does not fall easily. It won't topple on your own or someone else's head.

Poorly piled material is "slippy" and a menace to everybody.



NATIONAL SAFETY COUNCIL No. 140

YOUR HEALTH

General Suggestions

1. Clean your teeth at least once a day. Have your dentist examine them twice a year.
2. Bathe frequently.
3. Never eat without first washing your hands with soap and water.
4. Take your time eating and chew your food thoroughly.
5. Eat plenty of fruit and vegetables.
6. Drink at least six glasses of water a day.
7. Don't let a day go by without at least one thorough bowel movement.
8. Get eight hours sleep in every twenty-four.
9. Keep your windows open in your sleeping room but avoid direct drafts.
10. Do not dope yourself with headache powders or pills. A headache is a sign that something is wrong. It may be due to constipation, stomach trouble, or eye strain. Consult your physician.
11. Dress according to the weather and your job. Keep your feet dry.
12. Have a complete physical examination once a year.



NATIONAL SAFETY COUNCIL No. 141

AIR HOIST OPERATION

(Single cylinder direct lift type)

1. Always try to center the hoist over the load before lifting.
2. If for any reason it is necessary to hook onto a load with the hoist at an angle, stand to one side when making the lift.
3. Acquire the habit of always making sure which control handle will raise the load and which one will lower it.
4. Never operate the control valve so quickly it will jerk the load into the air. Many men have been injured when loads have jumped off the hooks or sling beams.
5. Keep your feet out from under all loads.
6. Never undertake to do any work under a suspended load without first blocking it so it cannot come down if air escapes from the cylinder.
7. Never operate a hoist that is known to be defective.
8. Whenever a hoist has safety devices to prevent the sling or chain ring from jumping off the hook or beam, make sure they are always used.
9. Never lift a load on the point of a hook.
10. Never use a hook that is bent out of shape or otherwise in bad condition or a chain you know is unsafe.
11. When moving a hoisted load, push don't pull and your feet will be out of the way if it drops.



NATIONAL SAFETY COUNCIL No. 142

SWING CUT-OFF SAW

INSPECT the saw each time before you use it. See that the guards are in place, that the arm swings as it should, that the swing limit stop is working and that the saw is sharp, well set, on the arbor tight and running true.

Observe the following precautions when using the saw:

1. Make sure the material you are about to saw is suitable and workable on the particular saw you are about to use.
2. Get a good grip on the material and pull the saw forward steadily.
3. Never force the saw.
4. Take extra precautions when sawing light stock.
5. Always stand to one side—never in line with the saw blade.

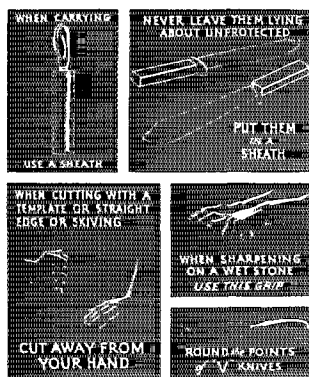


NATIONAL SAFETY COUNCIL No. 143

KNIVES

IF YOUR DUTIES REQUIRE YOU TO USE KNIVES, LEARN TO HANDLE THEM SAFELY

Here Are a Few Suggestions



NATIONAL SAFETY COUNCIL No. 144

PRACTICAL FIRST AID

Frost-Bite

SYMPTOMS:

1. The affected part of the body becomes painfully cold and then suddenly the sense of feeling in the part is gone.
2. The affected part becomes white or grayish-white in color.

TREATMENT:

1. The object of the treatment is to bring the frozen part of the body back to a normal temperature gradually and to restore circulation.
2. Keep patient away from fire or warmly heated rooms.
3. Apply palm of hand, wool or fur to affected part.
4. Massage the part very gently then apply cold water.
5. Apply ointment as you would to a burn because frostbite is the same in effect.



NATIONAL SAFETY COUNCIL No. 145

STAIRWAYS

How to Use

THE largest single cause of injuries in industry and at home is falls and a large proportion of them occur on stairs.

You can avoid injuries on stairs by forming the habit of observing the following precautions:

1. Do not run, push or scuffle.
2. Always keep one hand free for the handrail.
3. Take one step at a time—not two.
4. Keep your hands out of your pockets.
5. If it is at times necessary to carry large bulky objects up or down stairs handle them in such a way that you can look down to see where you are stepping.
6. If your attention is distracted stop until you can again look where you are going.
7. If the way is dark hold onto the handrail and proceed slowly. Feel your way from one step to another.
8. Be particularly careful about carrying glass and sharp objects.
9. Never carry scalding liquids in open top vessels. It's best to use a covered container.
10. One of the large causes of accidents is heels catching. The higher your heels the more careful you should be.
11. Keep all loose objects off stairs.



NATIONAL SAFETY COUNCIL No. 146

OILING MACHINERY

YOU are responsible for knowing the condition of the machine or the part of the machine you operate. So far as you have authority to do so, keep it clean, well lubricated and in good condition.

1. Stop the machine before cleaning, oiling, or adjusting it.
2. Take the necessary precautions to make sure no one can start it while you are working on it.
3. Before starting the machine again, check to make sure no one is in a position to be injured and that all working parts are free to move without damage.
4. Apply oil or grease sufficiently to give good lubrication but do not let it run out onto the floor.
5. Wipe up all spilled oil or grease immediately.
6. Take advantage of each oiling and greasing to inspect the condition of all visible machine parts. Report all unsafe conditions immediately.
7. Replace all guards immediately after each oiling or greasing and before the machine is placed in motion.



NATIONAL SAFETY COUNCIL No. 147

WORRY

WHEN things go wrong, worry won't help. Get busy and find the answer to your trouble. Here are several good rules—remember them:

1. Be sociable—Making and keeping friends help you to forget your troubles.
2. Don't let fear tell you what to do. The bravest man is he who faces trouble in spite of fear.
3. Concentrate on your work while you are working. Concentrate on play when you play.
4. Use your mind. The healthy brain is one that gets lots of exercise.
5. Simplify your work and play. Cut out confusion.
6. Get yourself under control. Never cultivate hate, fear and anger.
7. Don't be timid. Be courageous and self-confident. You can do it if you try.
8. Never turn your back to situations that need to be faced.
9. Avoid building up defenses making alibis and dodging consequences. They get you nowhere.
10. Stop thinking only of yourself.

REMEMBER Worry is one of the important causes of accidents.



NATIONAL SAFETY COUNCIL No. 148

THE SAFETY EXCHANGE

"A ROUND TABLE IN PRINT"

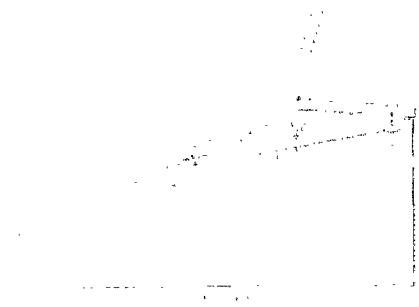
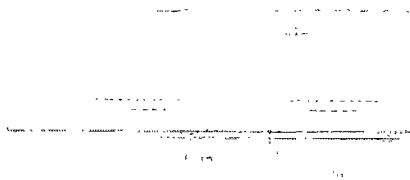


Demonstrate Resuscitation by Mechanical Figures

To demonstrate the correct method of producing artificial respiration the U. S. Bureau of Mines has used mechanical figures with success. Two mechanical men are dressed in overalls, and one of them actually goes through the motions of applying prone pressure to the other who represents the patient. Action is imparted to the figures by a series of pulleys and levers propelled by an electric motor. Mechanical details of this device are on record in the files of the National Safety Council in the form of a blue print which may be borrowed on request.

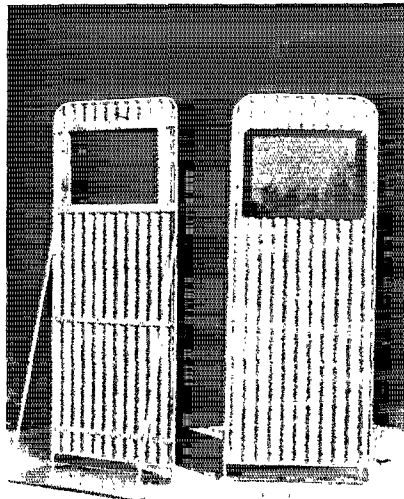
Safety Arm for Coal and Sand Bin Boxes

On lines of the Cleveland Railway sand and coal supply bins with large and heavy lids are located at various points. The box lids, when open, rest in an al-



most perpendicular position against an upright on the back of the box, and a sudden wind has caused several injuries to trainmen when the lid suddenly

slammed down. The accompanying diagram shows a safety arm designed to prevent this kind of accident. It consists of a steel casting 22 1/4 x 2 1/2 x 1/4 inch with an 8 inch L-shaped slot near one end. The slot allows free movement of a pivot of cast steel which is fastened to the lid. The other end is pivoted at the side and near the back of the box. Thus the lid can be securely locked in the open position.



Kiln Shield Gives Protection to Kiln Burner

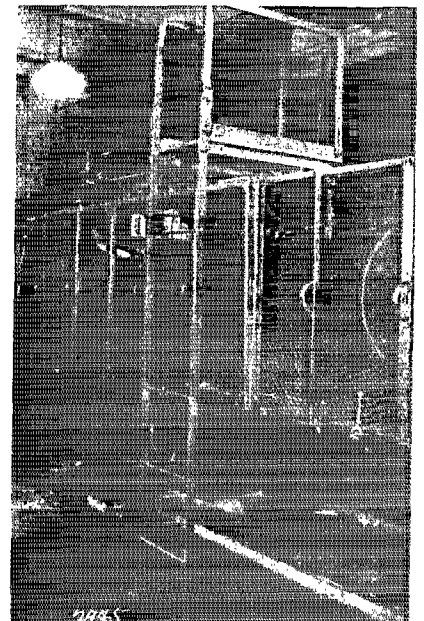
The kiln burner in a cement plant is not only subjected to intense heat radiation from a rotary kiln, but is also exposed to "puffing" and "flare-backs" through the observation opening around the kiln hood. The shield illustrated here was developed in the plant of the Lone Star Cement Company, New York, Inc., Hudson, N. Y., to protect him from burns and stop some of the heat radiation. It consists of a sheet of asbestos roofing in a welded pipe-frame, with a 1/4-inch plate glass window placed at a

THE IDEAS presented here have proved helpful. If you have developed a useful device or method send in a description, illustrated with a sketch, blue-print or photograph, if possible

suitable height, and with a floor plate and bracing to insure stability. The shield is placed some 4 to 6 feet in front of the kiln hood and observation opening, with the floorplate facing the kiln to avoid a stumbling hazard, and a weight placed on the floorplate adds further stability. The entire shield is painted with aluminum paint. The plate glass may be of tinted glass, as desired.

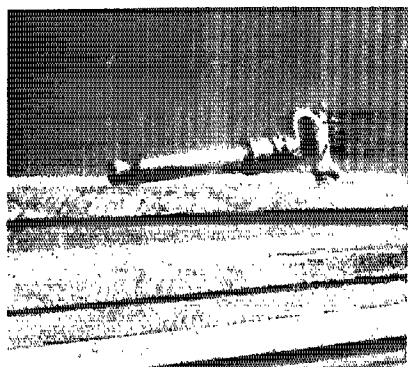
A Large Machine Guard and Safety Ladder

The ladder shown in this photograph is used to reach the oiling platform on a twine machine in the McCormick Twine Mills of the International Harvester Company. Construction of the ladder is plainly shown, also the handrail at the top of the picture for the protection of the oiler when oiling or adjusting the machine from above. The strong guards are removable, but locked in place.



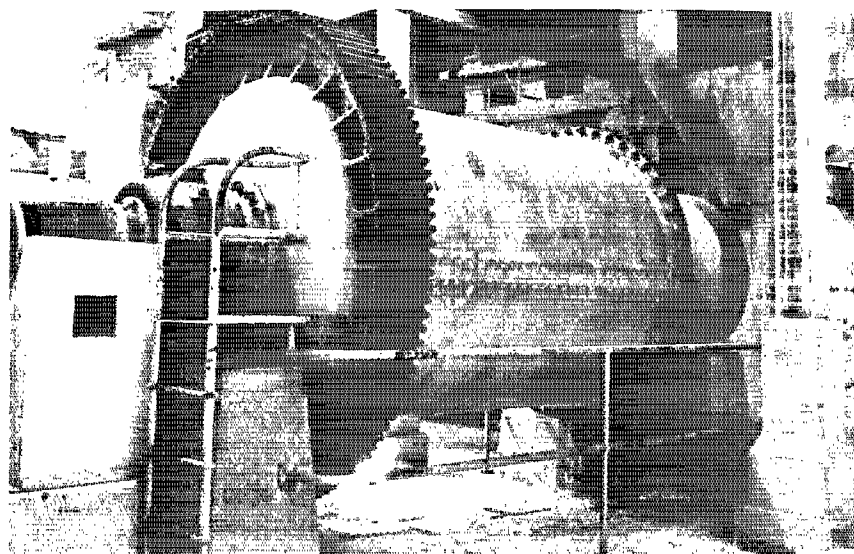
Air Hammer is Provided with Guard

Serious injuries have been caused by the accidental tripping of the air valve on an air hammer, allowing the rivet set to be blown out and striking someone within range. This hazard has been overcome by the simple device shown below. It consists of a small pin fastened to the gun by a short piece of chain which in turn is spot-welded to the air deflector ring. The pin is inserted through a hole drilled in the trigger and the gun cannot be operated with the pin in place. Dropping the gun causes no accidental discharge.



Interlocked Guard Makes Safety a Certainty

Here is an excellent example of how a little forethought and ingenuity can be used to make machinery guards fool-proof. The machine happens to be one used to remove the sheath from defective lead-covered telephone cable at the Hawthorne Works of the Western Electric Company, Inc. It consists of two sets of powerful corrugated rolls which, without protection, would be capable of



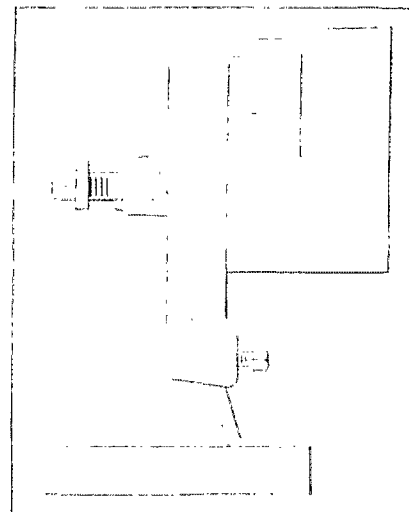
serious injury to the operator. Notice the hinged door-type guard in front of the rolls, and how the cam and level mechanism interlocks it with the machine control switch, so the door cannot be opened when the switch is on, and the switch cannot be turned on while the door is open.

For Icy Yards During the Winter Months

Calcium chloride mixed with cinders or coarse sand in the ratio of 25 or 50 pounds per cubic yard, and spread evenly over ice-covered walks, yards or runways at the rate of 1½ or 2 pounds per square yard provides excellent traction. This advice of the Highway Research Board offers an economical solution of the winter safety bugbear. Calcium chloride is far superior to common salt for this purpose.—*Factory and Maintenance Engineering*.

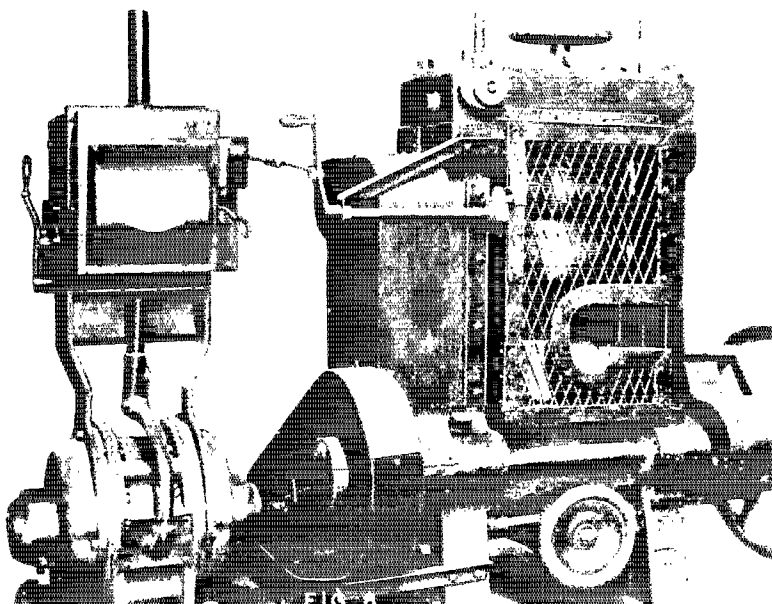
Guards About Revolving Ball Mills

For the protection of the oiler about a revolving ball mill in the Arthur plant of the Utah Copper Company, a neat and substantial ladder has been constructed; and the accompanying picture also shows a well guarded platform. The same safeguards are installed at both ends.



New Method for Cutting Slots in Shaper

When men cut slots and keyways in the shaper, using an ordinary tool-holder and toolbit, the tool often chatters, and results are anything but satisfactory. If, however, the toolholder is held in the reverse position from that generally adopted, as shown in the accompanying sketch, the work can be done better, more quickly, and with little danger of breaking the tool-bit. With the holder held as shown, says Theodore Kruger, foreman, Diamond Machine Company, in *American Machinist*, slots an inch deep are cut in die-shoes with little trouble.



INDUSTRIAL HEALTH

A Non-Technical Symposium for Physicians and Laymen

Health Hazards in the Foundry

By CAREY P. McCORD, M.D.*

IT IS characteristic of the American people to demand many repetitions of obvious truths prior to their acceptance. A single hint rarely overcomes a safety prejudice and clear cut facts sometimes bear restatement. Over and over it seems necessary to restate such well established foundry fundamentals as:

1. Excessive heat is a hazard common to all foundries.
2. Excessive heat means high loss of valuable chlorides from the body and calls for replacement. The use of salinized drinking water is now better established as desirable than ever before. More rather than less salt is advocated for the normal foundry worker exposed to high temperatures.
3. Molten metal emits chemical rays at times harmful to the eyes. Goggles fitted with glass barring these rays prove their worth to the workman in many plants.
4. Metal fume fever fortunately is fleeting in its known effects, but no less is real. It is more often found where zinc enters the metal mix.
5. Sudden and extreme variations in temperature may be the lot of foundry workers— notably so in winter. The body makes adjustments to these quick changes with admirable facility. No less these burdens are conducive to respiratory diseases, including pneumonia.
6. Lead poisoning is far from rare in the foundry.
7. Carbon monoxide may be found in harmful quantities.
8. Antimony, nickel, cadmium, manganese, phosphorus, arsenic and sulphur may on occasion find their way into the crucible and make possible the development of ill health traceable to such causes.
9. In core making, many binders have led to skin diseases.
10. If metal grinding, polishing and buffing constitute a part of the foundry's activities, a long list of additional hazards may be cited, ranging from the action of chrome polishing materials to tenositis from the drag of the buffing wheel.
11. Last but not foremost is the hazard of dust.

At present concern over health hazards

in the foundry may be divided in the ratio of 99 per cent for dusty lung diseases and one per cent for all others combined. While this disproportion may not be warranted, it appears desirable that the major portion of this discussion be devoted to dusts and the diseases produced by dusts.

Thus far in the battle against dusty lung diseases the outstanding activities have been directed to three aspects of the problem: (1) The nature of the diseases produced and their diagnosis; (2) The conditions in industry capable of inducing these diseases; (3) The control of objectionable conditions when detected by dust counts or otherwise.

Confronted with any new and outstanding hazard in industry, the tendency is to exaggerate the requirements for control. This notably was true when benzol first came into wide industrial application. The hue and cry was for the banishment of benzol as being so toxic as to be uncontrollable. Now the conditions under which benzol may with safety be used are so well delineated that where these conditions are provided benzol poisoning is unknown. A similar course is predictable for the silica hazard in foundries.

As the major problems connected with dusty lung diseases and their causation become harnessed by the specialist, opportunity is provided for the consideration of many secondary aspects of dust and dusty lung diseases. I propose now to comment on five of these slightly less significant matters— important in my opinion to the employment manager, the safety engineer and the plant physician.

1. *How shall the foundry operator protect himself against cases of dusty lung diseases originating in other plants?*

Many a foundry operator is faced with suits or other forms of claims, that undoubtedly are related to previous employment. Since silicosis may require and usually does require many years for

its development to the point of disability, it naturally follows by way of example, that 16 years of previous foundry exposure is more blamable in the causation of silicosis than 2 years of similar exposure in present employment. Yet the present employer is likely to find himself saddled with full responsibility.

Lately I have had opportunity to examine well made x-ray films of applicants for work, without admitted previous exposure in industry. These persons were found to live and drive on dusty country roads made of flint. Approximately 50 per cent of these young adults presented sufficient involvement in their films to be rated as "suspicious" in relation to pneumoconiosis. Given a few months exposure in a foundry any one might hold himself eligible for claims against his employer alleging dusty lung disease.

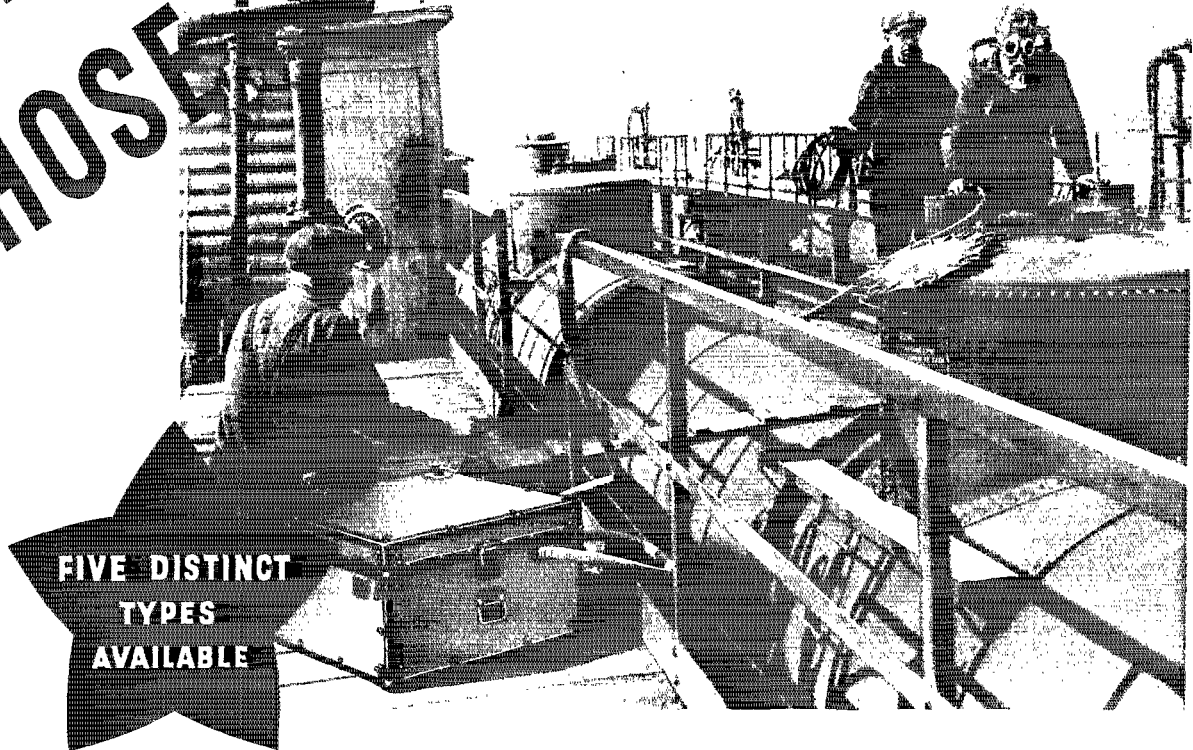
The answer to the problem is definite. Every prospective employee for any dusty portion of a foundry should be x-rayed by a competent maker and interpreter of chest films. Preferably these films should be in stereo. For the good of the prospective workman and for the good of the operator, any applicant exhibiting any x-ray evidences of any degree of involvement resulting from the action of dusts or in the presence of other pulmonary pathology in well established degree should be denied employment in any dusty exposure. Expensive as x-rays may be, they are likely to prove most economical in these days of wholesale litigation, synthetic testimony, unskilled physicians, and plaintiff-prone juries.

2. *What shall be done with the worker known to possess dusted lungs?*

In late months many employers in dusty trades have procured routine x-ray examinations of all employees. Out of every hundred undisabled men properly examined, a fair percentage is likely to present some degree of clear cut pneumoconiosis. What is to be done with such men? Many are not disabled. Some are outstandingly hale and hearty. Shall they be told of their state? Many are likely to develop mental quirks and neuroses. Some will take an unfair ad-

*Medical Director, The Industrial Health Conservancy Laboratories, Cincinnati, O.

MSA HOSE MASKS



*Safe ... comfortable
... easy to operate*

PROTECT your men who must encounter deadly concentrations of gas or fumes in or around oil tanks, gas holders, tank cars and other similar locations with MSA HOSE MASKS, designed and made by the world's largest manufacturers of safety equipment. Your men will welcome the comfort and convenience of MSA HOSE MASKS ... easy to use.—offering full

freedom while working yet assuring safety under the most dangerous working conditions.

These fresh air outfits are mounted in the highest quality, waterproof, fibre cases and consist of the comfortable and gas tight Kops face piece, harness, hose and a hand or motor operated blower which supplies a steady, un-failing supply of fresh air. Five distinct types are available from a simple one-man outfit to those that furnish protection up to six men from one blower.

Write for our descriptive bulletin.

MINE SAFETY APPLIANCES CO.

General Offices: Pittsburgh, Pa.



District Representatives in Principal Cities

M. S. A. EQUIPMENT includes Breathing Apparatus ... Inhalators ... Masks of All Types ... Gas Indicators ... Eye and Head Protectors ... Edison Mine Cap Lamps ... Safety Clothing ... First Aid Equipment ... Descriptive Bulletins will be sent on request.

vantage of the employer through claims. A small consensus of mature and fair minded opinions as to appropriate action for this very time may be epitomized as follows:

Seek to eliminate further exposure to the dust hazard. Do not apprise any undischarged workman of his condition. Make repeated x-ray examinations at about six months intervals. If advancement in the condition appears, then take action suited to the individual case and the respective state in which the cases may arise. Otherwise keep these men at some work.

It is not maintained that this is a perfect line of procedure. Many ethical and moral considerations arise. A year or two hence an entirely different lot of concepts may govern the situation.

3. *Are negroes more susceptible to dusty lung diseases than whites?*

I know of no large series of cases arising under identical conditions in this country among whites and negroes that prove the negro to be more readily involved by dusty lung diseases. The negro is more susceptible to tuberculosis than his white fellow workman. His housing is likely to be on a lower plane. His exposure to tuberculosis is prone to be greater than in the case of the average white man. On account of this background, the negro at this time is rated as a greater risk in the foundry than whites under conditions of equal exposure.

4. *How necessary are dust counts in detecting hazardous work points in a plant?*

The dust counter has established itself as the best available yardstick for determining quantities of dust in the atmosphere. Like so many instruments in its class, the dust sampler and counter has been glorified far beyond its real merits. Opportunities for errors are legion. It is most disconcerting to find that dark field illumination in distinction to light field may yield from 2 to 4 times as many dust particles in the same sample. The use of absolute alcohol as the entraining medium may add 30 per cent more. Difference between so-called good forms of microscope lamps may make a tenfold variation in results. Very fine particles of quartz dust, as well as others just above the size of microscopic invisibility, are extensively soluble in most collecting media. Legal standards based on present dust-counting methods are utterly futile.

Notwithstanding many pitfalls, the dust counter is a most valuable instrument. It finds its greatest usefulness in

WORTH WHILE SAFETY PLANNING

GREATER attention to safety will undoubtedly be one of a number of permanent effects of the present "socialization of industry" movement. In plain language, aside from the very important humanitarian aspects, it is going to cost industry more to permit accidents to happen.

Great progress has been made in safety work. But can anyone believe for an instant that final objectives have been reached when five men can die cleaning a tanning vat—as recently happened in New Jersey? The most progressive chemical companies, with well-informed safety directors employed, constantly find new problems to solve. Nevertheless conditions in the less progressive plants leave much to be desired, and chemical companies in particular are not economizing when they either withdraw or fail to join the National Safety Council. Membership is not an expense, but an investment. Yet 42 companies thought it necessary to discontinue membership; fortunately 20 companies found it desirable to join.

—Chemical Industries.

discriminating between much dust and little dust; in proving the efficacy of preventive measures and devices; in the determination of the carriage of fine dust into non-dusty departments; in the detection of unsuspected dusty work points.

5. *In litigation what medical defense may be invoked?*

Without presuming any qualifications in the domain of law, the plant physician, the safety engineer or the employment manager may be called upon to furnish attorneys all possible information in preparation for trials. Below are listed several items that are in prospective use or have been used in various instances:

(a) *Denial of the existence of dusty lung disease.* Recently in the examination of a sample of 202 films of men exposed and unexposed to dust, one was singled out as exceptionally free of even usual amounts of fibrosis. This film was examined as an unknown, as were all others. Later it was pointed out that the workman from whom this film was made was a litigant demanding a large sum of money on account of alleged silicosis. Similarly, about four out of five litigants alleging dusty lung disease are in fact free of such diseases. The claims are spurious and may be proved so by appropriate examinations carried out by qualified investigators.

(b) *The denial of disability or prospective disability.* A large number of workmen whose lungs show some signs of dust action are not incapacitated and no proof exists that real disability is an early prospect.

(c) *The denial of neglect.* Many of the true cases of dusty lung disease have been developing over long periods of years, such as 15, 25 or 40. Since the medical profession has possessed scant knowledge of these diseases during these periods, it is unreasonable to believe that the industrialist could have possessed more.

Inevitably it follows that operators of dusty

industries may not be presumed to have possessed earlier and greater information of these occupational diseases than physicians, industrial hygienists, state health departments, state factory inspectors, and other agencies devoted to health conservation. No industrialist may be charged with neglect for failure to supply protection against an insidious disease unknown or little known to the medical profession. Even at this time the average physician possesses meagre information about these conditions.

(d) *The origin of the dusty lung disease in previous employment.* Manifestly it is unjust that a few weeks of employment in some one foundry should be held responsible for a well established dusty lung disease when antedating this employment, there have been years of exposure in similar work in other plants.

(e) *The origin of the dusty lung disease from causes other than industrial employment.* In some localities it seems probable that sufficient dusts may arise from roads, farm work, etc., to induce characteristic involvement of the lungs.

(f) *The actual quantity of dust present in an industry is below any reasonable threshold of probable production of damage.* The mere fact that an industry or department is classified as a dusty operation is not in itself proof of the possibility of development of pneumoconiosis. The nature and extent of protective devices may fully exculpate the plant as a practical hazard. Dust count methods have certain undeniable limitations, but this form of testing along with tests of the efficacy of ventilating apparatus may be utilized on occasion wholly to eliminate any justification for contentions that air dustiness prevails.

(g) *Diseases other than pneumoconiosis may account for abnormal states in the lungs and other chest contents.* At least ten other diseases may so simulate pneumoconiosis as to permit confusion and error. Among others are fungus diseases, tuberculosis, especially disseminated tuberculosis, cancer, syphilis, pleurisy with calcifications, certain types of unresolved pneumonia. In addition, clausis are known to have arisen alleging pneumoconiosis when in fact the pathology centered about such unrelated conditions as aneurysm, mediastinal tumor, anaphylactic asthma, valvular heart disease, etc.

(h) *Silica is not a poison.* In some states claims at law must be based upon acts applicable only to poisonous substances. What constitutes a poison is a matter of definition. At the present time the best thought as to the action of silica within the lungs is unfavorable to acceptance of it as a poison. Primarily silica action is physical rather than chemical.

(i) *Pneumoconiosis does not constitute an accidental injury.* In some instances it has been contended that dusty lung states are accidental injuries. Such specious arguments ordinarily are put forth in an effort to obtain compensation in political states where no provisions are made for occupational diseases. Every valid concept prompts the recognition of the pneumoconioses as occupational diseases.

In a midst of disproportionate concern over dusts and dusty diseases much may be lost if we fail to recognize that the foundry possesses a dozen or more clearer health hazards. Silica dusts may blind us to pneumonia, metal fume fever, heat damages, lead poisoning, skin diseases, carbon monoxide poisoning—all traceable to the foundry.

FIRST AID



This seal denotes acceptance of Mercurochrome for New and Nonofficial Remedies by the Council on Pharmacy and Chemistry of the American Medical Association.

NEGLECTED scratches may cause serious infections. The prompt use of an antiseptic is an important preventive measure.

MERCUROCHROME is an effective antiseptic and should be used in the first aid care of all minor wounds, scratches and abrasions. In more serious cases the layman should not assume the responsibility of a physician.

HYNSON, WESTCOTT & DUNNING, Incorporated
BALTIMORE, MARYLAND

Cleaning Drums and Other Portable Containers Which Have Held Flammable Substances

Industrial Data Sheet D-Chem. 10

A. Problem

How to clean drums and other portable containers which have held flammable substances, so it is safe for workers to start repair work.

B. Hazards

The principal hazards in cleaning such containers are (a) burns from caustics, (b) burns from hot cleaning solutions, (c) fire, and (d) explosion.

C. Cleaning Method

First: See that all sources of ignition, such as open flames and unguarded electric lights, have been eliminated from the vicinity of the container.

Second: Remove the bung with a suitable wrench and allow any liquid or free sediment to drain out. Long-handled or special wrenches are recommended. Steel chisels and hammers should not be used as they may create sparks which may ignite the vapor. The residue should be disposed of in a safe manner so it will not increase the hazard of the job.

Third: Fill the container with hot soda or soda ash solution and rotate it mechanically for five minutes or longer; then drain the container. Short pieces of brass chain inserted with the caustic wash will act as scrubbers and aid in loosening any caked accumulations in the drum or cylinder. Hammering with a wooden mallet will also help to loosen scale. (See note A.)

Fourth: Spray live steam into the

container through the bung; then drain. (See note B.)

Fifth: Flush the inside of the container for a full five minutes with boiling water. (See note B.)

Sixth: Thoroughly drain and dry the container. This is usually done by turning it so that the moisture will drain out the bung and by circulating warm air through the inside.

Seventh: Inspect the inside of the container to determine that it is clean. This may be done by using a mirror to reflect light into the container. (See note C.) If, upon examination, it is found that the container is not clean, repeat the third, fourth and fifth steps.

Eighth: Inspect to determine if the container is gas free. This test preferably should be made by means of a suitable gas detector. It is the practice in some companies, however, to flash test for gases prior to any welding operations. Under no circumstances should anyone make such flash tests until the container has been cleaned as outlined in steps 2 to 7, inclusive. To flash test, first up-end the drum or cylinder. Then stand well back and place at arm's length the tip of the lighted welding torch into the bung of the container. Should the drum or cylinder not be gas free, a flash will follow. It, therefore, is of vital importance that during such tests, the operator stand as far away as possible.

Note A. Employees handling caustic soda or soda ash, or working about solutions made of these caustics, should wear suitable goggles to protect the eyes, proper

respirators to keep the dust out of the passages to the lungs, rubber boots and rubber gloves to protect the feet and hands against caustic burns. Where a vat in the floor, containing caustic solution, is used, in addition to wearing suitable rubber clothing, operator should keep a splash plate between him and the vat as the drum is pushed into the solution, as an additional protection against splashing.

Note B. When steam or hot water is used to clean a drum or cylinder, the operator should wear suitable clothing such as boots, hood, etc., to protect him against burns. When steam is used, the nozzle of the hose should be of non-sparking material; it should also be electrically grounded to the drum or cylinder, and the drum or cylinder should be grounded to prevent static electricity accumulation.

Note C. The light source should be either a vaporproof portable electric hand lamp or an electric extension lamp. If the latter is used, the lamp should be protected by a guard made of non-sparking material. The connections from the socket should be made tight to prevent arcing, and the wiring should pass through a non-conductor handle about 30 inches long. Make sure the whole electric unit is in perfect condition before using.

For further details on cleaning drums and cylinders safely see Industrial Safety Series Pamphlet Pet. 8 "Handling, Cleaning and Filling Drums and Barrels." If drums are welded after being cleaned, this welding should be done in accordance with the data contained in Safe Practices Pamphlet No. 23, "Gas and Electric Welding" and in Safe Practices Pamphlet No. 95, "Safe Practices in Handling Compressed Gases."

National Safety Council, Inc.

20 North Wacker Drive, Chicago, Illinois

Try this new way of reducing the rate of HAND INFECTION

**Why 1 out of every 4 HAND
injuries becomes INFECTED**



Points where ordinary soaps fall down

Ordinary soap can't get workers' hands really clean. It gets only surface dirt—leaves embedded dirt, especially around knuckles and nails. When this dirt gets into any scratch or cut, infection often follows. Plant studies show that the rate of infection for wounds of the hands is 26%.

Lava Soap gets all the dirt . . . effective against most germs

Lava helps prevent hand infections because it gets even ground-in grease in less than a minute. And against most common bacteria, Lava is 5 to 10 times as effective as carbolic acid.

Workers cannot avoid scratches and minor wounds to their hands. Nor is there any way to keep their hands from getting dirty. But you *can* reduce the risk of hand infection by seeing that *your* workers wash their hands regularly with Lava Soap.

Lava Soap gets ALL the dirt

Lava does a *different* job. First, thick, heavy lather gets the surface dirt. (Ordinary soaps stop there.) Then fine, powdery pumice gets even ground-in grime in less than a minute. Last, glycerine and soothing oils in Lava act as an ointment. They soothe the skin and help heal any nicks or raw spots on the hands.

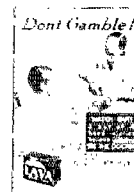
Companies now supplying workers with Lava Soap find they save money, too, because Lava doesn't waste away—outlasts ordinary soaps 3 to 1. Works equally well in any water—hot or cold, hard or soft. Investigate this safe, economical method of reducing the amount of lost time from preventable infections.



A PROCTER &
GAMBLE PRODUCT

FREE..Lava safety posters

Safety Directors of leading industrial plants in all parts of the country have requested these posters and are now on our mailing list. A new set of posters is mailed out every two months. They are yours merely by filling out and mailing this coupon to Procter & Gamble Co., Dept. LNS-14, Box 1801, Cincinnati, Ohio.



Name.....
Position.....
Company.....
City..... State.....
Number Posters Wanted.....
☐ Would be Interested in Prices on Lava

THE BULLETIN BOARD

A page for those who maintain the Show Windows of Safety

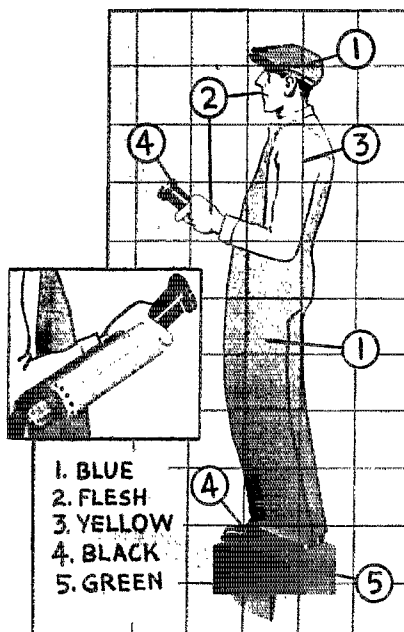
Conducted by STAN KERSHAW

More Cut-Outs for Use as Bulletin Boards

IN the two preceding issues will be found descriptions of the cut-out figures exhibited at the Annual Safety Congress to demonstrate one good way of popularizing poster displays. These you will recall, were cut out of plywood and painted in bright colors to make life-size and life-like figures.

In these issues it was also explained how small drawings can be squared off to facilitate the job of transferring them to the large sheets of plywood preliminary to cutting them out. A squared-off reproduction of one of the figures exhibited at the Annual Safety Congress was included in the last issue.

Here are three more squared-off figures on this page - one of them, however, calls for a special description because it does

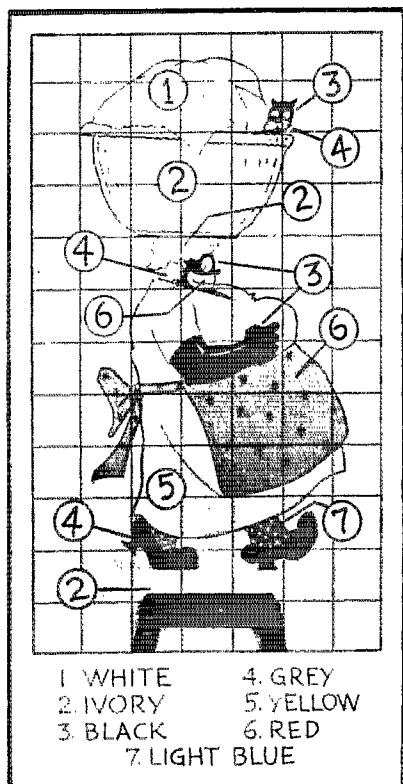


not provide for a panel on which to pin posters. It is the one showing a man with a flashlight in his hand.

This figure was made for the purpose of throwing a spot light on a bulletin board as a means of attracting attention to some special display of posters or notices. The flash light in the man's hand gives the impression that he is throwing a spot-light in the direction of the bulletin board and a home made electric light fixture attached to the back of his hand actually throws a beam of light.

The inset in the illustration shows the light in a tubular tin housing which serves to confine the beam to give the effect of a spot light. By the use of a simple inexpensive flasher attachment obtainable at any electric appliance store the light is made to flash on and off giving the impression that the man is actually operating the flash light pictured in his hand.

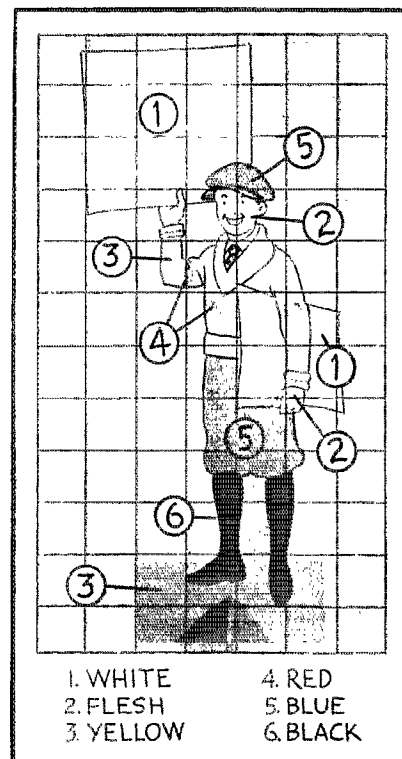
In making up the light attachment it was found necessary to paint the tubular housing white inside. Otherwise, even a fairly powerful bulb did not throw a strong beam of light.



It is important that the fixture be attached to the figure in such a way that a sufficient space is allowed for air to circulate between them. This is done to prevent the heat radiating from the lamp setting fire to the figure.

The electric wiring should be done in the best approved manner, and if it is necessary to place the figure where the cord crosses a passageway, a good way of keeping it clear is to run it overhead instead of across the floor or ground.

You will find unlimited possibilities in this novel means of drawing attention to poster displays. Safety education by the poster method is a matter of keeping the displays ever alive with new and interesting ideas. Follow closely the methods used by clever advertisers and the window decorators in progressive stores and you will find many ideas capable of conversion for use in your program of safety bulletin board work.

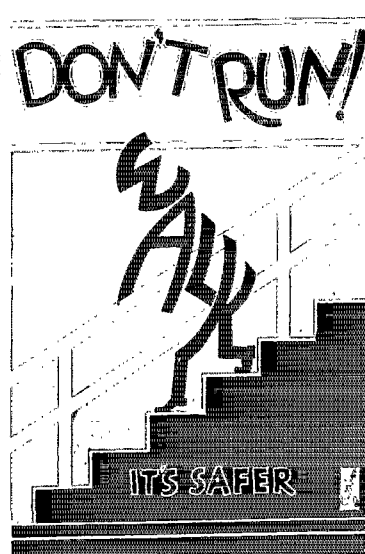




5012-B 17x23 inches 4 units

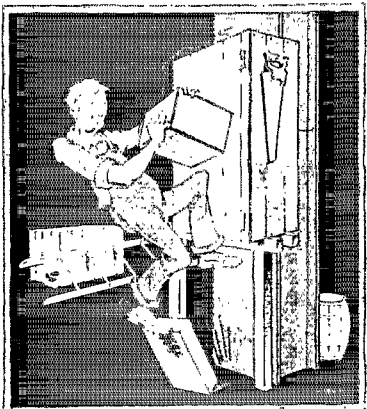


5032-B 17x23 inches 4 units
5033-C 25x35 inches 8 units

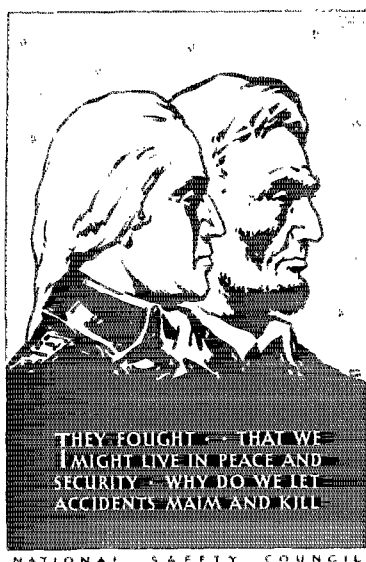


2118-B 17x23 inches 4 units

*It's not your Luck.
It's your Judgment*



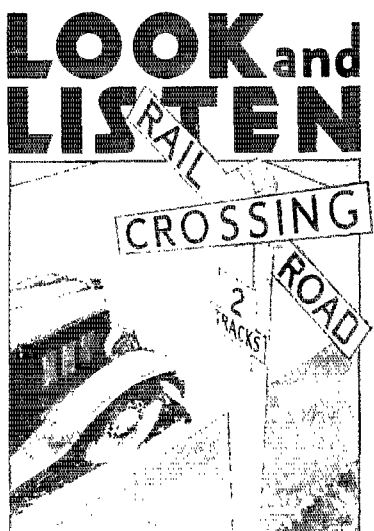
2434-B 17x23 inches 4 units



5013-B 17x23 inches 4 units



4187-B 17x23 inches 4 units



5014-B 17x23 inches 4 units

*They never
looked so good
as they do
right now*



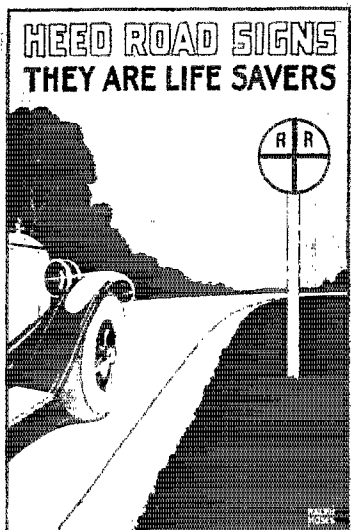
2773-B 17x23 inches 4 units



5010-B 17x23 inches 4 units

JANUARY, 1931

Electrotypes may be purchased from the National Safety Council for \$2 each



NATIONAL SAFETY COUNCIL

3034-B 17x23 inches 4 units

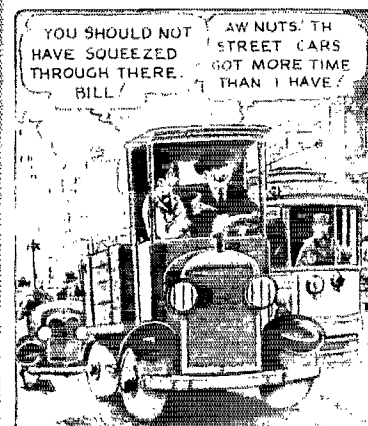
A BROKEN WIRE DID IT



FIRST-AID WOULD
HAVE PREVENTED
INFECTION

NATIONAL SAFETY COUNCIL

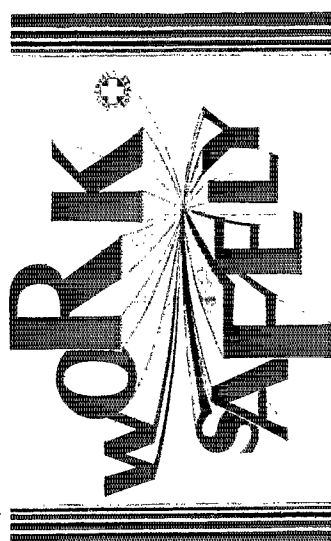
3023-B 17x23 inches 4 units



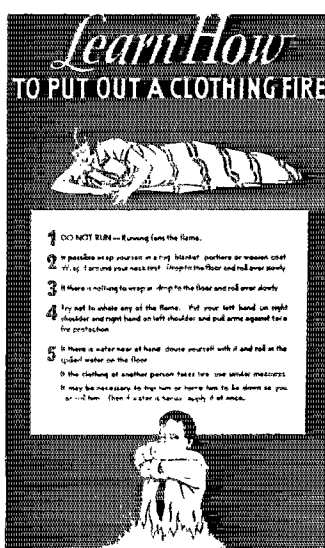
THIS KIND OF A DRIVER
DOESN'T BELONG IN OUR
COMPANY!

NATIONAL SAFETY COUNCIL

3011-B 17x23 inches 4 units



2361-B 12x17 inches 2 units



NATIONAL SAFETY COUNCIL

4021-D 12x18 inches 2 units



4261-D 12x17 inches 2 units



NATIONAL SAFETY COUNCIL

5024 9x12 inches 1 unit

A message to employees returning to work



NATIONAL SAFETY COUNCIL

5020 9x12 inches 1 unit



IF YOU MUST
SNEEZE
SNEEZE IN YOUR HANDKERCHIEF
IT'S YOURS.
DON'T SNEEZE IN THE AIR -
IT'S EVERYBODY'S

NATIONAL SAFETY COUNCIL

5005 9x12 inches 1 unit

Electrotypes may be purchased from the National Safety Council for \$2 each

NATIONAL SAFETY NEWS

Protect Your Eyes



This is as near
as you can come to
seeing thru a glass eye

NATIONAL SAFETY COUNCIL

4995

9x12 inches

1 unit

OUR SAFETY RULES IMPOSE NO HARDSHIP

*But THEIR
VIOLATIONS
MAY*

NATIONAL SAFETY COUNCIL

5020

9x12 inches

1 unit

FALLS



CAUSED
17,000
DEATHS
LAST
YEAR

WATCH YOUR STEP

NATIONAL SAFETY COUNCIL

2834

9x12 inches

1 unit



Give him a hand ~ show
the new man how to do
his work the **SAFE** way!
(YOU WERE 'GREEN' ONCE, TOO!)

2109

9x12 inches

1 unit



**BEAT
THE GERMS TO IT
WITH FIRST AID**

NATIONAL SAFETY COUNCIL

5026

9x12 inches

1 unit

WHAT YOU SHOULD KNOW ABOUT GAS WELDING CYLINDERS

1. Never use acetylene at a pressure in excess of 15 lbs. per square inch gauge pressure.
2. Never allow oxygen to come in contact with oil or grease.
3. Always refer to gases by their proper names. Do not refer to oxygen as 'air' or acetylene as 'gas'.
4. Never use oxygen as a substitute for compressed air for pneumatic tools or similar devices.
5. Never use pressure from an oxygen supply for cleaning clogged oil lines.
6. Never use cylinders as rollers or to support work.
7. Do not tamper with safety devices on cylinders or cylinder valves.
8. Do not have blowpipes when the regulators are attached to cylinders.
9. Never attempt to transfer gas from one cylinder to another.
10. Never attempt to mix two gases in one cylinder.
11. Do not let hot slag fall on combustible materials or on the cylinders.

NATIONAL SAFETY COUNCIL

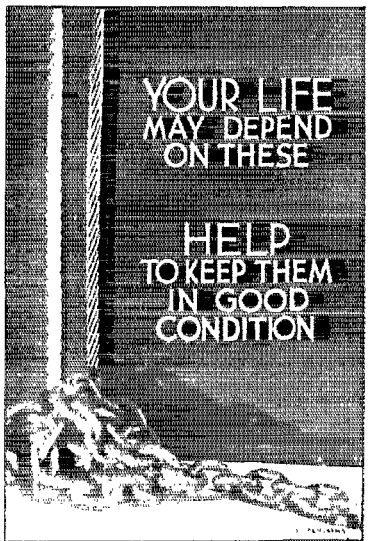
5018

9x12 inches

1 unit

**YOUR LIFE
MAY DEPEND
ON THESE**

**HELP
TO KEEP THEM
IN GOOD
CONDITION**

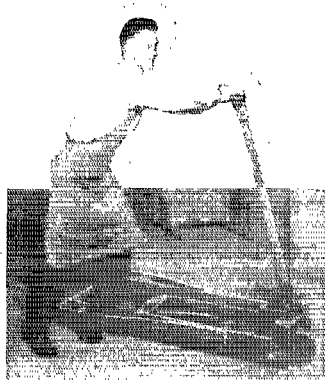


4278

9x12 inches

1 unit

JANUARY, 1934



**SCOOTERS
ARE OUT OF PLACE AT WORK.**
Avoid injury to yourself and
others by keeping off them.

2038

9x12 inches

1 unit



**Rock falls-Man runs-
Trips over tools-
Hit by rock-!**

5018

9x12 inches

1 unit

Electrotype may be purchased from the National Safety Council for \$2 each



TELL US

If you see a condition here that is dangerous, tell us about it at once. We would rather have your suggestion now than an accident report later. ■ ■ ■ ■ ■

NATIONAL SAFETY COUNCIL

5009 9x12 inches 1 unit

LEARN FROM THE EXPERIENCE OF OTHERS

A CRANE follower was steering a clam-shell grab bucket into position by holding one of the jaws with one hand. When the bucket jaws closed the end of his index finger was pinched off.

At the dispensary the injured man refused to take an anesthetic and stood with beads of perspiration on his forehead while the doctor clipped off the end of the bone, trimmed the flesh and sutured it together.

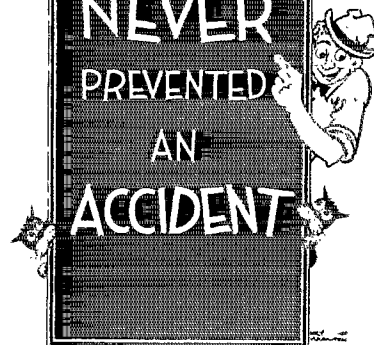
As soon as the wound was dressed he rushed back to the scene of the accident, located the severed end of the finger and put it in his pocket to exhibit to his friends. (It is to be hoped that they prouted thereby.)

GETTING CAUGHT IN GRAB BUCKETS IS NOT THE ONLY WAY TO LOSE . . . FINGERS. TAKE GOOD CARE OF YOURS

NATIONAL SAFETY COUNCIL

5021 9x12 inches 1 unit

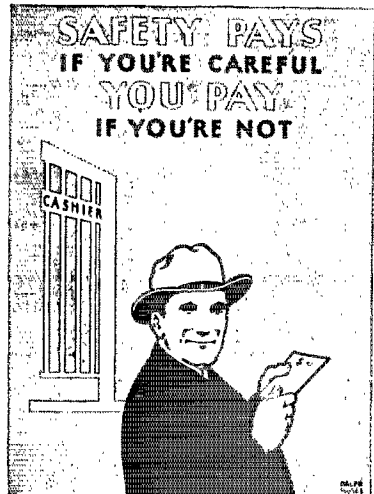
REGRETS NEVER PREVENTED AN ACCIDENT



NATIONAL SAFETY COUNCIL

5031 9x12 inches 1 unit

SHORTY SEZ:



NATIONAL SAFETY COUNCIL

3015 9x12 inches 1 unit



NATIONAL SAFETY COUNCIL

5030 9x12 inches 1 unit

BOARD GANGPLANKS SQUARELY



AVOID SPILLS
REMOVE LOOSE BOARDS

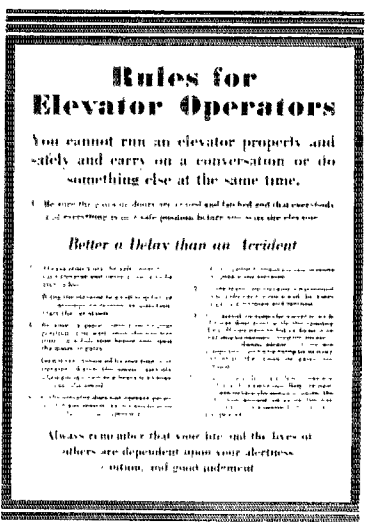
NATIONAL SAFETY COUNCIL

5015 9x12 inches 1 unit



NATIONAL SAFETY COUNCIL

1655 9x12 inches 1 unit



NATIONAL SAFETY COUNCIL

4284 9x12 inches 1 unit

WHY DO SOME PEOPLE HAVE MORE ACCIDENTS THAN OTHERS



NATIONAL SAFETY COUNCIL

2414 9x12 inches 1 unit

Electrotypes may be purchased from the National Safety Council for \$2 each

NATIONAL SAFETY NEWS

CHECK THE EXTINGUISHER



**IT MAY
HELP CHECK
A FIRE**

NATIONAL SAFETY COUNCIL

5005

9x12 inches

1 unit



**MATERIALS PILED
CARELESSLY ARE
NOT SAFE!**

NATIONAL SAFETY COUNCIL

5012

9x12 inches

1 unit

DID YOU REPLACE GUARDS



NEVER NEGLECT SAFETY

2126

9x12 inches

1 unit

FOR SAFETY

**IF IN DOUBT
ABOUT YOUR
+ WORK +
ASK YOUR
FOREMAN +**

NATIONAL SAFETY COUNCIL

4278

9x12 inches

1 unit

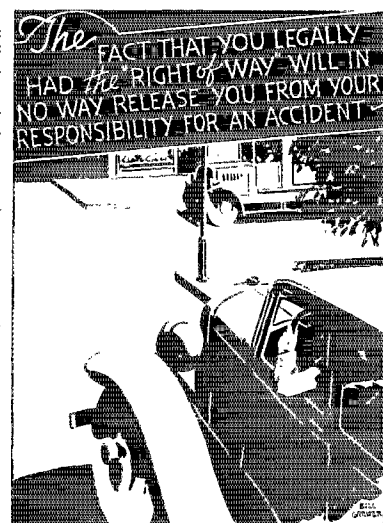


NATIONAL SAFETY COUNCIL

4107

9x12 inches

1 unit



NATIONAL SAFETY COUNCIL

5025

9x12 inches

1 unit

ALWAYS



Look to see that the snap is properly fastened to the D-ring. Your life depends on it. Don't trust to hearing the keeper click.



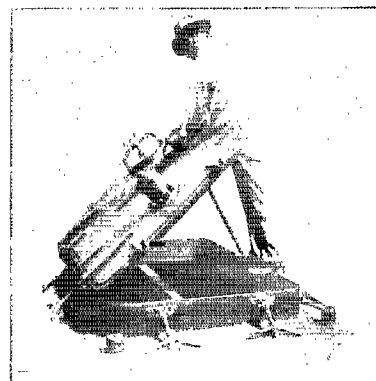
**"That safety man
was right -
ACCIDENTS
COST PLENTY"**

NATIONAL SAFETY COUNCIL

4887

9x12 inches

1 unit



**PROTECT
YOUR FEET FROM
TANK TOP FALLS**
NEVER STAND ON TANK TOP RIM. YOU MAY LOSE FEET!

NATIONAL SAFETY COUNCIL

5016

9x12 inches

1 unit

4883

9x12 inches

1 unit

JANUARY, 1931

Electrotypes may be purchased from the National Safety Council for \$2 each

I WAS ONLY FOOLING
IS NO ALIBI FOR HAVING INJURED A FELLOW WORKER

NATIONAL SAFETY COUNCIL

5022 9x12 inches 1 unit

..Live and learn to work safely from the fellow who takes foolish chances and gets HURT

NATIONAL SAFETY COUNCIL

5025 9x12 inches 1 unit

WAIT A MINUTE!



"FOR SAFETY"
KEEP TOOL REST PROPERLY ADJUSTED TO COMPENSATE FOR WEAR ON WHEEL

NATIONAL SAFETY COUNCIL

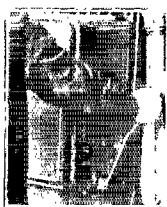
4421 9x12 inches 1 unit



ALWAYS STAND AWAY FROM LOAD AS FAR AS POSSIBLE

NATIONAL SAFETY COUNCIL

4139 9x12 inches 1 unit



When starting machines make sure no one is in DANGER

NATIONAL SAFETY COUNCIL

2350 9x12 inches 1 unit

A THOUGHT FOR TODAY

YOU WERE NOT HIRED TO TAKE CHANCES

NATIONAL SAFETY COUNCIL

5027 9x12 inches 1 unit

"FIRST THINGS" FOR MOTORMEN



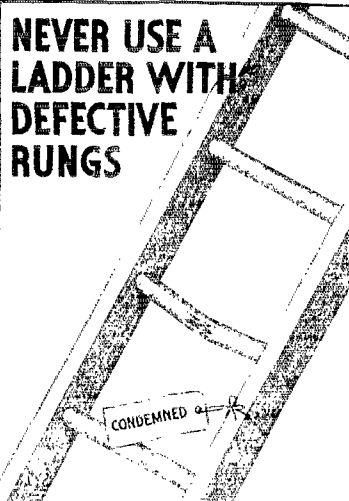
CHECK THE SAND SEE THAT IT WORKS

NATIONAL SAFETY COUNCIL

2625 9x12 inches 1 unit

JANUARY, 1934

NEVER USE A LADDER WITH DEFECTIVE RUNGS



NATIONAL SAFETY COUNCIL

4594 9x12 inches 1 unit

TIME TO GET DRESSED



TOOLS LIKE THESE SHOULD GO TO THE REPAIR SHOP OR JUNK PILE - THEY ARE DANGEROUS

NATIONAL SAFETY COUNCIL

5007 9x12 inches 1 unit

Electrotypes may be purchased from the National Safety Council for \$2 each

KLEINS



for Linemen

LINEMEN recognize that only the finest in safety equipment can be good enough—out on the sticks in any kind of weather—emergency jobs that must be done immediately—here safety, even life itself, depends on leather and steel. Where safety is the watchword you will find Kleins. In linemen's equipment, safety first means Kleins first—since 1857.

A national campaign featuring safety for linemen is being conducted by Mathias Klein & Sons to assist in selling the idea of safety to linemen.

Distributed through jobbers

Four pamphlets of interest to you if you are a lineman or responsible for the safety of linemen. Check the ones you want.

Safety on the P.O. Climber
Synthetic on Linemen's Belts and safety straps
The Safety Factor on Linemen's Leather Goods
Pocket Tool Guide



Mathias KLEIN & Sons
Established 1857 Chicago, U.S.A.
3200 BELMONT AVE., CHICAGO

Pioneering in Eye Protection

(Continued from page 14)

lation or circular ventilation. The closer the ventilation slots are to the back of the glass, the more effective the ventilation will be. It must, of course, be indirect so as to exclude all sparks, chips and other solid particles.

Maximum side and down vision are essential on many goggle jobs because of the tripping and stumbling hazards due to lack of sufficient vision in all directions. This is particularly true when working or walking in the vicinity of moving vehicles, overhead cranes or conveyors. Adequate vision in the side-shield and the cup-type goggles is now provided for.

Another important advance in the efficiency of goggles was made late in 1930 when, under the lead of the Federal Government and in cooperation with producers of eye protection equipment and various technical bodies, several new steps in standardization were taken. Chipping and welding goggle lenses were standardized at 50 millimeters (1.9685 inches) in diameter, instead of continuing the variable sizes as produced by different manufacturers in the past. The newer size not only increases the range of vision, but is a notable factor in convenience and in the efficiency of handling supplies in plants where a great variety of jobs and eye protection devices may be essential to safety.

The new Federal specifications also established definite limits of tolerance for the strength of chipping lenses and for the correctness of the optical surfaces. Lenses that are warped or twisted, producing blurred images, prove to be very tiring in constant use.

In welding goggles, also, the standardization of shades is clearly established in the specifications. Shades of welding glass are now based on a curve established by definite transmission formula. The importance of this is that all manufacturers are now able to work on the same shade scale. In other words, a No. 8 lens produced by one manufacturer should have the same percentage of transmitted light as a No. 8 lens produced by any other manufacturer.

The tolerance in the degree of opacity of welding glass to injurious rays is clearly established. Years ago users of welding glass depended only on density of shade, whereas the progress of the art has now permitted the manufacture of glass having an opacity to injurious

rays far out of proportion to the density of shade. In other words, a workman can now be protected against eye burns due to excessive injurious rays, while at the same time having a glass only dark enough to prevent undue glare.

The advance in scientific knowledge along this line has permitted the manufacture of glass in medium and dark shades, that cuts out all ultra-violet rays and also practically blocks the long series of infra-red rays, which heretofore had made welding operations so dangerous to sight; as a consequence of this advance inflammatory eye conditions in welding are now entirely avoidable.

This standardization of shades in welding goggles applies with equal force, of course, to the glass windows used in welders' helmets and handshields. The use of the electric arc of high amperage, and also the development of atomic hydrogen welding, have made imperative the development of these newer types of welding glass to afford definite protection against eye burns.

Still another problem has engaged the serious attention of the goggle manufacturer for many years. This is the ability to furnish adequate eye protection to the workman who is compelled to wear correction spectacles. There are thousands of these workers who, at one time, were either forced to lay off their correction spectacles in order to wear the eye protection available, or trust to the meager protection afforded by their own correction spectacles.

Goggle manufacturers have at length solved this problem in two ways. A special light-weight protective goggle has been developed which may be worn with comfort over the worker's own correction spectacles. But he may also, if he desires, secure for his standard goggles a hardened glass lens specially ground to carry the same optical qualities as his own correction spectacles.

In short, the eye protection industry has made such strides during the past two decades that it may very well be said to have kept pace with the safety movement. All eye protection equipment is not perfect, of course, nor have all eye protection problems been solved. But with the reasonably adequate equipment available most eye injuries are avoidable, and there is no sufficient excuse for the 200,000 eye accidents which still take place in industry each year.

PERSONALS

H. C. MURPHY, has been appointed superintendent of safety for the Chicago, Burlington & Quincy Railroad, with headquarters in Chicago. T. E. Pratt, who formerly handled the company's safety activities, continues as chief special agent.

ARTHUR GABOURY, secretary-general of the Province of Quebec Safety League and general manager of the Quebec Association for the Prevention of Industrial Accidents, has been appointed honorary colonel in Les Franc-Tireurs du Saguenay.

HELP WANTED

Capable safety engineer wanted by mutual company for Michigan, Indiana or Missouri territory. Give full details of your experience with application. Address Box 292, *National Safety News*.

Safety Instruction Cards

(Continued from page 30)

87. Hand tools
88. Lifting capacity of tackle
89. Drill press operators
90. Rope and block sizes
91. Lathe operators—general suggestions for all purpose metal working lathes
92. Posture
93. Portable electric tools
94. Window cleaning—safety belts
95. Safe use of jacks
96. Unloading tank cars—containing sulphuric and mixed acids, compressed air method
97. Lifting capacity of tackle—steel snell blocks with wire rope
98. Safety lines for electric line work
99. Gas masks—how to test for air-tight fit
100. Wire ropes—how to lubricate
101. Gas welding—hinders
102. Blanking off pipe lines
103. Helping the new employee
104. Grinding wheels—safe operation
105. Boiler gage glasses—replacing broken glasses
106. Elevators—making inspection and repairs
107. Unloading tank cars—flammable liquids
108. Care of Manila rope
109. Overcoming ice-slipping hazards
110. Grinding wheels—how to make the ring test
111. Safety suggestions
112. Window cleaning from ladders
113. Use of wrenches
114. Warning signs—ones to use
115. Care of the eyes
116. Stocking pipe and round bars
117. Practical first aid—carbon monoxide
118. Lead poisoning protection
119. Cold and caustic pipe lines—avoiding flanged joints
120. Handling explosives—storage
121. Warning signs—style of lettering
122. Safe loads for scaffold planks
123. Ladders
124. What to do in case of fire
125. Hand saw—how to start
126. Repairing lead tanks—precautions
127. Your health—colds
128. Two-wheel hand trucks
129. Carpenters
130. Plant electrician
131. Home hazards
132. Stairways and stockrooms
133. Thawing frozen pipes
134. Handling drums
135. Close guarding with cylinder
136. Lifting—wheels or beam
137. Brick masons
138. Fuelkeeper

JANUARY, 1934

SURGICAL **BAY'S** DRESSINGS

THE NEATEST BANDAGE EVER MADE

AN inch square of sterile gauze, four plies of it.
An inch-wide strip of BAYHESIVE three inches long with the gauze pad in the center. Perforations for ventilation. Crinoline over the adhesive which is removed before application. White and flesh-color BAYHESIVE. Each bandage in glassine envelope, one hundred in a sturdy box.
Applied in a jiffy over any small wound. Pull off the crinoline, put over the wound, press down the BAYHESIVE strip. Goes on bigger, costs one-eighth as much, delivers the goods as effectively. Fits any part of the anatomy from abdomen to zygoma and stays put until taken off.
What more could you ask—unless it's for free samples, and that's where the coupon comes in.

THE BAY COMPANY
BRIDGEPORT, CONN.
PARKE, DAVIS & CO.

THE BAY COMPANY, BRIDGEPORT, CONN.

Gentlemen: Kindly send me a free sample of Bay's Band-Bandage

Company _____

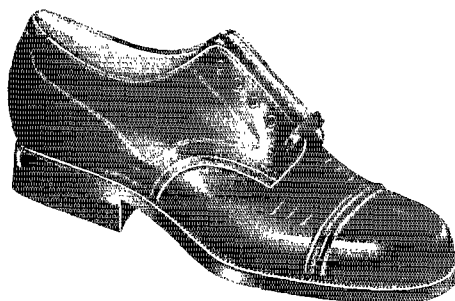
Person requesting _____

Address _____

"SAFETY PAL" SHOES

None Better Anywhere

One of
Many
Outstanding
"SAFETY PAL"
VALUES



No. 487. Full leather lined, calfskin oxford. Steel toe protection.

"Rock Oak" outsole.

Stocked in four widths.

It Will Pay You to Compare for Value!

Request sample for inspection at our expense.

SHEPHERD SAFETY SHOE CORP.

201 N. Wells Street, Chicago

Eastern Branch: 23 Pennington St., Newark, N. J.

Lessen Your Insurance Rates



Justrite Safety Can
Sizes—1 pint to
5 gallons



Justrite Waste Can
Capacity—6, 8, 10,
14 gallons

Prevent Fire and Explosion

How about YOU?—Your plant?—Your employees? Are you taking the fullest safety precautions against fires, explosions, accidents and other danger risks? Are you using modern, convenient, efficient and approved safety appliances to store your waste, gasoline, benzine, kerosene, turpentine, naphtha, alcohol and other hazardous explosives and volatile liquids? Play safe—follow the example of thousands of cautious plant executives—install the latest, improved JUSTRITE Safety Appliances TODAY.

Insurance Companies Gladly Lower Rate Premiums

to plants who install approved, up-to-date safety appliances. JUSTRITE Safety Appliances are inspected and labeled by the Underwriters, Inc., and the Associated Factories Mutual Fire Insurance Companies. Protect your plant—your employees—install the latest improved JUSTRITE Safety Devices TODAY. See your dealers or write us for interesting prices and literature.

Justrite

TRADE MARK

Justrite Mfg. Co. 2087 Southport Avenue
CHICAGO, ILLINOIS

Ethyl Gasoline

(Continued from page 20)

locker rooms, bathing facilities, ordinary and special protective clothing and equipment, and gas masks.

Regulations cover all the procedures, including the requirements in the matter of cleanliness, clothing changes and similar details. Workmen are selected by a medical representative of the distributor on the basis of physical fitness, and each man is instructed as to the regulations, and the dangers associated with improper handling of ethyl fluid.

Storage space for drums of fluid consists of a concrete platform at box car or truck height, with at least three sides open to the air and a roof overhead connected with drains so that it can be thoroughly hosed. This platform is continuous with the mixing area, the entire structure being enclosed with heavy wire, locked against entrance, and being of fire proof construction. The storage tank for fluid delivered by tank car is located adjacent to the mixing equipment.

Mixing of fluid supplied in drums is carried out by means of two types of equipment, one for less than full drums of fluid, the other in which not less than a full drum is used. In the former case a special apparatus is fastened in the bung opening, and the desired amount of fluid as indicated by gross weight loss, is drawn off by means of an eductor, attached to the gasoline line.

In the other case, the full drum of fluid is used as the unit of measure, and one or more drums as required are emptied by means of an eductor attached to the gasoline line, and mixed with the proper amount of gasoline in a tank. The operation is completed when the eductor line has been well washed out, when all the fluid has been introduced into the gasoline, and when the fluid and gasoline have been recirculated so as to obtain complete admixture. The latter is an important item, for when the heavy fluid is merely poured into gasoline it drops to the bottom and remains as a separate layer for a long time. Not only would this introduce serious error into the composition of the gasoline, but it may also result in the accumulation of concentrated fluid at the bottom of the tank which might be encountered when the tank is cleaned.

The entire procedure of storing the fluid and mixing it with gasoline in mixing plants which handle tank cars of fluid is carried out in two steps, (1) emptying the tank car into a storage

NATIONAL SAFETY NEWS

tank suspended on a scales, and (2) mixing weighed amounts of fluid into gasoline. Both steps are carried out through the use of an eductor on the gasoline line. Since all movements of the fluid are accomplished by suction, and since sufficient vacuum for the purpose can not be obtained in the presence of leaks in the system, it follows that if the apparatus moves the fluid at all, there is no opportunity for skin contact with leaking fluid or inhalation of escaping vapor.

The various factors which influence the magnitude of occupational hazards of the workmen may be listed in the order of their importance as follows: (1) The extent of the cooperation of refinery management in the avoidance of irregular practices, such as unnecessary sampling of fluid, the removal of small amounts of fluid into intermediate containers for experimental mixes, and for the correction of errors in mixing; (2) the quality of the mixing equipment; (3) the frequency of mixing; and (4) the degree of caution exercised by the mixing personnel in following prescribed instructions.

The importance of the last item is stressed at all times, but much greater dependence is put in the automatic safety afforded by the installation of proper mixing equipment and adequate storage facilities. It is manifestly impossible to prevent departures from accepted procedures excepting as the refinery management and personnel give their willing and intelligent cooperation, and unless they accept the point of view that no commercial consideration can justify the violation of a reasonable regulation.

The chief functions of the medical representatives are to promote such a point of view, to maintain and improve mixing plants, and to prevent any relaxation of caution. The periodic medical examination of every person engaged in this work, together with occasional study of the lead excretion of a representative group of workers, serves largely to determine the effectiveness of the precautions.

Perhaps this is a somewhat uncommon concept of the significance of medical examination. Such a concept, however, does not arise from any lack of appreciation of medical service. Rather, it springs from the certainty that no amount or excellence of medical care is sufficient in itself to prevent the occurrence of lead poisoning. In our opinion, the only way to prevent occupational lead poisoning is to so limit exposure that poisoning cannot occur.

JANUARY, 1934

The Next Slip or Fall May Be Really SERIOUS



Why gamble with fate? Sooner or later you will lose. Of 1222 lost time accidents analyzed as to cause by National Electric Light Association, 23% resulted from tripping, slipping and falling.

Do as hundreds of Safety Engineers are doing. Recommend—yes, insist—that workers wear *Gro-Cord* and *Raw-Cord* soled and heeled shoes. Sturdy cord tire cords, embedded upright in live rubber make *Gro-Cords* and *Raw-Cords* non-slip. As sole wears bare, cord ends grip most slippery walking surface—reduce chances of falling.

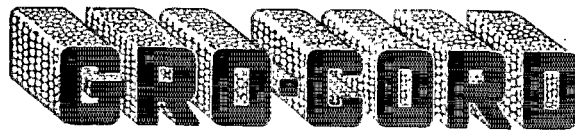
Workmen like *Gro-Cords* and *Raw-Cords* because they wear longer. Write for information. A complete line of safety rubber footwear—*Gro-Cord* and *Raw-Cord* equipped—now available.

The Lima Cord Sole & Heel Co.

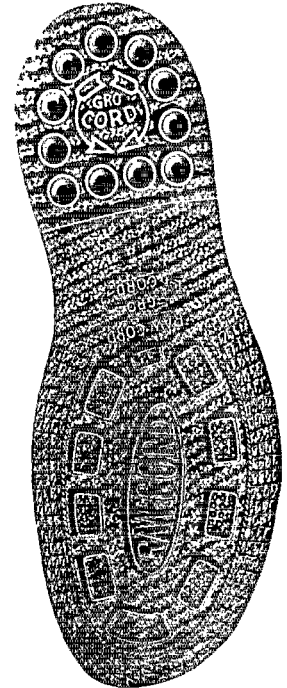
Dept. 1F

Lima, Ohio

Fully protected by patents—any infringement will be prosecuted.



**Non-Slip
SOLES and HEELS**



Gro-Cords and *Raw-Cords* are widely used in Dairies, Iron & Steel Foundries, Railroad Shops, Auto Factories, Gas & Electric Plants, Ice & Fuel Stations, Stone Quarries, Mines, General Warehouses.

DUPOR

Reg. U. S. Pat. Off.

RUBBER RESPIRATOR

Comfortable, Double Capacity, Better Vision, Reversible and Foldable, Highly efficient in all Dusts, Paint Spray and the lighter Fumes and Gases.

Price per doz., \$18.00

\$1.50

Upon receipt of \$1.50 one will be forwarded as a sample. It has only to be tried to be appreciated. Extra felt pads, 4c each.

H. S. COVER

CHIPPEWA-A

SOUTH BEND, IND.



Patents Applied For

Write for this New Bulletin



Industrial executives and safety engineers who are interested in the latest protective equipment for sand blast operators—in using safety equipment as a means of preventing silicosis—in maintaining the health of workers and reducing compensation claims—should know about this new CESCO product, the

HEALTHGUARD SAND BLAST MASK

Fully described in this new Bulletin. Write for copy to

CHICAGO EYE SHIELD CO.
2304 Warren Blvd.
CHICAGO, ILL.

Set Sights at No Lost Time, President Urges Company

A COMPANY'S safety record is an index to management; we can have our record just where we want it," said Robert R. West, president of the Riverside and Dan River Cotton Mills at the recent quarterly safety meeting for foremen held at Schoolfield, Va.

"As head of your company I am naturally disturbed when I see lost-time accidents costing our men and our company thousands of dollars," continued Mr. West. "We must set our sights at no lost-time accidents. When a man comes here to work it is good for him to know that he has come to a place where hazards have been removed and he can work safely."

Changes in the company's safety organization in the past year reduced the loss ratio to approximately one-third of the previous rate. With safety committees organized in every mill and constant encouragement from the management, the entire personnel has been making every effort to effect still further improvement in the safety record.

Honor Public Service Men for Safe Driving

FIVE bus operators from the Perth Amboy garage of the Public Service Corporation of New Jersey were honored for their safe driving records on October 25 when they were guests of their fellow employees at a dinner held in the New Packer House, Perth Amboy.

With six years of operation without an accident, the highest driving honors went to Frederick LaForge, Philip Geiger, James Melder, Edward Paves; each has had a perfect operating record for three years. John Montecalvo has operated two and one-half years without accident. The men were presented with citations congratulating each for his safe driving and expressing the appreciation of his fellow employees.

COMING EVENTS

Of Interest to Safety Men

Jan. 18, Newark, N. J.

Tenth Annual Eastern Safety Conference, Fred M. Rosseland, secretary-manager, Newark Safety Council, 25 Brantford Place, Newark, N. J.

May 14-18, Atlantic City, N. J.

Annual Meeting National Fire Protection Association, Franklin H. Wentworth, managing director, N.F.P.A., 60 Battery March Street, Boston, Mass.

Cold Weather Is Here

Watch Out For Foot Injuries



Because it is more difficult to handle material when ones hands are cold, feet should always be protected from falling objects.

Sankey Foot Guards are made of light steel or rigidium, an aluminum alloy. They are bell shaped and rest lightly over the shoe. The floor takes the impact in case of falling material.

Investigate this foot protection before you have a foot injury.

Ellwood Safety Appliance Co.

Ellwood City, Penna.

Financial Backing for the Safety Movement

MANY people are making provision in their wills to continue their support of philanthropic, educational and scientific causes. Such support for the Safety Movement will make possible a greater extension of activities than its present financial structure will permit. Gifts may be made for general activities or to establish specific projects, such as scientific research or awards for outstanding safety accomplishments.

Public safety activities cannot be made self-supporting. The vast amount of educational effort and the numerous research projects involved in this complex and many sided problem must be financed by public spirited individuals and organizations.

The following alternative forms are suggested for those who desire to provide by will for their continued support of the National Safety Council:

FOR GIFT OF MONEY OR OTHER PERSONAL PROPERTY

I give, devise and bequeath unto National Safety Council, a corporation organized and existing under the laws of the State of Illinois, the sum of _____ dollars, alternative provision: the following described personal property _____

to be disposed of and used by the National Safety Council in the furtherance and carrying out of its work in the cause of accident prevention.

FOR GIFT OF REAL ESTATE

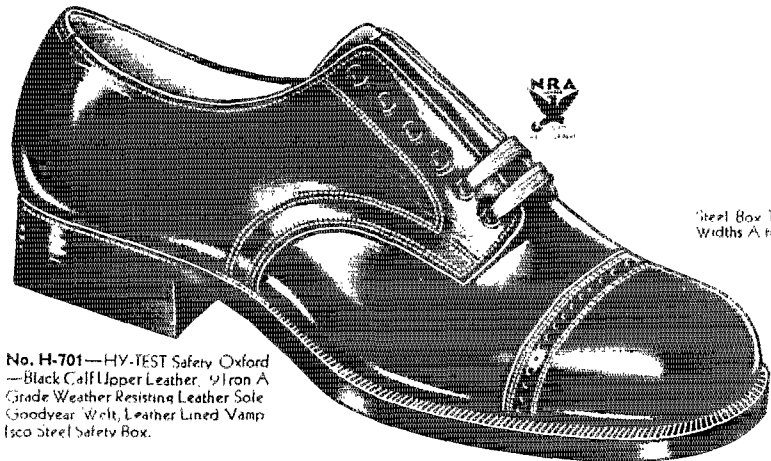
I give, devise and bequeath unto National Safety Council, a corporation organized and existing under the laws of the State of Illinois, the following described real estate, together with all buildings or other property existing thereon. (Here insert legal description of the land to be given), to have and to hold the same, unto the said corporation, its successors and assigns, forever. And it is my desire and intention that the National Safety Council shall have unlimited right of disposal of the said real estate, for the furtherance and carrying out of its work in the cause of accident prevention.

FOR CREATION OF ENDOWMENT FUND

I give, devise and bequeath to National Safety Council, a corporation organized and existing under the laws of the State of Illinois, the sum of _____ dollars, the principal of this bequest to be safely kept, invested and re-invested by the Finance Committee of the National Safety Council, as and for a part or the whole of a permanent Endowment Fund, the income of this fund to be used by the National Safety Council in the cause of accident prevention. Provided that if in the judgment of the Executive Committee of the National Safety Council the best interests of the National Safety Council require the expenditure of a part or all of the principal of such fund, then from time to time such principal may be so expended.

JANUARY, 1934

Yes, a really good looking DRESS SAFETY SHOE!



No. H-701—HY-TEST Safety Oxford
—Black Calf Upper Leather, 9 Iron A
Grade Weather Resisting Leather Sole
Goodyear Welt, Leather Lined Vamp
15cc Steel Safety Box.

Steel Box Toe
Widths A to E

...popular with men who want a dressy shoe with safety features

Attractive lasts give these new Hy-Test oxfords a trim appearance—scarcely revealing their hidden safety and genuine comfort features.

Available in four styles—the one illustrated, a Lace Oxford of the same construction, a Blucher High Shoe and a Blucher Oxford with Non-Slip Raw Cord Sole—all made

over Hy-Test's splendid fitting dress last with steel box toes.

Especially popular with foremen, superintendents, engineers and others whose duties require foot protection, yet whose shoes must be of a dress type.

Return coupon for additional information.



HY-TEST SAFETY SHOES

Designed and Manufactured Exclusively by
INTERNATIONAL SHOE COMPANY, ST. LOUIS, MO.
The World's Largest Shoe Manufacturer

----- THIS COUPON BRINGS THE COMPLETE STORY -----

International Shoe Company,
Dept. HI-13 St. Louis, Mo.

We are interested in knowing more about your new design HY-TEST Dress Safety Shoes without obligation on our part.

Safety Director's Name _____

Purchasing Agent's Name _____

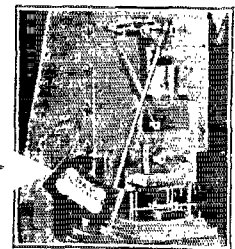
Firm Name _____ Address _____

PAT. SHIELD

Continues the PROTECTION
begun by the Guard itself

Your operator cannot reach behind this shield (fully protected by U. S. patents) until the danger point is passed. No other punch press guard has this patented shield.

D. & M. Automatics fit all punch presses—have only 3 working parts—are made entirely of drop forgings and steel (except the guard head), and are low in price—\$18.50 to \$28.00.



Order a D. & M. Automatic Guard for 30 days FREE trial, state size and make of press and whether left to right or right to left swing is wanted.



TAYLOR-SHANTZ CO.

486 ST. PAUL STREET
ROCHESTER, N. Y.

The Weakest Link

(Continued from page 18)

heating to a temperature of 1350-1375° F. for a time sufficient to thoroughly heat the chain. The chain is then removed from the furnace and allowed to cool freely in air. The rate of cooling is important.

The annealing of steel chain at this temperature is likely to result in some grain growth and it is therefore considered better practice to normalize chain made of this material. This is

done by heating the chain above the upper critical point to 1600-1650° F., thoroughly soaking and removing from the furnace, allowing the chain to cool freely in air.

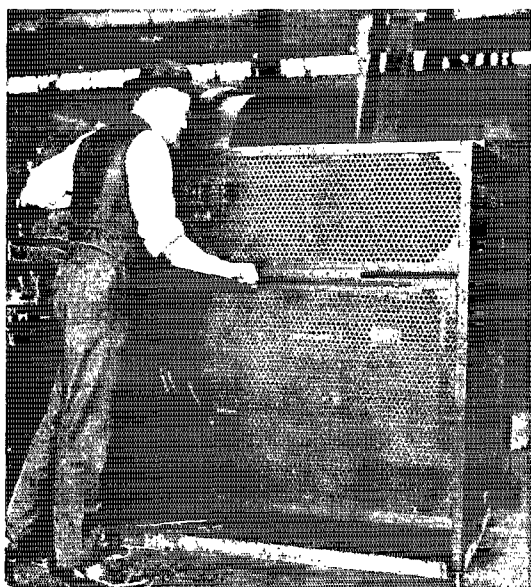
When in doubt as to whether chain is made of iron or steel, the chain may be annealed at either the high or low temperature but there are considerations which must be taken into account. If iron chain is heated to the high temperature of 1600-1650° F., excessive scaling takes place. The chain is likely to be too soft and stretch exces-

sively when proof tested, leaving little elasticity in the chain for the absorption of shock loads in service. If steel chain is annealed at the low temperature, excessive grain growth is apt to take place. However, the one consideration, that of high scale losses and excessive softening in the case of the iron chain annealed at high temperatures is a practical one which is easily demonstrated and common knowledge. The other consideration, that of the possibility of excessive grain growth in the case of steel chain annealed at low temperatures is largely academic, and if the proper annealing cycle is carried out, that is, heating directly and quickly to the annealing temperature and removing the charge without excessive soaking in the furnace, no excessive grain growth is likely to occur.

It is concluded that the practical procedure in the case of doubt as to whether chain is made of iron or steel is to anneal the material at a temperature of 1350-1375° F., withdrawing from the furnace and allowing to cool freely in air as soon as this temperature has been reached and equalized throughout the chain mass. The furnace atmosphere should be reducing at all times to keep down scaling. It is not considered good practice to pack the chains in boxes as this increases the heating time. Chains annealed in car bottom furnaces should be removed immediately from the car upon withdrawal from the furnace.

The question is sometimes asked as to the advisability of annealing differential or load chains used in chain hoist blocks. Consideration of the use of the chain here will show at once that if such chains are overloaded and stretch during use they will no longer operate in the pocket wheel of the hoist. They are therefore not subject at any time to excessive loads even approaching the original proof load of the chain without immediate detection by the operator. Most chain hoists have shear pins or overload clutches which protect the chain from overload. Because of the limited loads applied, the bearing pressures are reasonably low and the chain is not subject to impact by dropping. More harm than good will result from annealing or normalizing high carbon, heat treated load chain as the resistance to wear and the breaking strength of the chain will be lowered. In our experience no failures of differential or load chain taken from chain hoists have ever been diagnosed as resulting from

SAFETY GUARDS



SHOULD the moving parts of machines be guarded? Illinois, New Jersey and New York reported over 28,000 machine injuries in a single year. Leaving out the important humanitarian consideration, there remains the fact that it is profitable for manufacturers to eliminate hazard wherever it is possible.

Insurance rates are lowest when a plant is safe. Production is greatest when fear of accident is absent. We have studied the problem of guard making from the viewpoint of the manufacturer and have designed guard accessories to protect our own machines. They make for safety and economy, and we should like to have you try them.

The Harrington & King Perforating Co.

5645 Fillmore St.,

114 Liberty St., New York

Chicago, Ill.

the formation of work hardened surfaces.

In the forefront of this paper considerable stress was laid upon the desirability of employing a specialist for the repair and annealing of chains. Most of the progressive chain companies maintain departments for the repair and annealing of chains. The cost of this service is invariably less than the cost of making repairs in the average shop when overhead items of expense are considered.

The safety engineer who sets up a practice of returning all chains periodically to a chain-maker for reconditioning throughout may rest assured that the repairs will be made with the right materials by experienced men and that the final chain will be tested. Last, but certainly not least, the responsibility for the final result will rest with an organization which is skilled in the art and which is proud of its goodwill and reputation. The ends of careful safety supervision will thus be satisfied.

Bibliography

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A New Driver Control System

As a further step in its campaign to prevent accidents, the United Parcel Service, a consolidated delivery organization, serving retail dry goods stores in eight Pacific Coast cities and in New York, has recently put a unique driver control plan into effect. After carefully studying the accident record of each one of its several hundred drivers, the entire personnel has been classified and qualified as to driving ability and given a rating which is indicated by the number of his uniform badge.

For example, badge numbers between 1 and 500 are issued only to drivers who

are qualified to drive furniture, line-haul and large pick-up cars, as well as smaller vehicles.

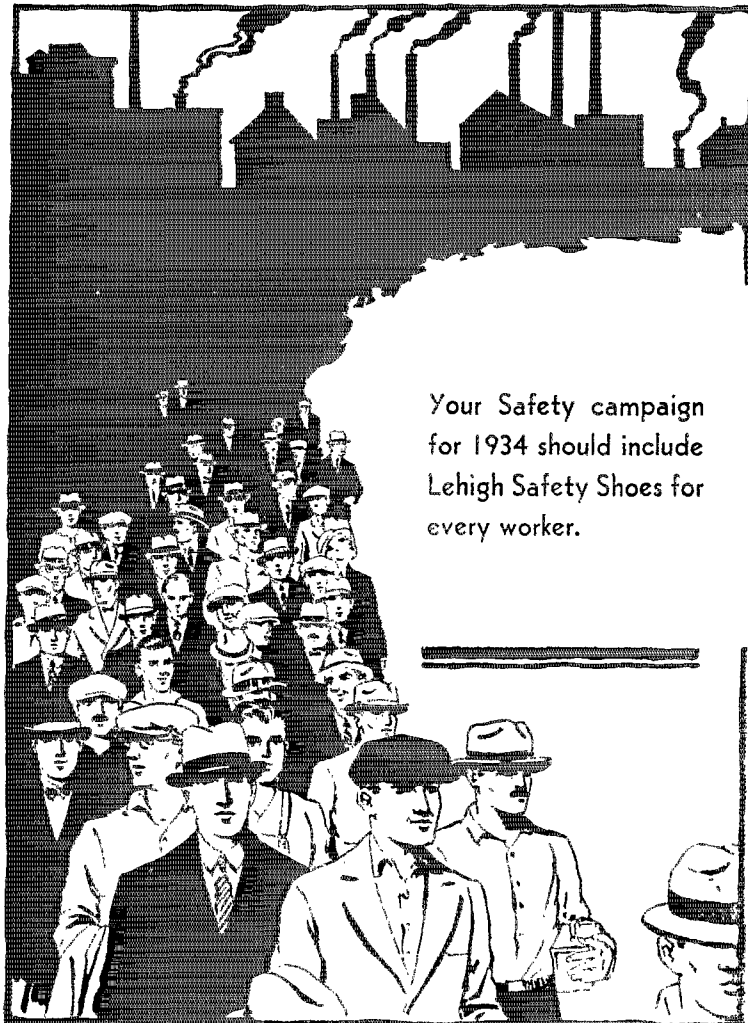
Badge numbers between 501 and 1000 are issued to drivers qualified to drive package cars; and numbers above 1000 are issued only to helpers and others who are not qualified to drive any type of car. No helper who has been assigned to a badge number over 1000 is permitted to drive a car by himself. If he has a chauffeur's license, he may drive under the supervision of his driver and only while the driver is with him in the car. He is not permitted to drive or even move the car in the absence of his driver.

Any helper or driver who wants to qualify for a lower badge number may

do so by applying to the Personnel Department for a road test. No driver or helper, under any circumstances, is permitted to drive a car other than the type of vehicle indicated by his badge number.

Delivery volume fluctuates considerably due to seasonal conditions or special sales and it frequently becomes necessary to send drivers and helpers to the various substations, on short notice. The badge numbering control arrangement enables the sub-station manager to determine definitely the driving qualifications of each man sent him and to assign the man accordingly. Properly qualified drivers for the various types of cars are thus always assured.

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Your Safety campaign
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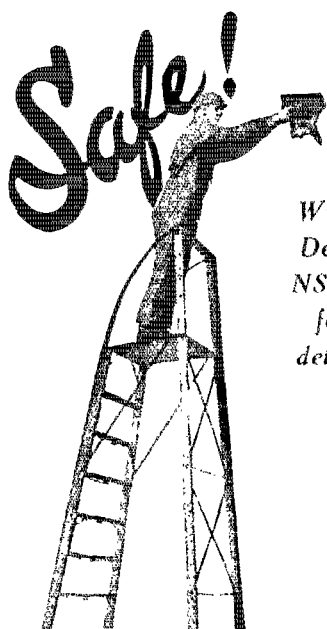
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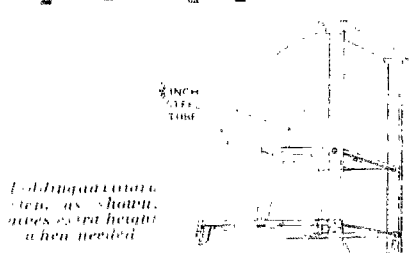
Allentown, Penna.

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GUARD against accidents in your plant, as re-employment increases, by using Dayton Safety Ladders. On the roomy platform of the Dayton, protected by waist-high guard rail, the worker has no fear of tipping, sliding, or falling. Daytons reduce labor costs, outlast several ordinary ladders. Sizes 3 to 16 feet. Moderately priced.



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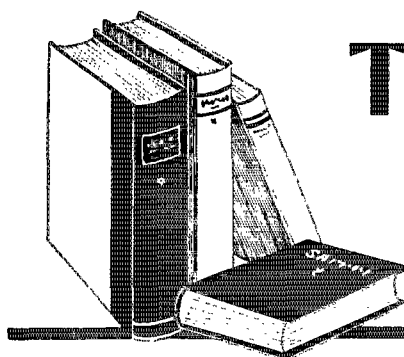
THE DAYTON SAFETY
LADDER COMPANY

121-123 West Third St. Cincinnati, O.

DAYTON Safety Ladder

(Patented)

Stock carried on Pacific Coast by E. D. Bullard
Co., Los Angeles and San Francisco, and by other
distributors from coast to coast. Made and
distributed in Canada by Perry Hermant, Ltd.,
Toronto.



The Safety Library

by
MARY M. WELLS
Librarian N.S.C.

Further information regarding publications listed here can
be obtained from the National Safety Council Library

INDUSTRIAL HEALTH SERVICE

Bristol, L. D.: **INDUSTRIAL HEALTH SERVICE.** Published by Lea & Febiger, Washington Square, Philadelphia, Pa., 1933. Price \$2.00. (Book)

This book of 170 pages is a splendid outline of important facts and problems concerning the health of the worker in industry. Dr. L. D. Bristol, who is health director for the American Telephone and Telegraph Company, deals with the problem from the standpoint of the employer, the supervisor, and their relation to the worker.

The book is divided into three parts—the first of which deals with a well-rounded industrial program for management representatives, including personnel and medical directors. The control of occupational disease and accident, tuberculosis, communicable diseases, etc., are discussed in a general manner, and the organization, personnel and related activities are described.

Part II deals with the problem from the standpoint of the supervisor and points out just how important the attention of this official to the various health problems is to the whole set-up. Some of the subjects treated in this portion of the work include "The Prevention of Colds," "Common Ailments," "Oral and Dental Hygiene," etc.

The third part of this book handles the subject from the standpoint of advice to the individual worker on personal hygiene. This material, if properly used by the industrial health director, can be of great value. From this material a program of several years' standing can be developed—a program which will prove exceedingly valuable as it is developed. For instance, there is a short paragraph on advice to the worker on "Selecting Your Physician." Then there is another on "The Physical Inventory," there is still another on "Diet." These are only a few of the discussions in this book which, I believe, will prove an asset to the library of any worker interested in industrial health, personnel problems, etc.—R. H. FRIGGS.

BOOKS AND PAMPHLETS

Accidents:

Great Britain Home Office. An illustrated series of abstracts from reports of industrial accidents. Vol. 1. 1933. To be purchased from H. M. Stationery Office, Adastral House, Kingsway, London, W. C. 2. Price 5s. (Pamphlet)

Construction Industry:

Wisconsin Industrial Commission. General orders on safety in construction. Effective July

15, 1933. Published by the Industrial Commission, Madison, Wisconsin. Free. (Pamphlet)

Handling Materials:

Handling material accidents—their cause and prevention. Published by the New York State Department of Labor, 30 Centre St., New York City, 1933. (Pamphlet) (Bulletin No. 181)

Labor Laws and Legislation:

U. S. Bureau of Labor Statistics: Labor legislation 1931 and 1932. For sale by the Superintendent of Documents, Washington, D. C. Price 15c. (Pamphlet) (Bulletin No. 590)

Marble:

Marble, limestone, and granite. Published by the Retail Credit Co., Atlanta, Ga., 1933. (Pamphlet) (Industry Report)

Mines and Mining:

U. S. Bureau of Mines: Explosion tests of Pittsburgh coal dust in the experimental mine 1925 to 1932, inclusive. By G. S. Rice and others. For sale by the Superintendent of Documents, Washington, D. C. Price 5c. (Pamphlet) (Bulletin 569)

U. S. Public Health Service: Mortality of coal miners. By Dean K. Brundage. 1933. For sale by the Superintendent of Documents, Washington, D. C. Price 5c. (Pamphlet) (Public Health Bulletin No. 210)

Silicosis:

Silicosis. Published by Metropolitan Life Insurance Co., 1 Madison Ave., New York City, 1933. Free. (Pamphlet)

Workmen's Compensation:

New York State Workmen's Compensation law and industrial board rules. With amendments, additions and annotations to November 1, 1933. Published by the State Department of Labor, 30 Centre St., New York City. Free. (Pamphlet)

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Canning Industry:

Quackenbush, V., How Minnesota Valley controls accidents in its plants. In *The Canner*, December 2, 1933, p. 9, 14.

Carbon Monoxide:

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Marine Industry:

Todd, Capt. David W.: Radio's part in maritime safety. In *Marine Progress*, November, 1933, p. 21, 61.

Mines and Mining:

Campbell, A. D., Safety and health. Major considerations at the McIntyre. In *Engineering and Mining Journal*, November, 1933, p. 492-496.

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Bayrer, O. D., A safety guide for rotary offset presses. In *Travelers Standard*, December, 1933, p. 231-235.

Psychology:

Farmer, E., The psychological study of accident proneness. In *Industrial Welfare and Personnel Management*, November, 1933, p. 16.

Safety Movement:

Auel, C. B., Safety in the modern program. Prevention of accidents may be accomplished through application of many types of guards. In *Abrasive Industry*, December, 1933, p. 8-9.

Standards:

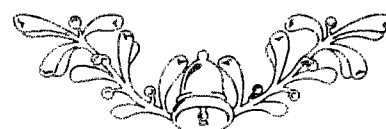
Baldwin, C. E., Status of industrial safety codes and regulations in the various States. In U. S. Bureau of Labor Statistics, *Monthly Labor Review*, November, 1933, p. 1103-1119.

If you have a copy of the October, 1927, issue of the *National Safety News* which is no longer required, the Council can make good use of it. Please send it to Library, National Safety Council, 20 North Wacker Drive, Chicago.

Maine Industries Enroll in State Safety Contest

BEGINNING January 1, 1934, and continuing for six months, industries in the State of Maine will participate in a state-wide safety contest. The contest will be conducted under the auspices of the State Department of Labor and Industry. Each industry will have its own contest, provided sufficient entries are received, and an appropriate prize will be offered in each classification, paid for out of a special conference fund. Plants having won prizes in national safety competitions will be enrolled in a special classification so that other less experienced organizations will not be discouraged.

Preliminary plans for the Congress were discussed at the Sixth Annual Safety Conference held at the State Capitol during November when considerable interest was manifested in the imposing display of trophies won by Maine plants in the Paper Industry Contest. Many of those in attendance expressed a wish that their plans might have some such stimulus for accident prevention work and the Department of Labor and Industry consequently sponsored the contest.

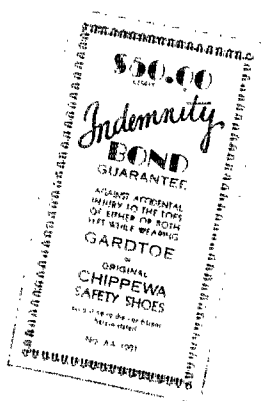


A HAPPY AND SAFE NEW YEAR

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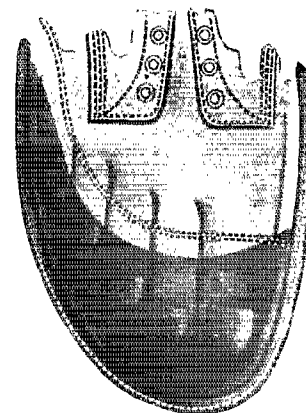
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Safety engineers have thoroughly tested GARDTOES . . . Thousands who wear them praise GARDTOES and recommend them to fellow-workers . . . GARDTOE patents cover the most comprehensive injury-preventing features ever incorporated in safety shoes . . . An indemnity bond goes with every pair . . . For these and many other reasons SPECIFY GARDTOES!

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Safety First Supply Co., Brady Bldg., Pittsburgh, Pa.

GARDTOE Safety Shoes are designed for wear in mines, quarries, shingyards, machine shops, mills, factories, etc., indoors or outdoors. Black or Brown leathers—good-looking, long-wearing, comfortable. Specially designed lasts insure proper fit. All have GUARANTEED 10-TOE PROTECTION.

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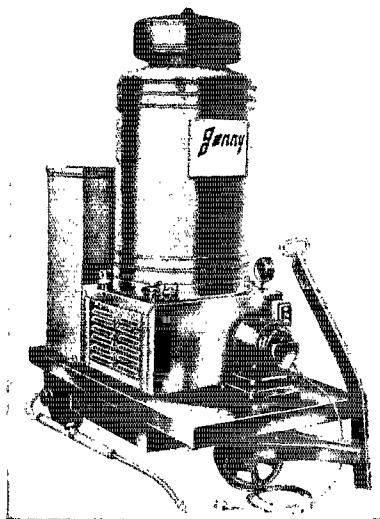
JANUARY, 1934

WITH THE MANUFACTURER

Manufacturers are invited to send in announcements of new products, or improved special features. Only items which can be considered as "news" to our readers will be published

HOMESTEAD PRESENTS MODEL "D" HYPRESSURE JENNY

From the standpoint of potential cost savings, the executives of mills, factories, plants, machine and repair shops, etc., will be interested in the announcement of the Homestead Valve Manufacturing Company, Coraopolis, Pa., of a new, fully-automatic model of the Hypressure Jenny, their highpowered machine for all-purpose cleaning, paint-stripping, or sterilizing. The improved and simplified unit is termed the Model "D."



The 1934 Model Jenny follows the earlier models in its essential characteristic,—the generation of a vapor blast, combining in any desired proportion the basic requisites for thorough cleaning: heat, pressure, and the proper cleaning solvent or solvents for the work to be done. In the engineering and operating details of the unit, however, diligent research and valuable field experience have brought many refinements.

The new Model is electric-motor driven, operating on lighting current, and is arranged for instant starting from a push-button switch. The fuel-oil burner used for heat generation is of the pressure atomizing type, as used for household heating purposes. Ignition is by an automatic electric spark. Throughout, the Model "D" Jenny is engineered for one-man operation, and is entirely automatic and self-contained; all necessary safety devices for this type of operation being part of the design.

The Model "D" Hypressure Jenny has been made fully enclosed and compact, for maximum ease of handling. The portable type, is only 30" wide, 55" long, and 70" high, enabling it to pass through any ordinary doorway, or enter any ordinary ele-

vator. The machine is also available in stationary types, for truck or floor mounting.

A NON-POISONOUS FUMIGANT

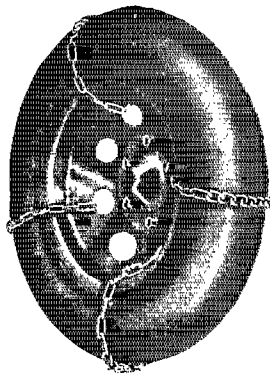
A new fumigating gas called Proxate has recently been brought on the market by the Liquid Carbonic Corporation of Chicago.

This gas is more than twice as toxic to insect life than carbon bisulphide, contains no poisons and is non-flammable, the manufacturer states. Its high toxicity combined with unusual safety features have a considerable economic value for any manufacturer who makes or stores food products since fumigation can be carried on safely and efficiently without danger to those working near at hand.

The gas is odorless and colorless, cannot damage merchandise coming in contact with it and leaves no taste or odor. It is delivered in steel cylinders and can be stored indefinitely. The Liquid Carbonic Corporation of Chicago, Illinois will make and sell Proxate through their branches in the United States and Canada.

NEW EMERGENCY CHAIN FOR TRUCKS

A new emergency chain for pneumatic truck and bus tires, combining unusual strength and ease of fastening securely, has just been announced by the Pyrene Manufacturing Company, Newark, N. J.

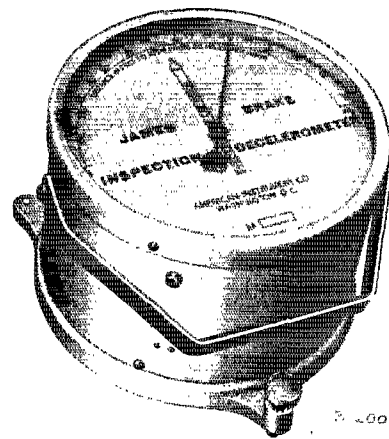


The chain is all-steel with hardened twisted link cross chain and straight welded link chain for the side members. It may be fastened to spoke or ventilated disc wheels by simply placing the chain around the tire and hooking a link into the snap hook. This hook has no projections to catch on anything. It can be easily opened by hand but it cannot open when in motion, the manufacturer claims.

It is recommended that three or four chains be used on each wheel—not as a substitute for regular tire chains but for emergency use only.

THE JAMES DECELEROMETER

The James Brake Inspection Decelerometer, developed by the American Instrument Company, Inc., 774 Girard St., Washington, D. C., is a standard device for testing automobile brakes. The Decelerometer test is made on the road, under exact running conditions.



One important feature of this instrument is that anyone can make the tests accurately and quickly, the manufacturer writes. The test is made by simply placing the Decelerometer on the floor of the car, leveling it with a quick-acting screw on the base, accelerating the car to any speed from 10 to 50 miles an hour and suddenly applying the brakes with full force. The indicator turns on the dial, showing, at a glance, the exact condition of the brakes.

Readings taken directly from the Decelerometer at the time of the brake test show the number of feet required to stop the car from a speed of 20 miles per hour, regardless of how fast the car is actually traveling at the time of the test.

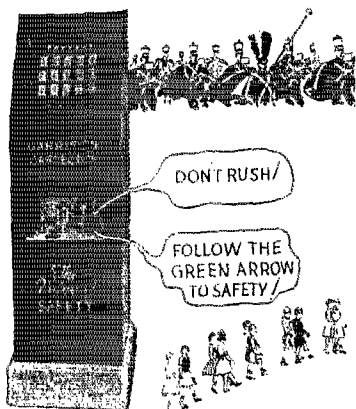
"THE VOICE OF SAFETY"

Garrison Engineering Corporation, New York City, manufacturers of Garrison Fire Detecting Systems, have perfected a new electro-mechanical system for the automatic supervision of the evacuation of buildings in which fire emergencies exist.

The Garterector is installed in conjunction with the Fire Detecting System and all of the necessary functions for sounding of local alarm signals, transmission of alarm to the fire department, and the supervision of the emptying of the building are instantly and simultaneously performed, the manufacturer claims.

The entire system operates without the necessity of any manual effort or human function, even to the giving of spoken instructions for the exit march, the design-

nating of exits which may be safely used, and the broadcasting of a military march through the sound amplifiers.



The fire department, responding to the alarm, are told of the part of the building from which the signal originated by lighted lamps on the building plan annunciator on the outside of the building.

The Gartector selects the exits which lead away from the section of the building in which the alarm originated and indicates these exits or stairways by green "exit" signs. The exit signs in the involved portion of the building are changed to show "stop" in red letters. This avoids dangerous delays and co-ordinates with the outside instructions to the arriving firemen and avoids their entering through the same doors used by outgoing occupants.

In connection with the amplifiers and sound apparatus, an interesting feature is a microphone panel by means of which any general announcement can be made over the loud speakers aside from fire emergency announcements.

[Statements published on this page are based on the claims of the manufacturer. While the National Safety News cannot guarantee these statements, they are believed to be accurate.]

News Items

COURT OF APPEALS UPHOLDS PULMOSAN PATENT

The United States Circuit Court of Appeals has affirmed the decree of the lower courts in upholding the Pulmosan Safety Equipment Corporation's patent for a respirator of the metal muzzle and non-inflated rubber cushion type.

The Court has found the Pulmosan patent to be valid against a strenuous defense in which there were set up a number of prior patents, American and foreign. The Court has also held that all of the three designs of respirator, which the defendant in the case adopted, are within the scope of, and therefore infringe on, the Pulmosan patent. The Court's opinion said: "Each of the devices made and sold embodies the operative principle and structural organization of the patent."

JANUARY, 1934

Trade Publications

for your

SAFETY EQUIPMENT LIBRARY

Information You Should Have

All of these booklets contain many valuable facts on controlling accidents and promoting efficiency. Industrial executives should avail themselves of this fund of information—because along with "safe operation" goes its close friend "profitable operation." Check those you would like and mail the coupon right now!

1. Viking Automatic Dispenser.

Folder describes Viking individual waxed paper drinking cups and sanitary dispenser. Boston Drinking Cup Company.

2. Safety Belt Fasteners.

Information on safety fasteners for power transmission belts, which have been designed to get away from the danger of projecting wires and loose lace ends. W. O. & M. W. Talcott, Inc.

3. New Blast Room Improvements.

Circular describes abrasive separator, self-sealing blast room doors, air-fed safety helmet and steel abrasives. Pangborn Corporation.

4. Electric Floor Machine.

Circular describes machine that refinishes, sandpapers, waxes, polishes, scrubs, and cleans. Interchangeable attachments are provided so that machine is adaptable for every sort of floor work on every type of floor. The Fay Company.

5. Health Guard Mask.

Folder on new Cesco No. 601 sand blast mask for use wherever harmful dusts are encountered. Details of laboratory tests on this mask are also given. Chicago Eye Shield Company.

6. Willson Personal Protective Products for Industry.

Catalog No. 29, illustrates full line of goggles, helmets, masks and respirators. Willson Products, Inc.

7. Hypressure Jenny.

Well illustrated folder describes the new Model D portable pressure cleaner for every kind of industrial cleaning job. Homestead Valve Manufacturing Company.

8. American Air Filters in Industry.

26-page bulletin devoted to industrial dust problems, covering such subjects as filtered air in atmospheric dust control, for industrial air conditioning, industrial ventilation, drying operations, product finishing, and many other operations. American Air Filter Company, Inc.

9. Electrical Live Line Equipment.

New inserts for Tips' catalog No. 6 on maintenance, grounding and tap off clamps. Also new price list sheets. Tips Tool Company, Inc.

10. "Klein-Kord."

Small pamphlet describes a new material for Linemen's Safety Straps. Mathias Klein & Sons.

11. Protective Signal System.

Well illustrated catalog on signalling equipment for Watchman's Supervisory, Sprinkling Supervisory and Manual Fire Alarm Systems. An ideal watchman system for industry. American District Telegraph Company.

12. 'Tabloid' First Aid.

A pocket-size book giving many valuable hints on treatment of all kinds of accidents, also facts on first aid equipment. Burroughs-Wellcome & Co. (U.S.A.) Inc.

NATIONAL SAFETY NEWS

20 North Wacker Drive
Chicago, Ill.

Please have sent to me the following publications, numbers:

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Title.....
Company.....
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January, 1934

PREVENT SLIPPING ACCIDENTS

on Stairs and Other
Walkways

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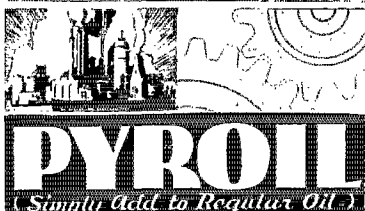
**Abrasive Metal Treads
For New and Worn Steps**

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**Durability Proven in Severest
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PYROIL

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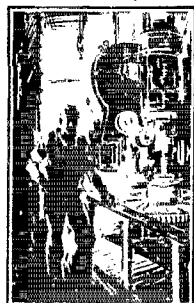
The Mutual Fire Protection Bureau, Chicago, Inc., "PYROIL, PREVENTS FIRE LOSS." Science Proved: reduces friction and overheating, saves on bearings, lights, oil, and money. It is recommended by many industrial, commercial, and domestic machinery, thus maintenance costs.

Most companies for Total Loss Differ. Important facts not found in "PYROIL, PREVENTS FIRE LOSS." Patented, Guaranteed by Pyroil Company, W. V. Kidder, Pres., 289 LaFollette Ave., LaCrosse, Wis., U. S. A.



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Without obligation send important facts and proof of Pyroil's SAFETY AND EFFICIENCY FACTORS in industrial use. Also Trial Test Order.

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HONOR ROLL

Details of no-accident records in excess of 400,000 man-hours, or 200 working days, are invited for this department

Canadian Bank Note Co., Ltd.

Since August 23, 1930, no disabling accident has occurred in the plant of the Canadian Bank Note Company, Limited, Ottawa, Ont. On November 30, 1933, the number of accident-free man-hours reached a total of 2,716,151. The number of employees has been between 500 and 600. This is believed to be the best record achieved in the province of Ontario since the passage of the Workmen's Compensation Act in 1915. The three essentials stressed in the safety program are: (1) Inspection by workmen's committees. (2) Education by means of bulletins and posters. (3) Safety talks to employees. P. J. Wood, vice-president of the company, is president of the Industrial Accident Prevention Associations of Ontario.

Continental Steel Corp.

The Gate Plant of the Continental Steel Corp., Kokomo, Ind., recently completed a period of 2,039 days without a disabling injury, from February 29, 1928 to September 30, 1933. The exposure totaled 432,486 man-hours for a group which averages 35 employees.

Philadelphia Company

Several creditable records are reported by the affiliated companies of the Philadelphia Company, Pittsburgh, Pa. Some of the more recent periods of operation without disabling injuries are:

Duquesne Light Co., entire company, March 16, to May 2, 1933, 49,193 man-hours.

Duquesne Light Co. Power Stations Dept., February 15 to July 8, 1933, 552,979 man-hours. (From December 2, 1930 to December 16, 1931, this department operated 1,772,694 man-hours without a disabling injury).

Duquesne Light Co., Distribution Dept., June 6, 1932, to January 13, 1933, 827,727 man-hours.

Duquesne Light Co., Sub-stations and Shops Dept., February 16 to October 19, 1933, 771,190 man-hours.

Allegheny County Steam Heating Co., November 30, 1929, to September 19, 1933, 755,199 man-hours.

Pittsburgh Railways Co., Transportation Dept., July 25 to October 26, 1933, 834,978 man-hours.

Pittsburgh Railways Co., Shops Dept., no accident since July 1, 1932, 309,132 man-hours as of November 1, 1933.

Equitable Gas Co., entire company, no accident since January 20, 1933, 812,370 man-hours as of November 1, 1933.

Equitable Gas Co., Meter Shops, no accident since March 23, 1926, 627,841 man-hours as of November 1, 1933.

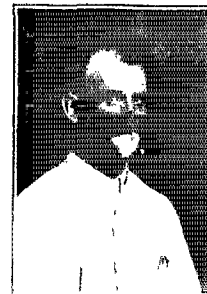
Pittsburgh & West Virginia Gas Co., Division F, no accident since October 17, 1930; 583,877 man-hours as of November 1, 1933.

Equitable Auto Co., April 17, 1931 to May 10, 1932, 483,785 man-hours.

Universal Gypsum & Lime Co.

On December 22 the Universal Gypsum & Lime Company at Akron, N. Y., completed 1,577 calendar days of operation without a disabling injury. Man-hours totaled 689,220.

Look For The DIAMOND



(Pat. Jan. 21, 1919)

DIAMOND Disc Respirators are universally popular because they are handy, efficient, and comfortable. Men will wear them because of these features. A large filtering area is provided in the Diamond Disc pocket arrangement where sponge is inserted for filtration purposes. Valve action produced by pressure at exhalation makes respiration easy. Leading industrial plants use the Diamond Disc.

Manufactured by

The Hygeia Respirator Co.

108 East 94th St. New York City
Sold by All Safety Supply Houses



The Spencer Central Vacuum Cleaning System

protects employees by removing injurious dirt and dust at its source.

It also saves in the cost of cleaning, in reclamation of valuable materials and in keeping the finished product clean.

Cleans any surface and is inexpensive, practical and dependable.

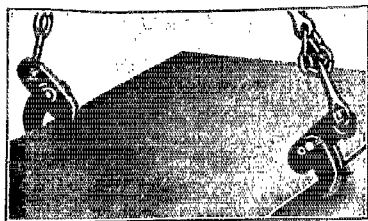
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THE SPENCER TURBINE CO.
Hartford, Conn.

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NATIONAL SAFETY NEWS



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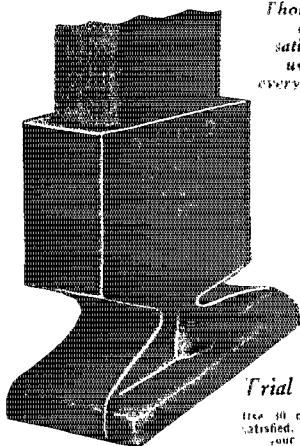
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Fire Gases Analyzed

THE gases produced by fires in our most common combustible substances have been subjected to detailed analysis recently by a group of scientists. Highly toxic gases have been found in considerable quantities in a wide variety of everyday fires. The scientists conclude that much of the loss of life in fires results from this cause rather than from the flames directly. The report of their investigations is published under the title "Gases from the Thermal Decomposition of Common Combustible Materials" in the June, 1933, issue of *Industrial and Engineering Chemistry*.

Those wishing reprints of this article may secure them by writing to the authors, Prof. John C. Olsen, dean of the Department of Chemical Engineering, The Polytechnic Institute of Brooklyn, Brooklyn, N. Y., or George E. Ferguson, chief chemist, Prere Manufacturing Company, Newark, N. J.



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THE ACCIDENT BAROMETER

A Monthly Review of Significant Trends in the Accident Situation

Prepared by the Statistical Bureau, National Safety Council

Occupational deaths reported to Industrial Commissions in 16 states numbered 465 in November, a drop of 9 per cent from the October total for these states of 514. The decrease was not shared alike by all states, however, California recording a drop of almost half and Pennsylvania showing a reduction of about one-fourth, while New York had an increase of 14 per cent and New Jersey one of 50 per cent. The eleven months' total for 15 states is 5,198, or 11 per cent below the similar total of 5,864 for last year.

	Nov. 1932	Nov. 1933	First 11 Months 1933	Oct. 1932	1933
California	23	19	555	642	60
Illinois	39	42	496	526	32
Indiana	4	12	80	113	3
Kentucky	10	1	89	100	11
Maine	1	1	19	32	1
Maryland	6	9	102	100	2
Massachusetts	17	15	266	303	35
Michigan	12	10	148	161	13
Minnesota	13	7	142	143	1
Missouri	7	10	66	92	26
New Jersey	18	16	183	212	29
New York	122	125	1212	1386	174
Ohio	67	75	821	909	88
Pennsylvania	54	36	361	498	137
Texas	—	10	—	25	25
Virginia	11	1	125	144	19
Wisconsin	11	13	105	102	3

Note: This table shows when deaths were reported to Industrial Commissions, not when accidents occurred. State totals are not directly comparable due to differences in laws.

Compensation awards in New York during the first six months of 1933 amounted to \$13,595,744, a decrease of 12.1 per cent from the total of awards for the first half of 1932. Cases closed declined a little more rapidly, the change amounting to 12.8 per cent. The average compensation per case was \$336 in 1933 compared with \$334 in 1932. The construction industry stands out with the highest compensation costs, averaging \$484 per case in 1932 and \$563 in 1933.

Motor vehicle deaths in October rose 17 per cent from September, according to reports from cities and states with 65,000,000 population. Furthermore, the October total is estimated to be considerably above October, 1932, and fully as high as October, 1931. The ten months' estimated total is slightly above the total for the same months last year.

During the first five months of the year deaths in 1933 were fewer than in 1932, but since that time the 1933 record has been getting progressively worse. In the following ten cities there was the same number of deaths in November as in October, but as there is usually a decrease in November this may be taken as an unfavorable record.

	November 11 Months			Per Cent	
	1933	1932	1933 1932	Change	
Baltimore	15	12	112	124	-9.7
Buffalo	11	12	92	87	+5.7
Cleveland	27	23	174	181	-3.9
Detroit	26	19	266	260	+6.4
Minneapolis	5	7	69	61	+13.1
New Orleans	11	4	66	55	+20.9
New York	97	95	930	928	+1.4
St. Louis	17	16	132	143	-7.7
San Francisco	7	8	111	119	-6.7
Washington	7	13	69	115	-40.0
Totals	223	209	2080	2061	+1.5

Commercial vehicle accidents continued to increase in October, advancing 7 per cent from September to a rate of 2.31 accidents per 100,000 vehicle-miles. This is the average for 26,000 vehicles entered in the National Fleet Safety Contest. Last year the October average was 2.39 for a similar but smaller group of fleets. Thus, although the rate appears to be advancing steadily this year it is still better than last year. The following table gives the October and the cumulated rates for the Contest.

	October	July-Oct.
Inter-city bus fleets	0.69	0.79
Disc. Mfg. plants	0.59	1.33
Passenger cars	1.61	1.49
Inter-city trucking	3.21	1.94
Public utilities	3.56	2.24
Petroleum	2.74	2.23
Truckers	2.56	2.50
Dairies	2.21	2.75
Factories	3.51	2.86
Newspapers	2.94	3.39
City trucking	5.29	2.89
Beverages	5.25	1.67
City bus operations	4.27	4.44
Department stores, etc.	4.20	5.21
Coal and ice	4.16	2.77
Laundries	3.56	4.19

Occupational injuries declined slightly in October among the 1086 plants engaged in the Inter-plant contests of 17 community safety councils, the frequency rate being 12.67, compared with the September rate of 13.56. However, as frequently happens, the severity rate went in the opposite direction, rising to 1.06 compared with 0.65 for September. The two rates taken together present a similar but somewhat better picture than the August rates. Last year the October

rates were both lower; frequency, 10.87; severity, 0.92.

Accidental deaths of all types totaled 18 per cent more in October than in September among the 42 cities sending detailed reports for both months to the National Safety Council. This increase is much greater than was expected. Usually a September-October increase amounts to no more than 1 per cent. In the reporting cities occupational deaths declined 9 per cent, while home deaths advanced 14 per cent, motor vehicle deaths, 18 per cent, and other public fatalities 29 per cent. November may see still further increases in accidental deaths, if the experience of the following 10 large cities is general. They recorded an advance of 3 per cent from October.

	Total	Acci- dents	Home	Motor Vehicle	Other Public
Buffalo	23	2	5	11	5
Cleveland	74	3	13	27	11
Columbus	16	0	1	7	0
Denver	16	1	1	7	0
Louisville	10	1	1	6	1
Newark	23	5	9	9	7
New York*	365	20	125	114	102
Rochester	8	0	0	1	0
St. Louis	13	1	11	1	1
Toledo	11	0	2	8	0
Total	559	33	184	212	126

*1 Deaths unclassified for New York City.

Student accidents in October were 17 per cent higher than in September, reaching a rate of 13.8 accidents per 100,000 student-days. Also, the October rate is well above the October 1932 rate of 12.9. Resulting absence from school averaged 2.9 days per accident, which is fully as high as in previous years.

Looking ahead... January may bring a slight reduction in fatal accidents of all types, but the rapid advance in deaths during September and October (in November as well, according to early reports) indicates that the trend may be upward for the next few months. However, January will probably show a decline in motor vehicle deaths of about 15 per cent, and a corresponding rise in deaths from falls and burns. Firearms fatalities will drop sharply, and will likely be replaced by asphyxiations as the fourth principal cause of accidental death.

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U. S. COURT OF APPEALS AFFIRMS PREVIOUS DECREE!

Official Letter to All Respirator Users!

The United States Circuit Court of Appeals has affirmed the decree of the Lower Court in our suit against the Chicago Eye Shield Company on our patent for a respirator of the metal muzzle and non-inflated rubber cushion type. The Court has found our patent to be valid against a strenuous defense in which there was set up a number of prior patents, American and foreign. The Court has also held that all of the three designs of respirator, which the defendant adopted, are within the scope of, and therefore infringe on, our patent. The Court's opinion said:

"Each of the devices made and sold embodies the operative principle and structural organizations of the patent."

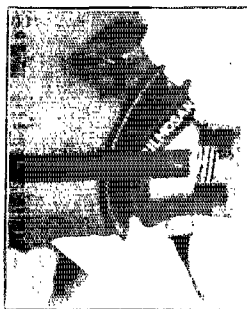
We publish this notice to the trade as an indication that we intend to protect our rights in respirators embodying the operative principle and structural organization of PULMOSAN non-inflated cushion respirators.

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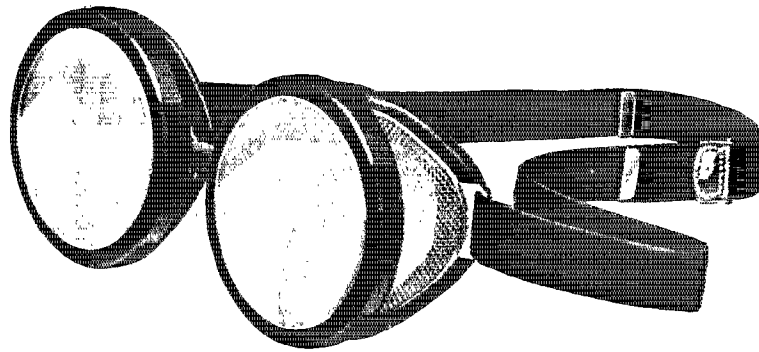
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