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National Safety News, Dated August 1933 [7731-7735]

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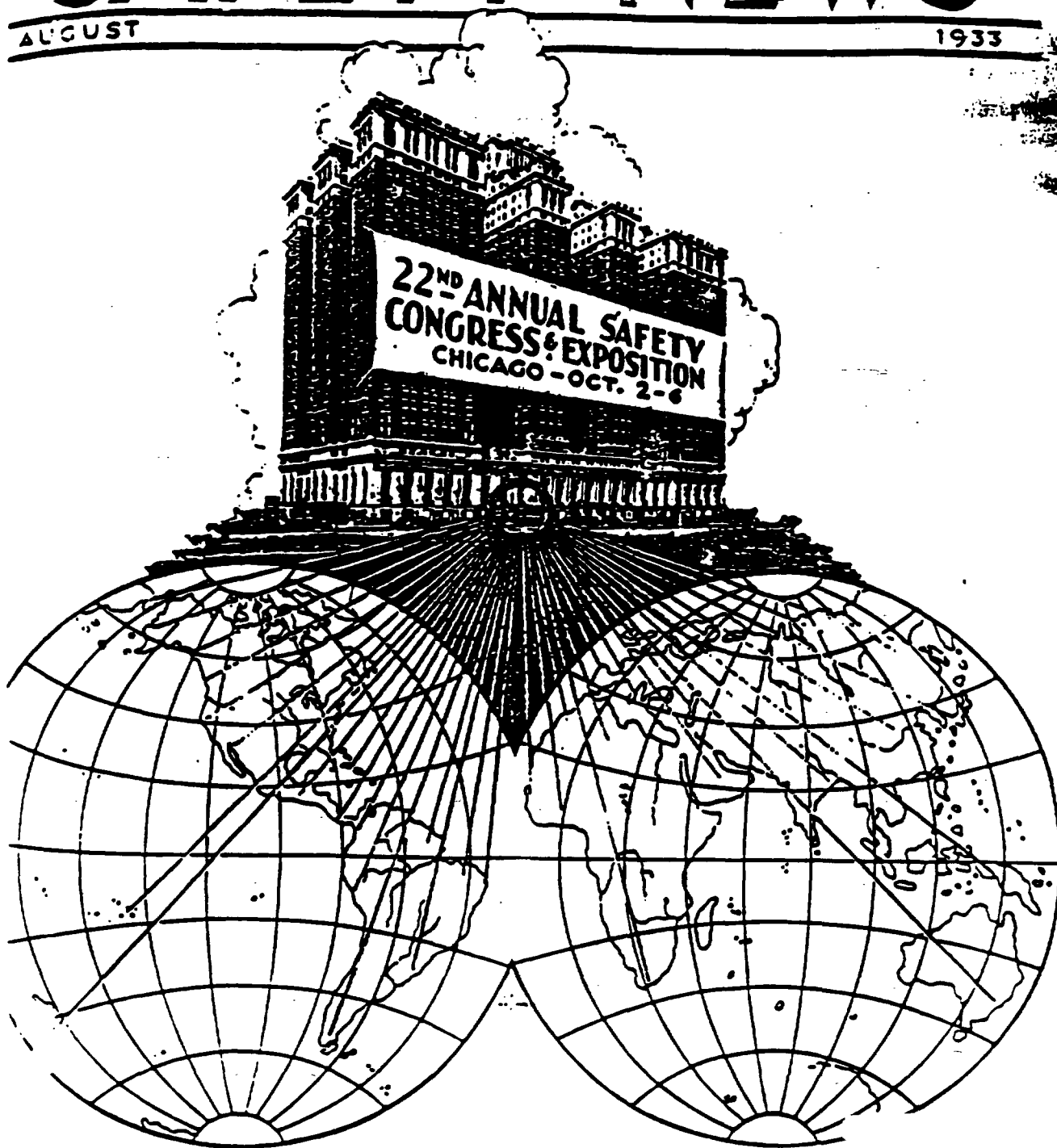
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WH-862

NATIONAL SAFETY NEWS

AUGUST

1933



VOL. XXVIII. No. 2

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By DAVID S. BEYER

Mr. President and Chief Engineer,
 Liberty Mutual Insurance Company, Bos-
 ton, Mass., a paper read at the Twelfth
 Annual Safety Conference of the Mass.
 Institute of Engineers.

- ¹See Dust Hospitals in a Hurry of
Wages, Personnel Files, Vol. 1.

In general, the most reliable source of correct and just buzzed is to call.

Equipment that will capture the dust at the point where it is generated. This has been worked out very effectively for such equipment as grinding and buffing wheels.

Unfortunately a complete system of dust collecting and separating for a large department costs a lot of money—more than many plants feel they can possibly afford under present business conditions.

Temporary Expedients

For such cases there may be other alternatives or temporary expedients that will at least tide matters over until improved business conditions warrant the installation of a permanent dust removal system.

For instance, the manager of a plant recently visited by the writer stated that they had already spent \$80,000 in exhaust equipment and had not yet fully solved the dust problem. In this industry, the use of oil which has been sprayed on the material in some cases in the past, to improve its handling in the machinery and processes, offers a promising solution to the dust problem. Dust counts in some plants using the oil show reductions of 90 per cent or more in millions of particles per cubic foot, and if further tests corroborate these results it offers a simple and comparatively inexpensive method of correcting the dust hazard in one industry.

In other operations, such as the shaking out of foundry castings, it may be possible to do this work at night, by men who are protected by respirators, and thus eliminate a common exposure to employees engaged in other operations in the same room. The use of enclosed mechanical conveyors and material handling systems, properly exhausted, instead of the old individual hand methods where the workers were brought into close contact with dusty substances, offers a solution in other cases.

The treasurer of one concern with whom I recently discussed the hazard of his foundry said, "Maybe we have the answer right here," and he brought out the design of a machine which was fabricated entirely from sheets, plates, angles and other structural shapes, riveted and welded together, which would entirely eliminate the castings of which it was largely composed in the past.

Where the dusty work is in a permanent location, and the great freedom of movement is not required, the air-line

respirator may give satisfactory results. For cases of temporary dust exposure, as for sweeping and cleaning up dust, the improved types of filter respirators may be adequate. In some cases substitutes may be found for the substance causing the trouble. This has already been done in some processes where benzol was formerly used, and efforts are being made to extend the use of this principle.

The use of water to overcome dust hazards is one of the first suggestions that is usually made. I recently tried to explain this problem to an industrial manager and after telling him that the dust which causes the trouble is less than 10 microns in size, a micron being about 1/25,000th of an inch, and being encouraged by his nods which seemed to indicate that he was following my explanation perfectly, I was a little disconcerted at the end to have him say, "Why can't you get rid of those microns by washing the air?" Apparently after all my efforts he still thought a micron was something like a microbe!

Water has been found rather effective for laying the dust in some operations such as mining, sweeping up dusty floors, etc. In other cases, it has been a disappointment as, for example, on grinding wheels, where a dry exhaust system has proved to be more satisfactory than wet grinding.

During the conference in South Africa in 1924 one of the speakers pointed out the futility of trying to completely remove dust clouds by water sprays or atomizing, adding the further comment that a tiny droplet of water may collect as many as 800 dust particles and then being inhaled is like inhaling the lungs with shrapnel instead of single rifle fire.

Unwarranted Confidence

Where exhaust equipment is installed, poor maintenance of these systems whereby their value is reduced or entirely vitiated is altogether too common. An inquiry in a plant recently as to how the dust filtering apparatus was working brought the reply, "Fine! we haven't had to even look at it for six years!" When we climbed a ladder to the roof to see this miraculous equipment, a touch on the screens shook a pail-full of dust from the "clean" side of the separator.

Another common and dangerous practice in many dust removal systems is

that of returning the filtered air to the plant in order to conserve the heat that would be lost if it were discharged outside the building. In five such systems where dust counts have been made during the past few months there was only one where there was even a question as to whether or not the air was fit to be returned. In one case over forty-seven million dust particles per cubic foot were found in the air that was being re-circulated, or many times what we would consider a safe limit!

Ineffective Installations

The salesman who had put in the equipment had persuaded them that the filtered air was so much purer than God's product as represented by the outside atmosphere that he had even piped it into the office; so the manager was breathing the dust as well as the factory employees. (Perhaps that might be called co-superation!)

While it may be going too far to say that an filtering equipment can make dusty air suitable for re-breathing, the constant chance of the system getting out of order makes it almost as questionable a practice as an attempt to recover drinking water from a sewage system.

Installations that are clogged, leaking and otherwise ineffective are common. One of our engineers found that the belt connecting the exhaust fan to the motor in an overhead installation had been oil for an indefinite period. The motor switch had been thrown regularly but no one noticed that there was no exhaust at the grinding wheels it serviced.

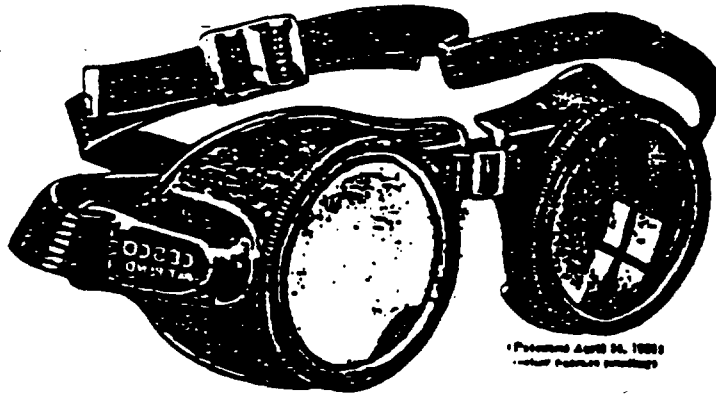
In another installation seen by the writer recently, a handkerchief held before the wheel stood out horizontally showing that the dust was being blown out toward the operator instead of being drawn in away from him.

An important point that should be borne in mind in designing an exhaust system is that it is highly desirable to capture the dusts or vapors as close to the point at which they are generated as possible, before they have had a chance to be diffused throughout the air of the room.

General ventilation may be helpful in reducing the concentration but it is obviously of little value to draw the objectional substances up through a roof fan as is sometimes done, thereby carrying them past the faces of the operators who must draw them in with every breath.

The design of a proper dust system
Please turn to page 7735

See Health of Workers in Dusty Trades
U. S. Public Health Bulletin No. 127.
U. S. Government Printing Office, Washington, D. C.



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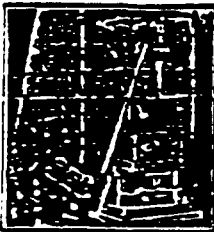
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Mechanical Control of Occupational Diseases

(Continued from page 22)

to effectively control dust requires thorough understanding of certain engineering principles that are completely lost sight of in many of the installations now in use.

For example, where the dust collector can be so arranged as to enclose the source of dust completely, or almost so, a very complete dust elimination may result, but where the inlet is five or six inches away from the source of the dust its efficiency may be reduced by as much as 90 to 95 per cent, and be wholly ineffective.

Where the exhaust equipment has been looked on in the past as more or less of a nuisance because it is non-productive and could accordingly be slighted at will, it must now be recognized as a primary operating problem, and responsibility must be placed on management to see that it is kept in first class condition at all times.

And so, to summarize the results of this brief survey of the mechanical control of occupational disease hazards, it is the opinion of the writer that chiefly in this direction lies safety from some of the most serious diseases, if one also includes rearrangement of the process under "mechanical control," in contrast with the "medical control."

While agreeing that medical supervision of new prospects for employment is of primary importance, in order to prevent placing new employees who have some physical impairment in a position where they will quickly break down as a result of the work hazard, and granting the value of medical follow-up of employees subjected to exposures such as lead and benzene, which bring about a temporary condition that may be checked by medical supervision and a change of occupation, it seems evident that in the most serious industrial disease hazards, that of exposure to silica dust, chief dependence must be placed on elimination or control of the dust.

In installing such equipment it is not only a matter of saving money and grief in the long run, but employ a competent engineer who understands the difficulties of collecting and disposing of palpable dusts or vapors, and can have a reasonable assurance of getting an effective installation without resort to the "cut and try" method.

Wm. A. Schmitt, Chicago, Ill., is a member of the American Society of Heating and Ventilating Engineers, and is a past president of the Chicago Chapter of the American Society of Heating and Ventilating Engineers.

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STANLEY H. KERNAW, PUBLER Editor
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1918 by National Safety Council, Inc. Printed in U.S.A. Published monthly.
 * An covered-class matter June 1, 1921, at the Post Office at Chicago, Ill., under the
 March 2, 1879. Additional entry at St. Joseph, Mich.

Subscription price to members for extra copies of the NATIONAL SAFETY NEWS
1 per year. Single copies, 40 cents. Reduced quantity prices for yearly subscrip-
tion single copies on request.

reprints are available only to members of the National Safety Council.
For Audit Bureau of Circulation.

magazine is indexed in the Industrial Arts Index.

Views and opinions advanced in signed articles are to be understood as individual views of their authors and those of the National Safety Council.

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