

FILE NAME: Allis Chalmers (ALL)

DATE: 1946 Nov

DOC#: ALL004

DOCUMENT DESCRIPTION: Article and Advertisements from Trade Journal – Southern Power and Industry

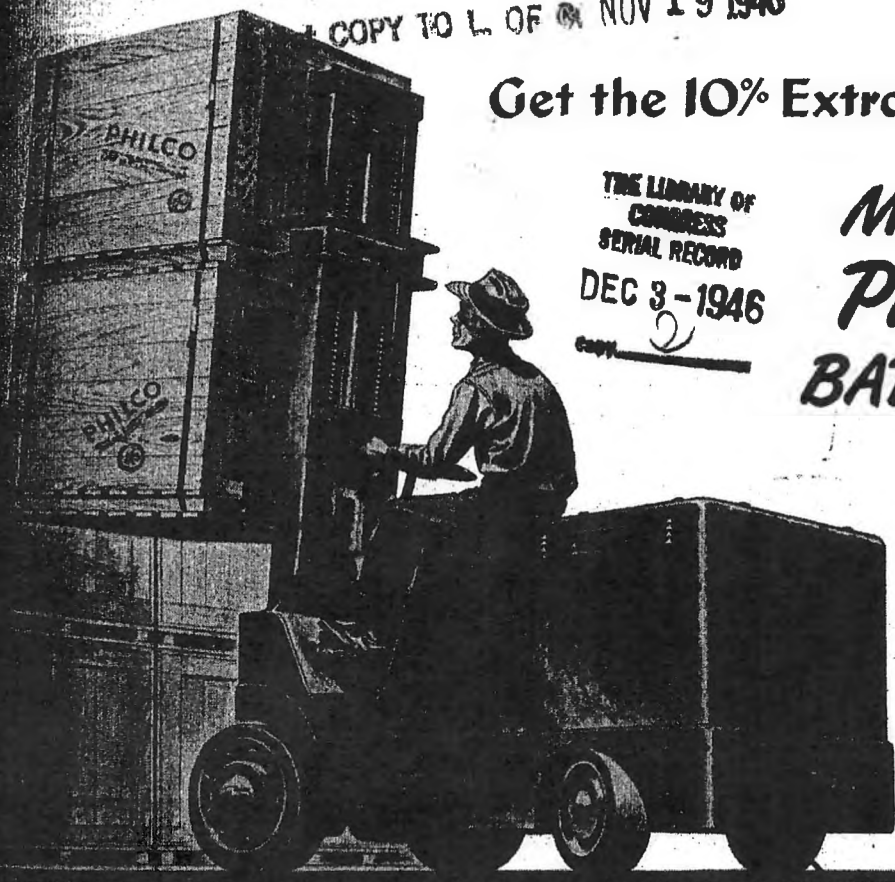
SOUTHERN POWER AND INDUSTRY

COPY TO L. OF NOV 19 1946

Get the 10% Extra Capacity in

**MODERN
PHILCO
BATTERIES**

THE LIBRARY OF
CONGRESS
SERIAL RECORD
DEC 3 - 1946
COPY

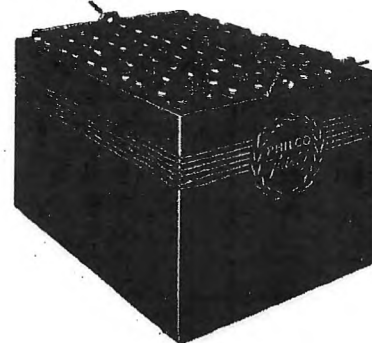


SALES AND SERVICE:

915-101 Marietta Street Bldg.
ATLANTA, GEORGIA
BIRMINGHAM • ST. LOUIS

and continuous work, Philco pioneered the modern extra capacity bat-
that provides 10% additional capacity with no increase in overall size.
great advantage, first made available in Philco Type XL and XVL
series, is an outstanding feature of the famous Philco "Thirty"... the
ery with 30% longer life. For today's heavier work schedules, make sure
the capacity you can get. Specify a modern Philco. Write for catalogs.

PHILCO CORPORATION, Storage Battery Division, Trenton 7, N. J.



PHILCO

FOR 50 YEARS A LEADER IN
INDUSTRIAL STORAGE BATTERY DEVELOPMENT

Grinn
comple
any, In
Island

L

ON

- For O
seventy
perty. C
night, be

TOBER

trial ex
ng your
ties be
efficient
require
dernize
ipment

catethe
of your
ts. After
Consult
sugges
n equip
ents in
omy.

l in the
specialists
rvice in
adations
ineers
e in re
s by in
or by
acilities

quipped
—steel
ineries
etcetera
al boiler
special

3.



Eugene W. O'Brien
Managing Director

Francis C. Smith, Editor

Hunter R. Hughes, Jr.
Associate Editor

Richard L. Priess
Southwestern Editor

W. E. Coogler
Production Manager

Business Representatives

L. Rogers, 18 East 48th St.,
Room 1904, New York 17,
N. Y.—Phone, Plaza 8-2565.

William K. Hoffman, 28 Bowdoin
St., Maplewood, N. J.—Phone
So. Orange 2-2484.

Wayard L. Durham, 67 Coving-
ton Road, Buffalo 16, N. Y.—
Phone, Amherst 6332.

E. C. Smith, 266 Auditorium
Building, Cleveland 14, Ohio
—Phone, Cherry 7352.

O. E. Johnson, 168 North
Michigan Ave., Chicago 1,
Ill.—Phone, Central 4131.

E. B. Chappell, Auditorium Bldg.,
427 West 5th St., Los Ange-
les, Calif. — Phone, Tucker
6368.

Richard L. Priess, 1341 Liberty
Bank Bldg., Dallas, Texas.—
Phone, Central 7673.

Annual Subscription—\$1.00
Canada—\$1.50; Foreign \$2.00

Published Monthly by

W. R. C. SMITH
PUBLISHING CO.

Publishers also of: *Cotton, Elec-
trical South, Southern Hardware,
Southern Automotive Journal,
Southern Building Supplies.*

W. J. Rooke, President; R. P.
Smith, Executive Vice-President;
T. W. McAllister, Vice-President;
E. W. O'Brien, Vice-President;
A. E. C. Smith, Vice-President;
J. C. Cook, Vice-President; O. A.
Sharpless, Treasurer; A. F. Rob-
erts, Secretary.

Editorial and Executive Offices

GRANT BUILDING
ATLANTA, GEORGIA

EVELAND
g and Ventilation
boats and Barge
or Transportation

BER, 1946

SOUTHERN POWER AND INDUSTRY

CONTENTS

Mechanical Handling of Cross-Ties, by A. M. Deiters	40
A Good Lunch Helps, by Francis C. Smith	46
Profits in Plant Layout, by Gregory M. Dexter	49
Progress in Candy Making, by R. A. Brock and F. W. Hayward	58
Hygienic Importance of Dust, by N. V. Hendricks	61
Centrifugal Boiler Feed Pumps, by Igor J. Karasik	65
Labor Turnover, by Phillip Panfield	74
Damage by Fly Ash Erosion, by Harry M. Spring	78
Electric Circuit Troubles, by Thomas Trail	84
A History of Power, by Carl J. Eckhardt, Jr.	86

PRACTICAL DISCUSSION

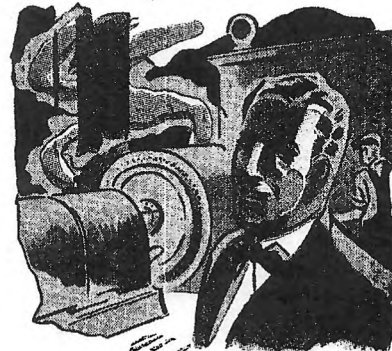
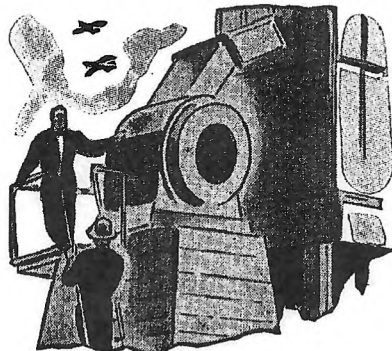
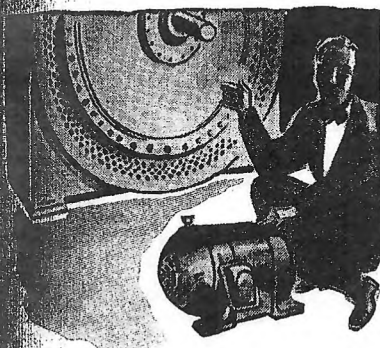
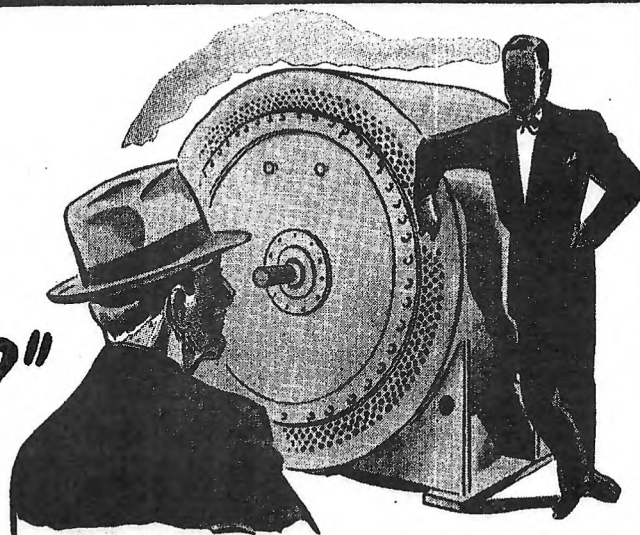
Routing, Operation Improved	92	Tight Bolt-Threads	94
Magnetic Street Cleaner	92	Ladder Aids Maintenance	94
Simple Air Manifold	92	Freezing Aids Repairs	94
Reading Meters and Gauges	94		

DEPARTMENTS

FACTS AND TRENDS	5	INDUSTRY SPEAKS	39
BUYERS' INFORMATION	6	NEWS OF THE MONTH	96
TIMELY COMMENTS	27	NEW EQUIPMENT	114
INDEX TO ADVERTISERS	134		

Copyright, 1946, by W. R. C. Smith Publishing Company

"Did You Say, Up to 2000 hp ...Weatherproof?"



"Right. In Allis-Chalmers' modern motor line we're now prepared to offer you a complete range of outdoor weatherproof, totally-enclosed motors all the way from small, standard ratings to sizes of 2,000 hp or larger."

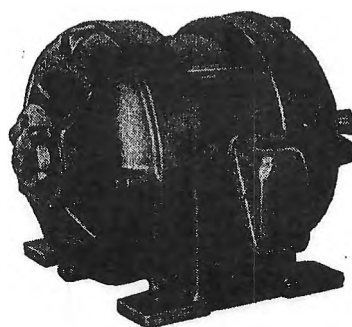
"Why, That Means Then," our customer exclaimed, "in larger ratings they fill the need of power plant engineers who want to install equipment like draft fans *outside*, and thus keep down structure costs per kw capacity." Right again—and they fit into *other* industries too!

Chemical, for instance. Here cast iron motors have generally been preferred ... because they stand up better under acid and alkali conditions. But now these *new* motors, with *new* design improvements, promise to provide several important operating advantages ...

Looking for a Good Motor?

SPECIFY "Allis-Chalmers"! For whether your job calls for a large motor like that above, or a small standard machine, you can be sure of getting two things when you specify "Allis-Chalmers:" 1) Exactly the right type and size motor; 2) consistent with the finest quality workmanship of which we are capable.

For the full story of liberal Allis-Chalmers motor construction, call our nearby dealer or sales office. ALLIS-CHALMERS, MILWAUKEE 1, Wis.



ALLIS CHALMERS

One of the Big 3 in Electric Power Equipment —
Biggest of All in Range of Industrial Products

We've Re-designed the heat-transfer system to improve ventilation. We've reduced maintenance by making air passages not only more accessible, but practically self-cleaning as well. And we've eliminated liquid and dirt-trapping pockets. In the smaller ratings we of course offer our standard design.

RE-
out con

ES—Bul
- Explain
regulation
1 — also
fferential
— THE
1 Euclid

S—Bulle
pl valve
ication in
ing, open
HOLSON
Pa.

R—Bulle
e advan
ra. giving
instru
boilers,
in power
quids, no
es up to
MPANY,

—Bulle
eters in
in open
ss, sludge
mechanical
wide se
binations
grating.—
100 Road

S—Bulle
for devel
ty in de
achines.—
ve., New

letin NL
ne design
phon bel
its, open
tic.—THE
4, Tenn.

J, 6 pages
or pages
wrenches
plicability
Industrial
& GAGE

2006, 24
record
tric type
of steam
ds.—THE
5 Wayne

R, 1946

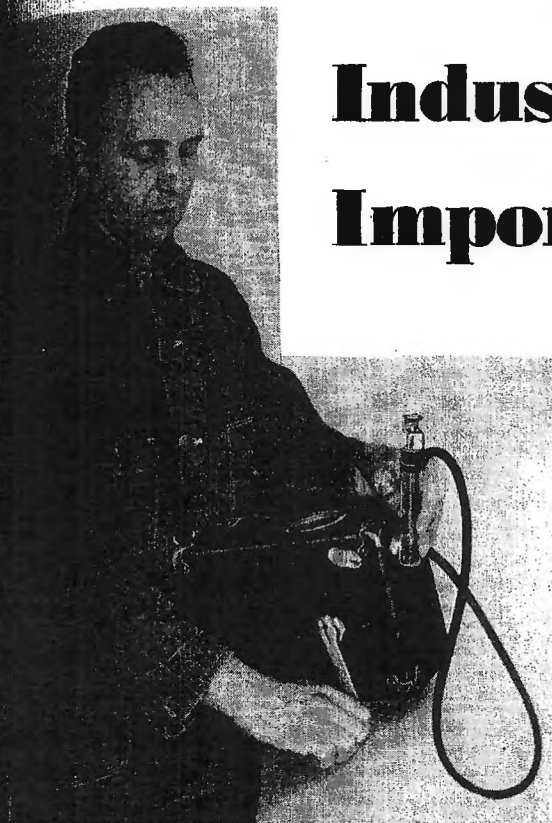
Industrial Hygiene

Importance of Dust

By N. V. Hendricks

Chief Engineer Industrial Hygiene
Service, Georgia Department
of Public Health

*Nearly all types of modern
industry are concerned
with dust and its control.*



Courtesy M. S. A. Co.

FIG. 1. THE MIDGET IMPINGER USED FOR COLLECTING ATMOSPHERIC DUST SAMPLES.

THE annual cost to industry from uncontrolled dust amounts to a staggering figure. In many cases the problem of dust is dismissed by management as only a nuisance. In other plants, the recovery of certain dusts is economically sound, especially where the particulate matter may contain precious metals or may carry valuable processing stock. Aside from any nuisance or economic loss resulting from the escape of dust there are certain dust exposures which may result in acute health hazards. This is especially true of dusts containing a high percentage of free silica, asbestos, and other toxic materials. Where health considerations are involved in such exposures, legal aspects present themselves. In most states where occupational diseases are compensable, specific coverage is given to those disabilities resulting from the inhalation of silica dust.

Definitions

Many times true dusts are confused with fumes, smokes, mists, and fogs. In order to differen-

tiate between the origin of these materials, a definition of them is in order.

DUSTS are formed by the reduction of earthy materials and are usually produced by such operations as crushing, grinding, buffing, etc. The particle size of dusts may vary considerably, ranging from sub-microscopic to visible.

FUMES are formed by condensation and sublimation. Chemically, they are metallic and are usually the oxides of such metals as zinc, and lead. The particle size is usually below one micron.

Smoke comes from the burning of organic material and its particle size is usually less than one-half micron.

Mists and Fogs result from the condensation of water vapor on suitable nuclei, and the particle size will vary with given conditions.

General Properties

As a substance is reduced in particle size, there are certain general properties of the material which are changed. On breaking up a solid into finely divided particles, the surface area is greatly enlarged and therefore the space

occupied is greatly increased. As an example, a piece of quartz one centimeter on each side when crushed to where the particles of one micron in size will present a system containing 10^{12} number of particles. The total surface area will be 6 square meters. If these dust particles are dispersed onto the atmosphere in such manner that the concentration will be 100 million particles per cubic foot, the space occupied by this dispersed system will be 10 thousand cubic feet.

The chemical activity of a solid is considerably increased by a reduction in particle size. Thus the rate of oxidation is increased as is evidenced by occasional disastrous dust explosions. The phenomena of adsorption becomes more important as gases are more easily adsorbed on the surface of the smaller particle.

From the standpoint of health hazards resulting from dust exposures, the physiological properties of dust vary somewhat with the particle size. It is an accepted fact that with exposures to silica dust, the smaller the particle size, the greater the hazard.

Physiological Response

Drinker has summarized the reactions resulting from the inhala-

tion of dust by classifying the response into four groups. These are:

(a) **Pneumoconiosis**—The dusts producing this type reaction are harmful only when inhaled. The principal materials producing this type reaction are free silica and asbestos dust. On inhalation, these two materials produce specific lung pathology and from the standpoint of disability, present the most important of the dust exposures.

(b) **Toxic Reaction**—(As poisoning by lead, cadmium or radium) These materials produce harmful effects when taken into the body both by inhalation and ingestion. With reference to lead and its compounds which may be present in the atmosphere as particulate matter, it has been fairly well established that entrance into the

body by inhalation is more important mode of entry than the same material taken by mouth. This is primarily due to the fact that when such materials are taken into the body by inhalation, the major portion is taken into the blood stream, whereas, a considerable part of that taken by mouth is removed by certain organs of the body.

(c) **Metal Fume Fevers**—These conditions result from the inhalation of finely divided fume particles. The importance of metal fume fever has been brought to the attention of industry by the great amount of welding which has been an important industrial tool for the past few years. Where burning or welding is done on surfaces which have been galvanized, the problem of metal fumes becomes immediately important.

This is also a problem in foundries where the pouring of brass is done.

(d) **Allergy**—This type reaction is in general produced by pollen and certain organic dusts.

Common Industrial Dusts

Carbonates are usually combined with either calcium or magnesium. They normally occur in nature as calcite and magnesite or as dolomite, which contains both magnesium and calcium in the carbonate. Limestone and marble contain considerable amounts of these carbonates. In the manufacture of cement, these do the materials from which cement is made.

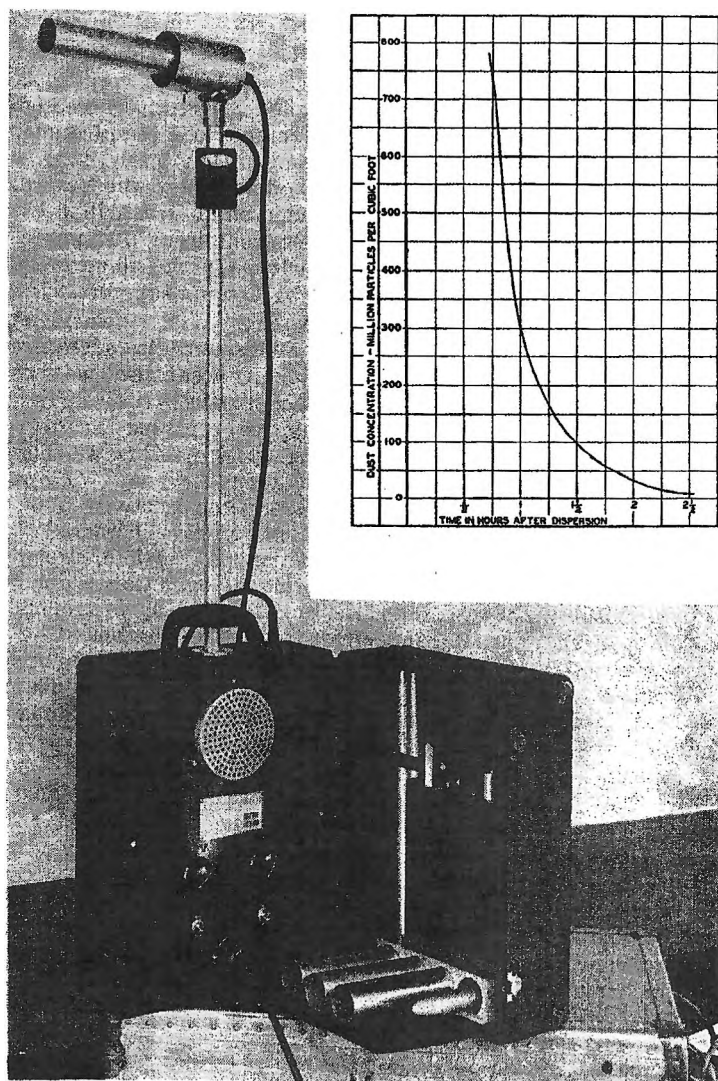
Due to the solubility in fluids, these materials are removed when taken into the body by inhalation. The presence of carbon dioxide in such fluids is an important factor influencing solubility. The same thing applies to the presence of carbon dioxide in water which comes into contact with these materials. In the presence of carbon dioxide the carbonate is converted to the more soluble bicarbonate, thus adding to the ease with which it is removed by solution.

Experimental and practical observations on carbonate dusts indicate that these materials are not harmful when taken into the body by inhalation. This is probably due to the fact that they are easily removed due to their solubility.

Sulfates are common industrial materials and this general class may be illustrated by gypsum which is calcium sulfate. This is a common material and is widely used in many industrial operations. It is generally considered that this type material is non-toxic and does not present any particular problem from a health standpoint.

Oxides vary considerably in their physiological reactions. In general the nature of the reaction will be dependent on the metal from which the oxide is derived. Where such metals are specifically toxic, as would be the case with arsenic or lead, a specific toxic reaction could be expected from the inhalation of the oxide. However, other oxides appear to be relatively harmless, particularly where the metal is of a non-specific type. This is the case of iron oxide. The mining of iron results in the exposure of a large number of men to the oxides.

FIG. 2. THE ELECTROSTATIC PRECIPITATOR AS USED FOR COLLECTING ATMOSPHERIC SAMPLES OF DUST AND FUMES. INSERT SHOWS RATE OF SETTLING OF DUST.



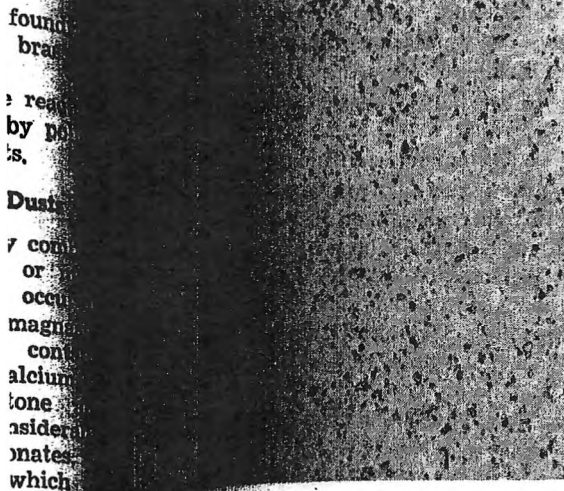


FIG. 3. GEORGIA KAOLIN DUST MAGNIFICATION 130X.

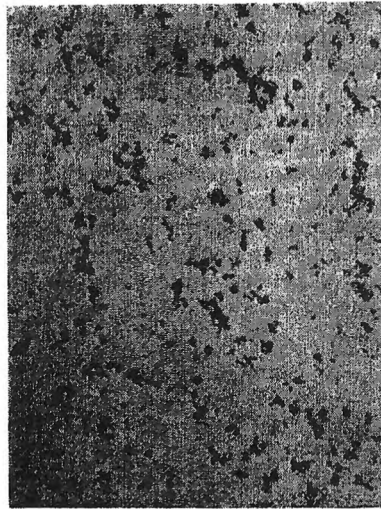


FIG. 4. QUARTZ DUST (SiO_2) MAGNIFICATION 130X.

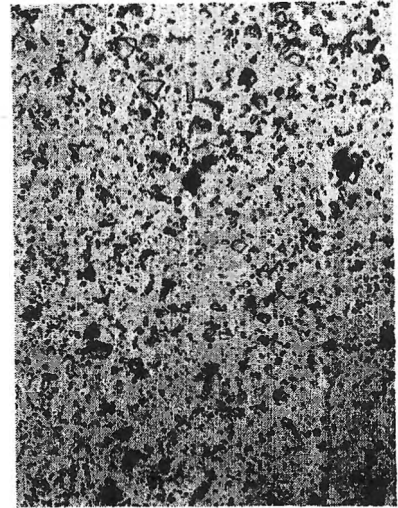


FIG. 5. CALCIUM CARBONATE DUST MAGNIFICATION 130X.

in body. However, it appears that exposure to the dust of iron does not produce pathology unless such exposure is accompanied by the pressure of free silica. The mining of coal results in exposure to coal dust which contains a high percentage of carbon. Detailed studies of exposure to coal dust have been made by the U. S. Public Health Service and other agencies. It has been found that, in general, coal dust is retained in the lungs only when such dust contains a high percentage of free silica. Although coal dust may be deposited in the lungs of exposed individuals, the condition resulting is usually not considered disabling unless silica is present.

Silicates make up an important class of industrial materials and are used principally in the production of ceramics and similar materials. Talc, kaolin, mica, clays, etc., are chemically silicates and their widespread industrial application results in a great number of employees being exposed to this type dust. With the exception of asbestos, which is a silicate, this general class of materials does not appear to produce a disabling condition, except in isolated cases, when taken into the body by inhalation.

Asbestos is the only silicate known at the present time which produces a lung pathology comparable with that resulting from exposure to silica dust. Of all the dust found in industry, probably the most important is free silica or silicon dioxide. It occurs in the form of quartz, flint, sandstone, and chert; and is associated with many other minerals and ores. The disabling condition resulting from the inhalation of free silica is known as silicosis and has long been a problem with industries such as stone cutting, granite, foundry, abrasive, and the like, where silica is used in processing. There are relatively few industrial operations which might result in direct exposure to pure silica dust. The importance of silica lies in its association with other materials. As an example, in foundry operations the dust generally will contain clay and materials of a non-silicious character, so that the actual percentage of free silica may be relatively low. This is also true in exposures to coal, iron oxide, and the mining of ores. When hard rock or silica is present, these dusts become important mainly due to the presence of silica rather than to the inherent properties of the parent material.

Factors Influencing Hazards

In evaluating the exposure to a dust there are several factors which should be taken into consideration. The duration of exposure is important, as it will indicate in a general way the total amount of dust which might be expected to have entered the body. Obviously other factors enter into such an evaluation of total dustiness, and these will be discussed later. History of past exposure is important. This is particularly true where an individual is exposed to silica dust. This point is of extreme importance to industry due to the fact that a worker may have contracted silicosis under a

previous employment. Where such a condition exists, the desirability of preemployment examination is obvious.

The concentration of dust breathed is important as this, within certain limits, will determine the possibility of development of dust diseases. Considerable research and practical observations have been made in the field of dust exposures to correlate clinical findings with atmospheric concentrations. For free silica, asbestos, and some of the other materials, fairly definite standards have been established. The nature of dust is important primarily from the standpoint of free silica content. This is particularly true of mixed dusts which constitute the majority of industrial exposures. The volume of air breathed enters into the picture as it directly influences the amount of dust which will be taken into the body. The rate of respiration or amount of air breathed in general will be determined by the physical effort required on the particular job. Where heavy work is being done, naturally an individual will require more ventilation than where less physical effort is involved.

Dust Measurements

In addition to the factors influencing dust hazards, it is necessary to make direct dust measurements in order to obtain a true evaluation of any dust exposure. Such measurements are made by the actual collection of dust samples, the counting of the dust particles, and by the identification of the materials making up the dis-

persed system. For the collection of dust samples, several instruments may be employed.

Much of the early work done on the control of silicosis in the mining areas of South Africa was carried out with the Konimeter. This instrument has been used some in this country, however, it has not met with the popularity which is enjoyed by certain other methods. From the standpoint of collecting efficiency, the electrostatic precipitator is probably the choice instrument, however, most of the work done on correlating atmospheric dust concentrations with medical findings has been based on samples collected and counted by the Greenburg-Smith technique. The collecting device employed is an impinger unit which samples at the rate of one cubic foot per minute.

Counting by this technique is done under light field. The percentage of free silica in a dust sample is usually determined by either chemical or petrographic methods.

Permissible concentrations of dust have been established for free silica, asbestos, and other materials. For both silica and asbestos, 5 million particles per cubic foot is considered as maximum working concentration. The U. S. Public Health Service has suggested a procedure by which the total dust concentration in millions of particles per cubic foot is multiplied by a percentage of free silica. If the resulting figure is more than 5 million particles per cubic foot, the condition is considered unsafe. If less than 5 million, the condition is considered safe. There should be considered certain limits of dustiness for any type of dust,

whether it be merely a nuisance value or health consideration. To most industrial hygienists, 50 million particles per cubic foot is the maximum atmospheric concentration of dust under which an employee should work. It should be pointed out that the only way of determining both the nature of the dust and the actual concentration is by direct sampling and similar procedures for the counting of dust.

Case History

MANY industries having problems of dust control recognize the existence of such problems to varied degrees. Some take passive attitudes, while others apply sound engineering procedures which result in a real job of dust control. Such modern engineering methods are used by the LeTourneau Company of Toccoa, Georgia.

This particular plant manufactures heavy road grading equipment and its major dust problem lies in operation of a foundry for the protection of basic steel parts. It is interesting to note that this Company considers the control of dust as a part of the general overall production schedule and as a result has its control methods integrated into general plant operations.

Although there are several methods which can be used for control of dust, ventilation, both in the form of general and local exhaust, probably offers the most satisfactory method and it is this approach which has been used by the LeTourneau Company. For general ventilation in the foundry,

two 15-foot fans are installed which handle 500 thousand cubic feet per minute each. Actually the material removed by these fans is made up principally of smoke rather than true dust.

Two electric arc furnaces are operated and these are equipped with roof fans located immediately above the units. These fans handle 60 thousand cubic feet per minute each. Again, the major portion of the material coming from the arc furnaces is smoke rather than true dust, and comes from the alloy and flux material charged into the furnaces.

A problem of dust control in a foundry is the shakeout operation. This is particularly true where shakeout is mechanical and is handled on a vibrating screen or grate. Here, a line conveyor system is used to bring the casting directly to the shakeout grate. A canopy type hood is installed immediately over the grate itself. In addition to canopy, side enclosures are provided which prevent air leakage. The fan serving this hood delivers 35 thousand cubic feet per minute, which results in a high capturing velocity at the entrance and discharge ports. An excellent job of dust control results on this particular operation.

Sand conditioning in many foundries is a dusty job. With the LeTourneau Company this is handled by means of local exhaust ventilation and three bag type filters handling 6 thousand cubic feet per minute each. Tumbling operations for cast cleaning are also provided with local exhaust ventilation.

(Continued on page 80)

FIG. 6. LOCAL EXHAUST ON TUMBLERS FOR CAST CLEANING.

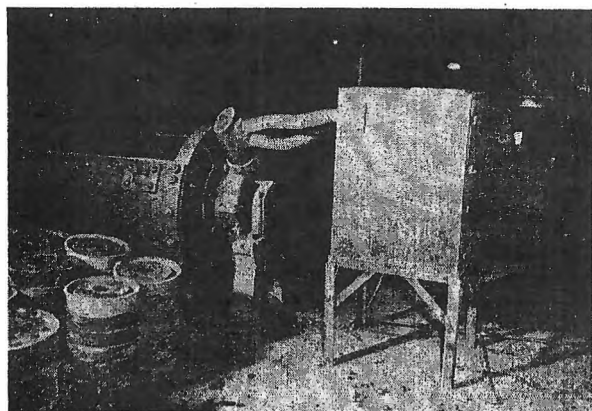
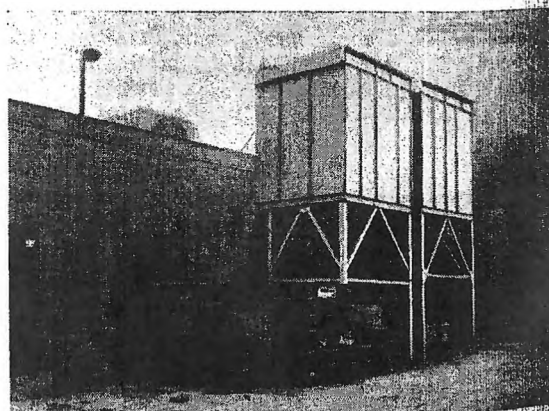


FIG. 7. BAG HOUSE AND SAND BLAST UNIT FOR CAST CLEANING.

Courtesy LeTourneau



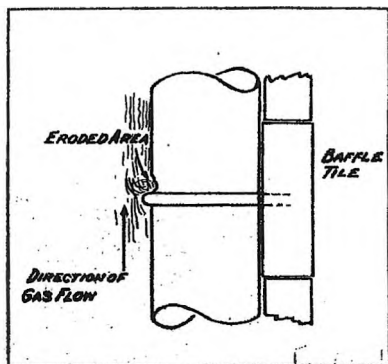


FIG. 3

at least 75%. Figure 2 shows the condition of the tube that failed.

Other tubes were found eroded adjacent to U bolts holding baffle tiles. The U bolts provided sufficient interruption in gas flow to cause eddy currents and localized impingement. (Fig. 3.)

Erosion by particles of fly ash

and unburned fuel has also been found in stoker-fired boilers.

At the time of each shutdown for cleaning and preventive maintenance (at least once every four months), all areas vulnerable to erosive attack should be examined. Areas most susceptible are:

1. Where flow of gases makes a turn throwing out particles of solids.
2. Behind any cracks, breaks, or gaps in a gas baffle.
3. Adjacent to any projection that might divert normal flow of gases.

Should the boiler be provided with an induced draft fan, observe the condition of the blading. Abnormal wear may be indicative of erosive attack in the boiler.

Careful attention by all engineers to the problem of erosion may well prevent a serious accident.

Candy Making

(Continued from page 60)

not be taken for granted, a chemical laboratory is essential.

The Brock Candy Company is now in the process of constructing a modern chemical laboratory and training a technician to perform control analyses. The laboratory, which is located in a large air conditioned room near the candy cooking operations, is equipped with modern stone-topped laboratory benches, the latest chemical glassware, and such special analytical instruments as balances, vacuum oven, refractometer, and pH meter. Provision has been made for such analyses as moisture, invert sugar, viscosity, pH, melting point, and refractive index. Many of the control tests have been developed specifically for the Brock Candy Company, and new procedures will be added from time to time as the need arises.

The Industrial Research Institute of the University of Chattanooga has cooperated with the Brock Candy Company in selecting the equipment, outlining and developing analytical procedures, and training a technician to operate the control laboratory. A research

project on improvement of the quality of candy has been sponsored by the Brock Candy Company at the Industrial Research Institute of the University of Chattanooga.

Since all raw materials will be analyzed and tested in the company laboratory, variation in properties will be detected before the material is used. This procedure will assure products of uniform quality, since inferior raw materials will be discarded and formulations will be based on the actual analysis of high grade raw materials rather than on standard procedure which do not make allowance for variation in the ingredients. Analysis and testing will assure high quality of finished products and permit any difference in quality to be detected. In this way, any unavoidable errors in manufacture can be corrected and adequate controls instituted to prevent their reoccurrence.

The facilities of the control laboratory will also be available for the evaluation of research and development work being carried out in the factory. In addition to maintaining the production of uniform high quality products, the personnel and equipment of the control laboratory will be available for many other technical assignments

in the plant.

The modernization program of the Brock Candy Company is taking place at a time when any product, regardless of price or cost, can be sold. The real bottlenecks today are shortages of materials and skilled personnel. However, progressive business men know that these conditions are only temporary and that in a few years, companies which do not guarantee quality will not be able to sell their products. The Brock Candy Company will continue to be a leader in its field because it has refused to sacrifice quality of its products in hard days when consumer demand is greater than the supply of raw materials and because it has inaugurated a program of development and research which will result in constant improvements.

Dust

(Continued from page 62)

tion and dust arrestors as is shown in the photograph. Note that the dust is applied through the trunnion of the tumbler.

In foundry operations or in other industrial type processes, housekeeping is an important factor influencing the generation of dust. This foundry employs a five horsepower vacuum cleaner for floor maintenance. By this procedure loose dust, sand, and chips, like, is removed from the floor and is not projected into the atmosphere by the movement of machinery, scuffing of feet, and the like. This is one impressive point in the operation of this particular foundry. Excellent housekeeping is combined with a good procedure for materials handled.

In all of the attempts at dust control at the LeTourneau Company, employee cooperation is obtained. Employee cooperation comes through planned program of employee education and employee participation in affairs involving the health of the worker.

Periodic dust samples collected in the LeTourneau foundry indicate atmospheric concentrations at various operations well below what is considered as maximum safe working limits.

ADVERTISER'S INDEX

The Advertisers' Index is published as a convenience, and not as a part of the advertising contract. Every care will be taken to index correctly. No allowance will be made for errors or failure to insert.

A

Airetool Mfg. Co.129
Alken-Murray Corp.100
Allen Bradley Co.
Allis-Chalmers Mfg. Co.9
Allpax Co., Inc.124
Aluminum Co. of America
American Blower Corp.32
American Coal Burner Co.133
American Engineering Co. (Holsts)....35
American Engineering Co. (Stokers)....
American Monorail Co.38
American Pulverizer Co.110
Anaconda Wire & Cable Co.33
Anderson Co., V. D.119
Arkansas Fuel Oil Co.
Armstrong Machine Works85
Asbestos Textile & Packing Div.,
Raybestos-Manhattan Corp.
Audel & Co., Theo.130
Automatic Transportation Co.29

B

Babbitt Steam Specialty Co.130
Babcock & Wilcox (Boilers)
Bailey Meter Co.
Baldwin-Duckworth Division
Bay State Abrasive Prod. Co.
Beico Industrial Equip. Division....
Belmont Packing & Rubber Co.106
Betz, W. H. & L. D.31
Bird Archer Co.
Black-Sivalls & Bryson101
Blaw-Knox Co. (Grating Division)....
Brad-Foote Gear Works
Brown Instrument Co.28
Brownell Co.
Buell Engineering Co., Inc.91
Builders Providence, Inc.127
Busseman Mfg. Co.82 and 83

C

Carlisle County Ice Co.132
Carolina Refractories Co.130
Chapman Valve Mfg. Co.36
Chicago Bridge & Iron Co.117
Cities Service Oil Co.
Clark Mfg. Co.11
Classified Ads132
Cleveland Chain & Mfg. Co.123
Clippert Belt Lacer Co.
Cochrane Corporation104
Combustion Eng. Co., Inc.14 and 15
Combustion Equipment Div.
Continental Gin Co.103
Crane Company23

D

Dart Mfg. Co., E. M.102
Davis Regulator Co.131
Dayton Rubber Mfg. Co.
De Laval Steam Turbine Co.
Detroit Stoker Co.
Dravo Corporation (Heater Dept.)....89
Dravo Corporation (Power Dept.)2

E

Eagle-Picher Co.95
Edge Moor Iron Works, Inc.4
Edward Valves, Inc.
Elgin Sulfener Corp.135
Engineer Co.128
Ernst Water Column & Gage Co.
Everlasting Valve Co.

F

Fedders-Guigan Corp.114
Fisher Governor Co.
Flexible Steel Lacing Co.128
Flexitallic Gasket Co.
Foster Wheeler Corp.79
Frick Company125
Fulton Siphon Co.97
Fyr-Feeder Industrial Stokers133

G

Gardner-Denver Co.
Garlock Packing Co.27
General Coal Co.
General Electric Co.87
Golden-Anderson Valve Specialty Co. 133
Goulds Pumps, Inc.
Gould Storage Battery Corp.
Greene, Tweed & Co.112
Grinnell Co.Back Cover
Griscom-Russell Co.
Gulf Oil Corp.105

H

Hall Laboratories, Inc.20 and 21
Hercules Float Works120
Hoffman Combustion Eng'g. Co.
Homestead Valve Mfg. Co.111

I

Industrial Electronics Co.126
Ingalls Iron Works Co.
International Exposition Co.18
International Nickel Co., Inc.
Iron Fireman Mfg. Co.

J

Jenkins Bros.Inside Back Cover
Johns Manville71
Johnson Service Co.
Jones Foundry & Mch. Co., W. A.

K

Kewanee Boiler Corp.
Kirk & Blum Mfg. Co.24

L

Layne & Bowler, Inc.124
Leslie Company
Liberty Engineering & Mfg. Co.24
Lille Hoffmann Cooling Towers, Inc. 131
Lincoln Electric Co.
Link Belt Co.17
Liquid Conditioning Corp.
Lummus Company
Lunkenhelmer Co.30

M

M & H Valve & Fittings Co.
Manzel Brothers Co.123
Marion Machine Fdry & Supply Co.124
Marsh Corp., James P.
Mason-Neffan Regulator Co.
Medart Company121
Midwest Piping & Supply Co., Inc.99
Moccasin Bushing Co.127
Monarch Fuse Co., Ltd.
Morse Chain Co.25
Murray Iron Works Co.116
Murray Mfg. Co., D. J.126

N

National Aluminate Corp.1
National Boiler Protector Co.118
National Valve & Mfg. Co.26
Niagara Blower Co.
Nicholson & Co., W. H.130
Northern Equipment Co.34
Norton Co.
Nugent & Co., Inc., Wm. W.

O

Oakite Products, Inc.122
Otis Elevator Co.16

P

Peabody Engineering Corp.
Peerless Pump Division
Permutit Co.
Philco CorporationFront
Pittsburgh Piping & Equipment Co.
Pibrico Jointless Firebrick Co.
Powell Co., Wm.
Power Show, 17th National
Powers Regulator Co.
Pratt Daniel Corp.
Pritchard & Co., J. F.

Q

Quaker Rubber Corp.

R

Raybestos-Manhattan Corp. (Asbestos Textile & Packing Division)
Refinery Supply Co.
Reliance Electric & Engineering Co.Inside Front
Republic Flow Meters Co.
Republic Rubber Division
Richardson Scale Co.
Ross Heater & Mfg. Co.
Roto Division
Round & Son, David

S

Sarco Co., Inc.
Shaw Co., Benjamin F.
Shell Oil Co., Inc.
Shepard Niles Crane & Hoist Corp.
Sinclair Refining Co.
Skinner Engine Co.
Smith, Inc., Winfield H.
Smooth-On Mfg. Co.
Snap-On Tools Corp.
Socony-Vacuum Oil Co.
Southern Natural Gas Co.
Southern Railway System
Southern Supply & Equip. Co.
Squires Co., C. E.
Standard Oil Co.
Strong, Carlisle & Hammond Co.
Sturtevant Co., B. F.
Syntrol Company

T

Taylor Forge & Pipe Works
Terry Steam Turbine Co., The
Texas Co.
Todd Shipyards Corp.
Trico Fuse Mfg. Co.
Troy Engine & Machine Co.

U

U. S. Hoffman Mch. Co.
United States Rubber Co.

V

Voss Co., J. H. H.
Vulcan Soot Blower Corp.

W

Want Ads
Warren Steam Pump Co., Inc.
Watchmoke Optical Co., Inc.
Webster Engineering Co.
Westinghouse Electric Corp.
Wheeler Mfg. Co., C. H.
Wilson, Inc., Thomas C.
Wing Mfg. Co., L. J.
Wrigley Jr., Co., William

Y

Yarnall-Waring Co.