

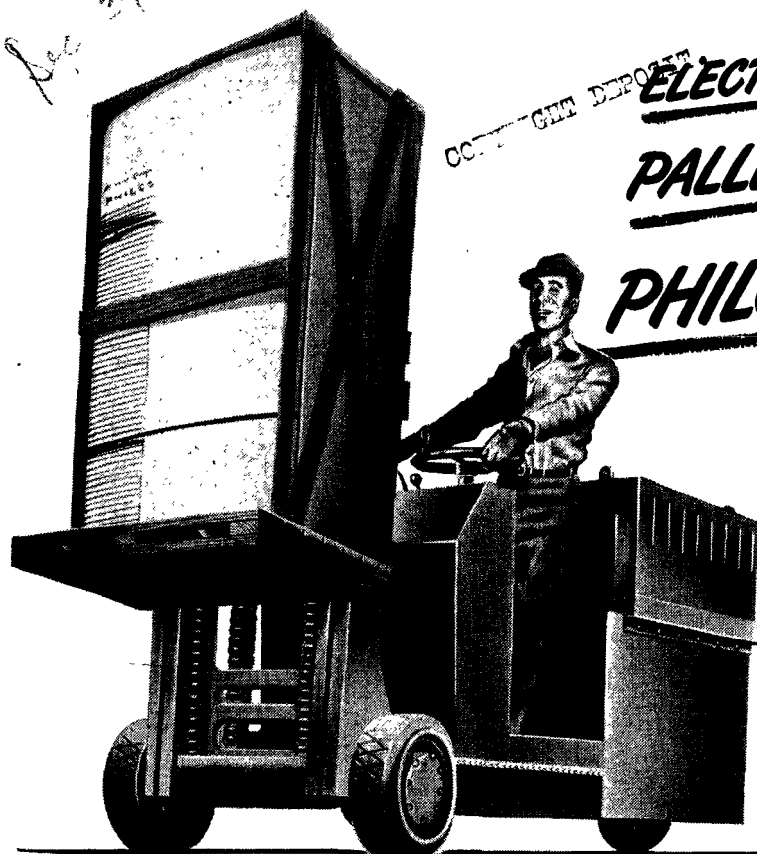
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SOUTHERN POWER AND INDUSTRY



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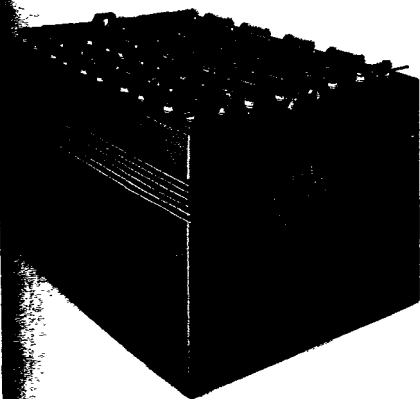
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**GRANT BUILDING
ATLANTA, GEORGIA**

SOUTHERN POWER AND INDUSTRY

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INDUSTRIAL HYGIENE

Control of Working Environment is Important

This third installment is a discussion of the working environment — its problems, their evaluation, and recommended control.

EVERY important factor influencing our lives and one which is given little consideration is the environment in which we work. The general environment dictates our requirements as to the clothes we wear, the food we eat, and to a certain extent our mode of living. The average individual will spend at least eight hours a day at some occupation. The remaining portion of the day is usually spent at home. It is obvious that two distinct problems of environment exist: the home or community, and the working environment.

There are certain safeguards thrown about the community as providing safe drinking water, proper sewage disposal, collection and disposal of other wastes including garbage, and immunization programs. The importance of these protective procedures in a community has been long recognized. Their accomplishment is measured in terms of reduced death rates from various communicable diseases. Some diseases which in the past have taken great toll of life

By N. V. Hendricks

Chief Engineer Industrial Hygiene
Service, Georgia Department
of Public Health

have by these methods been reduced to a point of minor significance. As civilization has progressed with an accompanying complexity in our living, the necessity for public safeguards in the community has been given more and more consideration. It is only through these approaches that the proper public health measures for the community environment can be applied.

For a number of years, consideration has been given to the development of certain methods by which the working environment of an individual may be modified or adjusted to more healthful working conditions. Many plant operations by the very nature of the materials processed and by the mechanics of the operation produce an atmosphere of toxic or

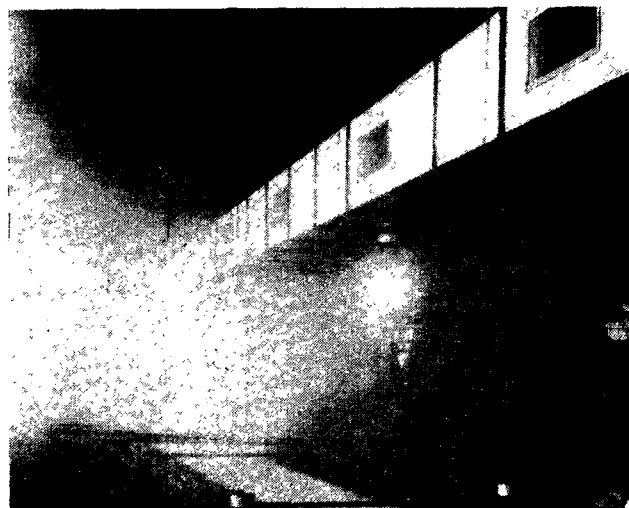
otherwise harmful substances. The final objective in any industrial hygiene program is the alleviation of health hazards incident to industrial operations by the use of scientific methods.

Occupational Diseases

Industrial operations require the use of many materials, some of which are toxic and produce harmful effects on individuals who are exposed to them. In addition, there are certain physical conditions which exercise harmful effects on the worker. The deleterious effects produced by these materials and conditions may, in a broad sense, be termed occupational diseases.

In some states, industry has been legally responsible for the effect on the worker which is brought about from such exposures. Where legal responsibility has been designated, codes or schedules have been established for a rate of compensation covering occupational diseases. Such codes vary from all inclusive loss to those which cover only specific occupational diseases.

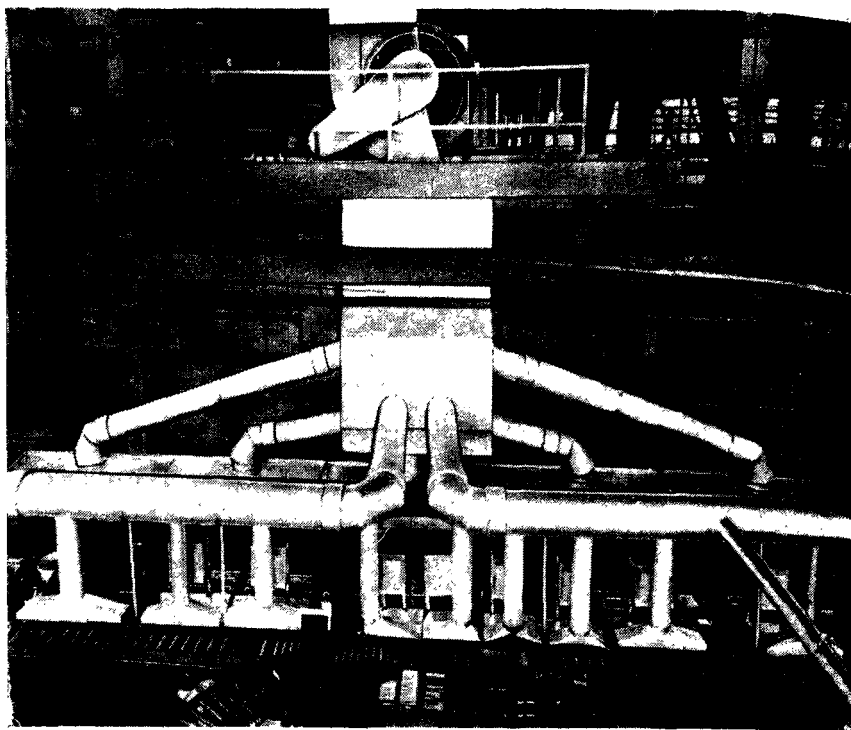
BEFORE AND AFTER INSTALLATION OF VAPOR ABSORPTION SYSTEM IN MERCERIZING DEPARTMENT OF BLEACHERY AND DYE WORKS.



In considering the potential development of occupational diseases and the responsibility and cost incident, management cannot escape the fact that the condition of the working environment is an economic factor expressed in terms of the overall cost of production. Proper consideration to the status of the environment, in many cases, will directly lower the cost. Recognizing these facts, management should take every possible means of improving and controlling the working environment. For many occupational diseases there is no known medication and the logical method of control is the adjustment of the working environment in order that the exposure from which occupational diseases result may be removed.

Processing And The Environment

The working environment in any plant will be dependent on these factors: (1) materials, (2) processing methods, and (3) process equipment. Many of the raw and processing materials used in industry are specifically toxic and toxic compounds are often liberated as by-products of certain operations. In any case, the type material and its presence in the working atmosphere will determine the existence of a hazard. Fortunately most processing materials are non-toxic. However, with many industries it is impossible to avoid the use of certain specific compounds which



FUME REMOVAL SYSTEM FOR EXHAUSTING FUMES FROM PICKLING TANKS.

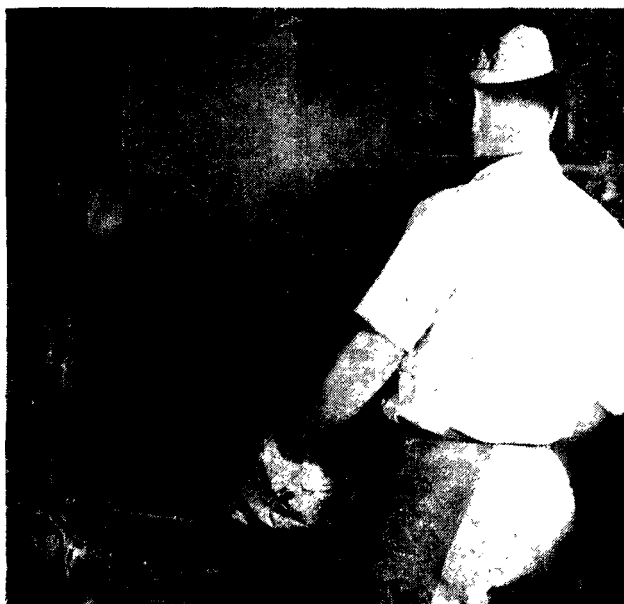
are known to produce harmful effects on individuals exposed to them.

The method of processing is important as it will determine the extent to which materials are dispersed into the working atmosphere. Important factors associated with process methods include: (1) temperatures required for various operations, (2) agitation and other mechanical details, and (3) specific operations where

by-products are formed and liberated.

Equipment plays an important role in determining dispersion since the design of such units may call for open or closed operations, rotation at high speed or close or frequent observation on the part of the operator. Specific design would determine the extent to which certain control installations such as local exhaust ventilation might be applied.

OPERATOR EMPTYING BAG OF CARBON BLACK INTO BANBURY MIXER BEFORE AND AFTER INSTALLATION OF DUST AND FUME REMOVAL SYSTEM.



Environment Problems

Of importance to industry is the matter of controlling dust. Fortunately, there are relatively few types of dust which are specifically toxic. The more important from an industrial standpoint are silica, asbestos and finely divided salts of toxic metals, such as lead.

Silica and Dust

Exposures to free silica are more important from the standpoint of population exposed and deserve more consideration than those to asbestos dust. However, asbestos dust is just as toxic as free silica. Wherever sand or materials containing free silica are processed, exposure to the dust is likely to result. This is especially true in foundry operations, abrasive cleaning, blasting, and the like. Sufficient exposure to concentrations of free silica often results in the production of fibrotic growths in the lungs of the exposed individual. This condition is known as silicosis and is one of the prime disabling occupational diseases and has cost industry considerable sums of money for compensation.

Asbestos dust although specifically toxic, does not result in a numerically great number of exposures due to its infrequent industrial applications. However, in the production of asbestos cloth and other products, a serious problem of dust control is presented.

Certain heavy metals and their salts produce specific toxic reactions. Many industries employ lead and cadmium, and their application to plant operation usually results in the creation of an actual or potential exposure. Lead compounds are particularly important in such operations as the manufacture of storage batteries, printing industries, and the production of paints or pigments.

Gases

Gases are usually classified as either asphyxiant or irritant. Industrially the more important asphyxiants include carbon monoxide, hydrogen sulfide and hydrogen cyanide. Of these, carbon monoxide occurs more frequently. This gas is associated with the combustion of carbonaceous materials and is ex-

tremely toxic. On entry into the body it exerts an affinity for hemoglobin which is about 300 times the affinity of oxygen resulting in a tremendous decrease in the ability of the blood to carry oxygen and produces a condition of asphyxia.

The more common irritants found in industry include sulfur dioxide, chlorine, ammonia, and the oxides of nitrogen. Although these gases are extremely toxic, they are sufficiently irritating so that the individual exposed usually has some warning as to their presence. Under these conditions the worker can normally remove himself from the exposure before too much damage is done. However, these materials do occur frequently in industry and the importance of exposures to them should not be minimized.

Vapors

Vapors come from organic compounds both of the aliphatic and aromatic series. They play a tremendously important part in modern production and their number and use is limited only by the ingenuity of the chemist. They are used widely as degreasing agents, intermediates, solvents and cleaning compounds.

Most of these materials are excellent fat solvents, and on entry into the body tend to go to the nervous system. This is true of the aliphatic series, including distillates and petroleum. From the standpoint of pure toxicity, probably the most important of these materials would include benzol, its homologues and the chlorinated compounds. Sufficient exposure to these compounds results in chronic disturbance and in some cases disability.

Mists

Acid and alkaline mists are associated with plating, stripping and cleaning. Chromic acid mist is probably the most important of this class of material and results from electroplating, anodizing and similar operations. Exposure to such mists may result in perforation of the nasal septum, and if cuts or abrasions are present on the exposed parts, ulcers may develop.

Fumes

Fumes are usually associated with welding, cutting, or other operations where metals are heated to high temperatures. From an industrial standpoint, lead, zinc, and cadmium are probably the most important. Atmospheric fumes of this type are often found around pouring of brass, welding or burning of galvanized metal or on high temperature operations involving surfaces coated with lead bearing paint.

The physiological response to the inhalation of these materials may vary considerably. The less serious condition is known as metal fume fever which carries symptoms of zinc oxide. It is of short duration and no permanent tissue damage is done. The more serious conditions arise from the exposure to fumes or metals which are specifically toxic.

Physical Conditions

Physical conditions such as working positions, temperature, humidity and abnormal pressures, play an important part in the ability of the worker to produce. The correction of such conditions is primarily a problem of engineering and when given proper consideration will do much toward increasing production and lowering costs, through improvement of quality of the final production, reduction of spoilage, and increase in the final plant safety.

Evaluation of Environment

In order to properly evaluate the exposures in an industrial plant, a detailed engineering study and analysis is required. Such a study in the form of an industrial hygiene survey is a mechanical means by which the plant is observed department by department for the purpose of noting occupational hazards and unsafe practices so that they may be appraised. Such a survey should include a work analysis, analytical procedure rating of hazards, analyses of the hazards and recommendations for control.

The work analysis should be made by noting each and every job carried out in the plant, method of process, and hazardous conditions to which each worker

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COMMON PROCESSING MATERIALS WITH SAFE CONCENTRATION AND PHYSIOLOGICAL SYMPTOMS

TOXIC MATERIAL	INDUSTRIAL USE	SAFE CONCENTRATIONS	PHYSIOLOGICAL RESPONSE
Acrolein	Organic synthesis; mfg. military gases; soap and varnish; fertilizer.	1.0 ppm	Irritation of skin and mucous membranes of eyes and respiratory tract, dyspnea, bronchitis.
Ammonia	Organic preparations; refrigeration; bronzing; dye and color mfg.; sugar refining.	100 ppm	Irritation of respiratory passages, cough, pulmonary edema, severe eye irritation, caustic action on skin.
Aniline	Organic synthesis; dye mfg.; paint and varnish; disinfectants; explosives.	5.0 ppm	Muscular weakness, vertigo, cyanosis, fainting, nervous symptoms, loss of equilibrium, nausea, vomiting, diarrhea.
Arsenic Compounds	Paint and pigments; leather industry; insecticides; mining and smelting; dye and varnish mfg.	0.5 mg/M ³	Pains in stomach, vomiting, diarrhea, headache, gastric disturbances, skin diseases, loss of hair, weakness.
Bromine	Organic synthesis; dyes; bromides; explosives.	1.0 ppm	Irritation of air passages, bronchitis, conjunctivitis, skin eruptions, discoloration of skin.
Benzol	Solvent; paint and varnish removers; dye; varnish mfg.; rubber industry.	100 ppm	Headache and vertigo, gastro intestinal disturbances, hemorrhages, injury to blood forming organs with changes in blood picture, injury to blood vessels, heart, liver, kidneys, etc.
Cadmium	Alloys; cadmium salts; electroplating; storage batteries; lead and zinc smelting.	0.1 mg/M ³	Loss of appetite, weakness, nausea, inflammation of the lungs, cough, soreness of chest.
Carbon Disulfide	Solvent; mfg. viscose rayon; varnishes; insecticides; carbon tetrachloride.	20 ppm	Headache, vertigo, weakness, mental disturbances, irritation of skin.
Carbon Monoxide	Mfg. iron and steel; enamel; illuminating gas; kiln operations; smelting.	100 ppm	Headache, painfulness of eyeball, throbbing of temples, weakness, nausea, vomiting, increased respiration and pulse, collapse.
Carbon Tetrachloride	Solvent; mfg. cleaning compounds; dye; paint and lacquer industries.	100 ppm	Irritation of nose, throat and eyes, nausea, headache, vomiting, confusion, narcosis, injury to liver, dermatitis.
Chlorinated Diphenyls	Electrical equipment; lacquer mfg.; paints, wax mfg.	1.0 mg/M ³	Acneform skin eruptions, jaundice and atrophy of liver.
Chlorine	Organic synthesis; textile bleaching; water purification; chlorination.	1.0 ppm	Acute cardiac paralysis, burning, blistering, cough, bronchitis, chronic anemia, nasal and bronchial catarrh.
Chlorobenzene	Solvent for cellulose acetate, resins, oils, fats; dry cleaning.	75 ppm	Headache, giddiness. Blood changes.
Chromium Compounds	Dyeing; metallurgy; electroplating, printing; tanning.	0.1 mg/M ³	Bronchitis; bronchopneumonia, anemia, nephritis, ulcers of skin and membrane, perforation of nasal septum.
Ethylene Dichloride	Organic synthesis; solvents; thinner for lacquers.	100 ppm	Irritation of eyes and nose, vertigo, unconsciousness and death if exposure is prolonged.
Formaldehyde	Organic synthesis; dyes; rubber goods; leather; synthetic resins and lacquers.	20 ppm	Irritation of mucous membranes, conjunctivitis, severe dermatitis, degeneration of liver.
Hydrochloric Acid	Leather industry; organic synthesis; dye stuffs; mfg. chlorides.	10 ppm	Coughing, bronchitis, destruction of teeth, contraction of throat, caustic action on skin.
Hydrogen Sulfide	Reagent; analytical chemistry; viscose rayon spinning; leather tanning, mining and smelting; paper mfg.	20 ppm	Conjunctivitis, exhaustion, pallor, pain in eyes, nose and throat; headache, convulsions, paralysis.
Lead	Chemical equipment lead pigments; alloys; storage battery mfg.; insecticides.	0.15 mg/M ³	Weakness, pallor, loss of appetite, lead line, anemia, constipation, cramps, colic.
Mercury	Prep. mercury salts, scientific instruments, chemical processing.	0.1 mg/M ³	Inflammation of gums and mucous membrane of the mouth, necrosis of the jaw, enteritis, anemia, tremors of the hands and face.
Silica Dust (Free)	Foundries; stone industry; abrasive cleaning; blasting.	5,000,000 p.p.c.f.	Fibrotic lung tissue, development of silicosis.
Sulfur Dioxide	Refrigeration; bleaching; cellulose; paper; mining and smelting.	10 ppm	Bronchitis, coughing, laryngitis, bronchopneumonia, digestive disorders.
Sulfuric Acid	Fertilizers; refining, explosives; organic synthesis; leather; textiles; chemicals.	2.0 ppm	Acute and chronic bronchitis, bronchopneumonia, decay of teeth. On the skin, pain, edema and ulceration.
Toluene	Solvent; paint and varnish; organic preparations; dye and varnish; rubber industry.	200 ppm	Narcotic effect, headache, vertigo, gastro-intestinal disturbances, injury to liver and nervous system.
Zinc	Metallurgy; galvanizing, brass foundries--smelting.	15 mg/M ³	Metal fume fevers; irritation of respiratory tract, headache, nausea, chills, pain in limbs.

NOTE: P.P.M. = Parts of substance per million parts of air by volume
 p.p.c.f. = Millions of particles of substance per cubic foot of air
 mg/M³ = Milligrams of substance per cubic meter of air

is exposed. Toxic materials when present are investigated from the standpoint of the liberation into the atmosphere; physical state, whether or not the employee is required to be in the area where this material is dispersed, and the probable effect on the individual.

Analytical procedures usually include the collection of field samples and their analysis and the completion of other measurements when necessary. Atmospheric samples are collected from the breathing zone of the exposed worker and are taken in such manner as to be representative of average working conditions. Actual sampling and analysis of the atmosphere is the only scientific means by which a known exposure may be accurately evaluated. Some toxic materials make their presence known by odor and other properties, but these do not offer a means of determining their concentrations.

The rating of a hazard or exposure is a measurement to determine the degree of a condition and the effectiveness of existing control methods. Much work has been done in establishing safe permissible concentrations for some of the more common toxic materials. These threshold values offer a means of determining the extent of individual exposures. By an analysis of processing methods, rating of hazards and study of efficiency of existing corrective measures, a baseline for adequate **control procedures** may be established. In most cases processing methods will determine the type control indicated.

Application of Data

When the industrial hygiene study has been completed and observations and data analyzed, it is necessary to translate this information into terms of specific control procedures. Unless these data finally result in corrective measures, a great waste of time and effort will take place. Although the plant or process engineer may not be primarily concerned with activities other than strictly processing, this individual should take advantage of information obtained through the industrial hygiene survey. In many cases, a study of environmental conditions under which a job is carried out will of-

fer the production engineer a means of increasing the efficiency of the particular operation.

The plant engineer should also be concerned with the industrial hygiene information because the control procedures applied will be based on an analysis of these findings. The design and installation of such control procedures as local exhaust ventilation should be worked out with the plant engineer in order that the final installation may be entirely consistent with processing requirements.

Control Procedures

Hazards associated with industrial operations can either be eliminated or reduced to harmless limits by the application of public engineering methods. Procedures for the control of such exposures usually consists of one of the following:

Isolation of the process. Frequently a job which is productive of dust or tends to disperse other materials into the work area can be removed and located at a point so that the liberation of such material will not contaminate the general working atmosphere. It is occasionally possible to close off individual operations so as to isolate them from other areas and control the exposure.

Substitution of non-toxic material occasionally offers a good method of alleviating specific exposures. Where toxic materials are used and it is possible to replace them with non-toxic substitutes, the exposure can be removed in the easiest possible way.

Wet methods can sometimes be applied. These are frequently used in the stone industry in drilling, crushing, and grinding. Where materials being processed must be kept in the dry state, this method is obviously eliminated.

Personal protective equipment offers an excellent control procedure where the exposure is infrequent or of a short duration. Where this type of equipment is used, care should be exercised in its selection in order that the equipment used be designed for the particular exposure. Only equipment which bears the stamp of approval of the U. S. Bureau of Mines should be purchased.

Some exposures may be con-

trolled by means of **general ventilation**. By this procedure a sufficient amount of air is introduced into the work area to dilute the contaminant to a point below the toxic limit. This method has certain disadvantages, such as the handling of excessive amounts of air, and the failure to reduce concentrations of the material at its point of liberation. It is usually at or close to the point of liberation where real exposure occurs and general ventilation, in most cases, does not correct this situation.

Local exhaust ventilation offers the most effective and generally the most efficient means of controlling individual exposures. A hood or similar type of collecting device is located as close as possible to the point of liberation of the contaminant and sufficient air handled in order to remove this material in such a manner that it is not dispersed into the work area. This type control should remove the material before it has an opportunity to come into the breathing zone of either the worker on the individual job or the workers in the surrounding area.

In considering the matter of local exhaust ventilation, it is highly essential that these installations be properly designed and engineered. In too many cases hoods and the entire exhaust systems are installed by mechanics or other individuals in the plant and no thought is given to their design or the principles on which they should operate. Unless such systems are based on good engineering design there is no assurance that the installation will operate in such manner as to control the exposure.

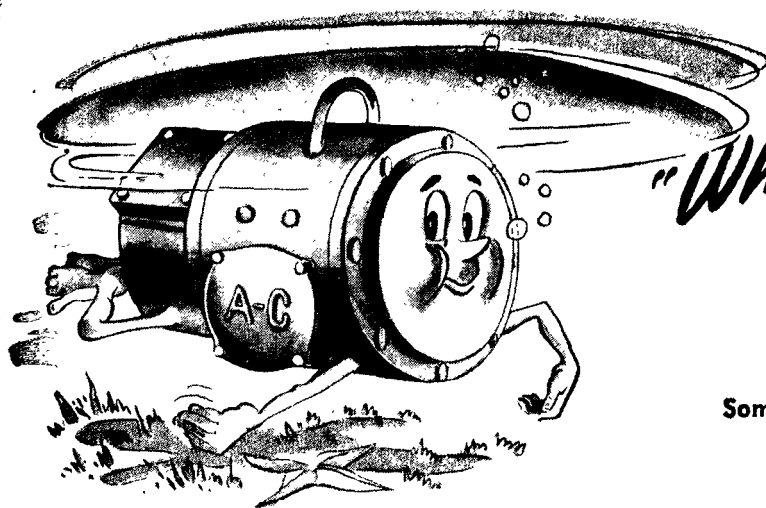
The next article of this series will cover organic solvents and similar industrial materials, their properties and uses as they influence the environment and health of the worker using them.

1945 INDEX

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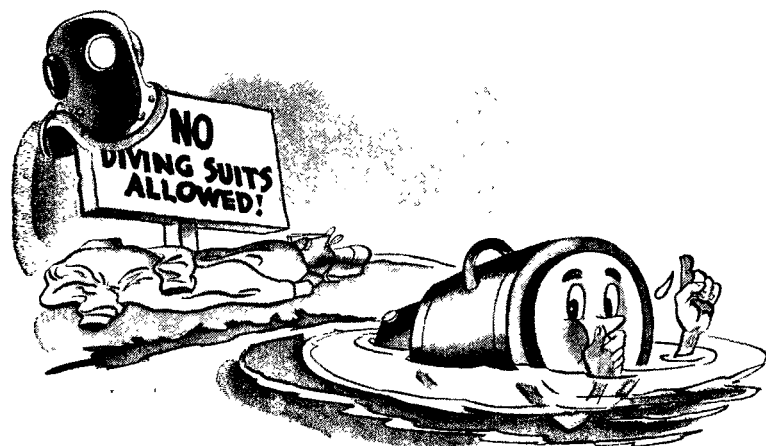
If you keep your back issues
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See Page 66

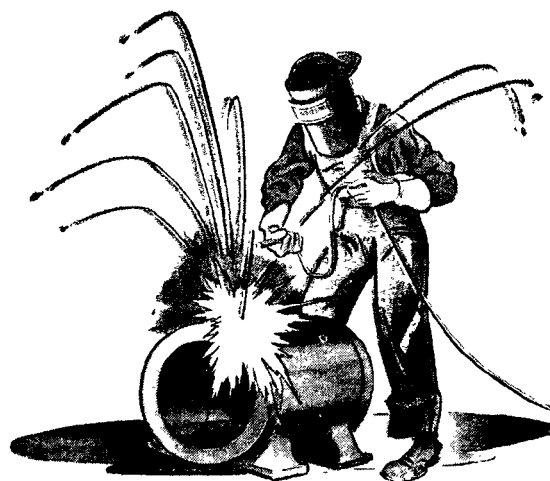


"What! Build a Motor to Run Underwater for 90 Days?"

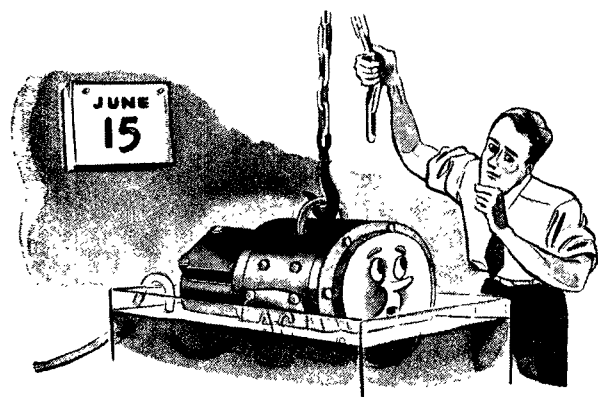
Some said "Impossible!" But the Navy insisted, "We want a motor that likes water so well it'll run in 25 feet of it for 90 days. What's more—it's got to be lighter, more compact than standard motors."



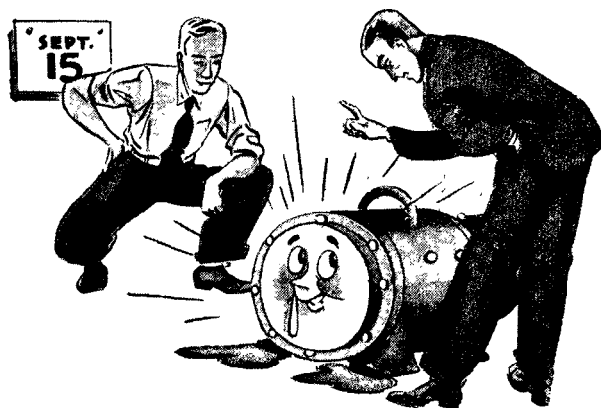
No diving suits allowed! Biggest problem was waterproof, pressure-proof casings. Cast-iron wouldn't do — too porous. So we turned to fabricated steel — tough, durable — and lightweight too!



Then we found that fabricated parts could be successfully welded together to assure water-tightness. For proper magnetic characteristics, we decided to use field yokes of one-inch rolled steel.



Things look better! We reinforced end-housings, double-checked insulation, made sure exposed parts were leak-proof. Nothing left to do but put our baby in the test-tank, check it regularly, and hold our breath.



90 days later—we took a good look. Motor still running and not a drop of water inside! That called for a short cheer and wide smiles all around. Mass production of these motors followed.



There's a Moral: Every time Allis-Chalmers engineering solves *special* motor problems, we discover new ways to build better standard motors for you. **ALLIS-CHALMERS, MILWAUKEE 1, WIS.**

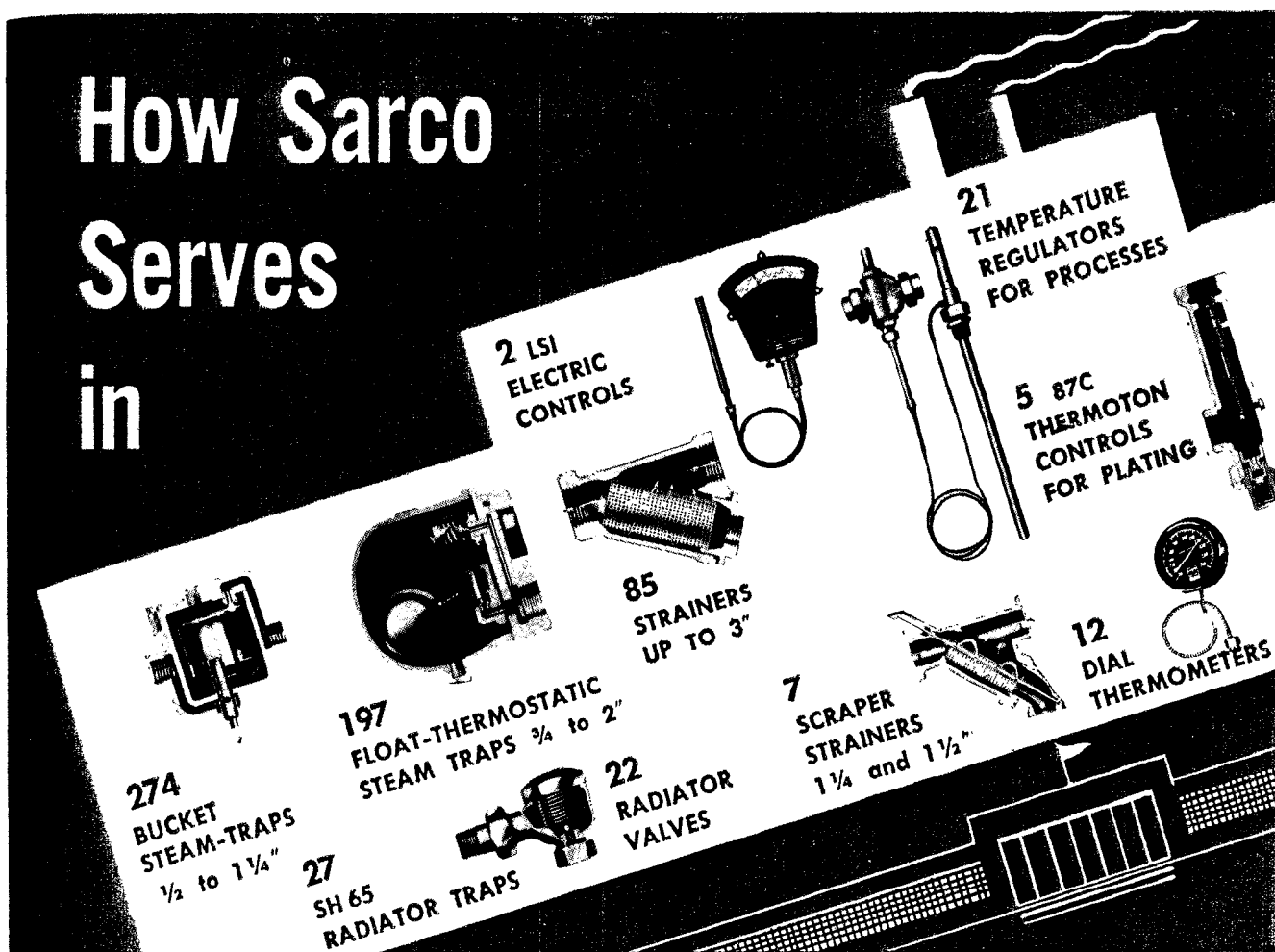
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How Sarco Serves in



THE MODERN FACTORY

Here is a typical case with no name mentioned, because it is a defense plant. The industrial company and their contractor decided to standardize on Sarco for all steam traps and temperature control because in their years of experience in connection with many other jobs, there was no other line as broad and versatile and as reliable.

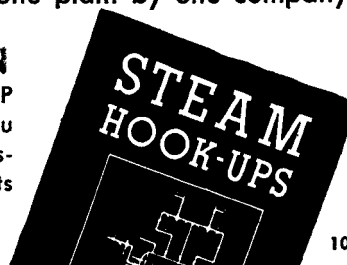
The illustration above shows the extent to which eight different but related Sarco products were used in this one plant, and the wide range of sizes required. Team work in operation was obviously secured.

Other advantages of standardization with Sarco are:

Ease of inspection and cleaning without disturbing the piping. Small number of spare parts required in stores. Ease of obtaining duplicates for additions or extensions, and the knowledge that all parts were made in one plant by one company.

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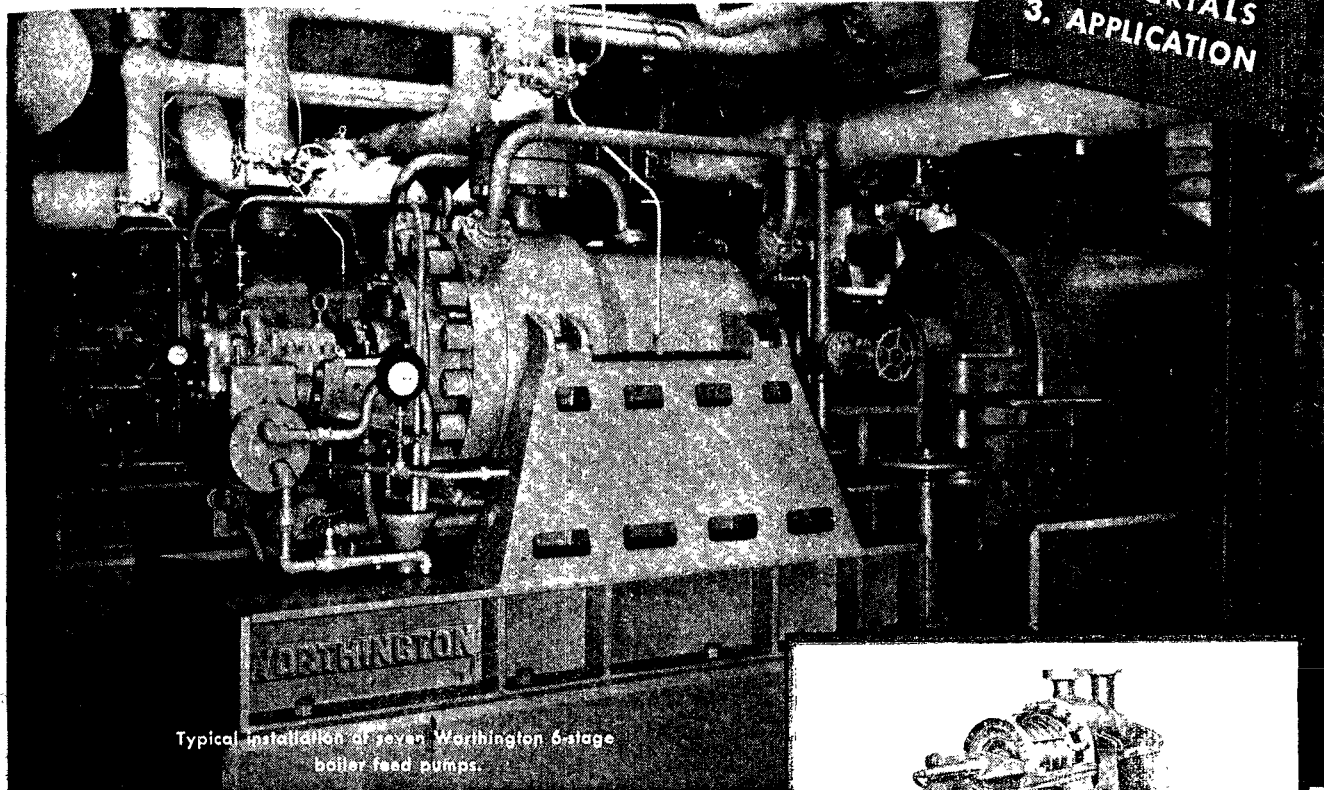
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3. APPLICATION



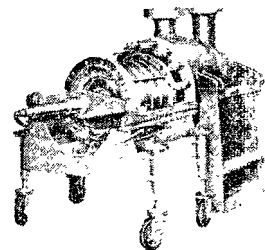
Typical installation of seven Worthington 6-stage boiler feed pumps.

1. DESIGN — Worthington has longer experience in manufacturing high-pressure centrifugal boiler feed pumps . . . has acquired unique constructive ideas from power-plant operating engineers. That's why you'll find such superior design features in Worthington high pressure boiler feed pumps as: a balancing device construction that minimizes wear; bolted ring-type pressure joints; impellers shrunk on the shaft; oversized Kingsbury thrust bearings.

2. MATERIALS — Worthington has greater facilities for research. That's why you'll find the *right* materials in Worthington high-pressure boiler feed pumps: stainless steel for internal parts—to prevent destructive corrosion and erosion; forged steel casings—tested and proved by years of power plant operation.

3. APPLICATION — Worthington Pump Application Engineers are thoroughly versed in every phase of applying the most complete line of boiler feed pumps for high or low pressures — capacities from 50 to 3500 GPM . . . pressures from 50 to 2500 PSI. That's why Worthington will fit the *right* feed pumps to your feed cycle.

For further details on Worthington High-Pressure Boiler Feed Pumps . . . or for an appointment with a Worthington P.A.E.*, write us or telephone the nearest of our 36 district offices. You'll find



AS EASY TO DISMANTLE AND ASSEMBLE AS A SPLIT-CASE PUMP

Complete rotor assembly of Worthington High-Pressure Boiler Feed Pump can be withdrawn *in one piece* on a portable assembly truck without disturbing suction or discharge piping connections. Simplifies inspection, replacement or repair of internal parts.

that there's more worth in Worthington. Worthington Pump and Machinery Corporation, Centrifugal Pump Division, Harrison, N. J.

*Pump Application Engineer



WORTHINGTON



24C5-3

THE WORLD'S LARGEST MANUFACTURER OF PUMPS

For Boiler Feed Service
Capacities from 30 to 1500 g. p. m.
Heads from 180 to 1000 feet.



For Hotwell, Condensate, Chilled Water, General Service
Capacities from 150 to 1300 g. p. m.
Heads from 110 to 500 feet.



For Boiler Feed Service
Capacities from 25 to 1450 g. p. m.
Heads from 220 to 1600 feet.



For Water Works, Circulation, Drainage, General Service
Capacities from 500 to 1600 g. p. m.
Heads from 900 to 3200 feet.



For Boiler Feed Service
Capacities from 200 to 1600 g. p. m.
Heads from 900 to 3200 feet.



For Boiler Feed Service
Capacities from 500 to 2000 g. p. m.
Heads from 2000 to 7000 feet.



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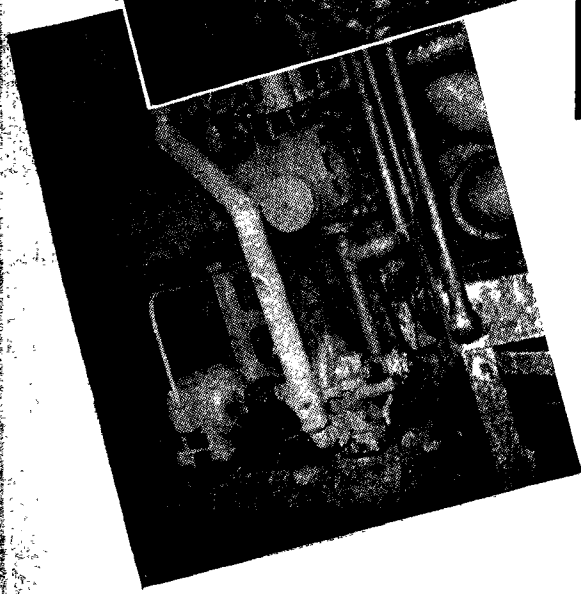
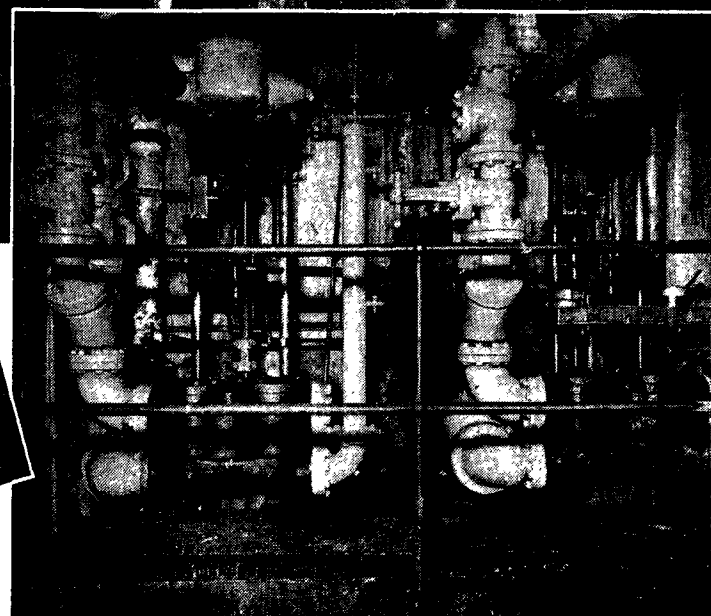
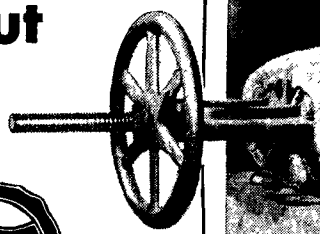
WARREN

Pumps in Necco

plant round out

two decades

of service



Warren Pumps in the New England Confectionery plant in Cambridge, Massachusetts, include Boiler Feed, Condensate, Vacuum, Spray Pond, Chilled Water, Brine, City Water Booster and Process Spray.

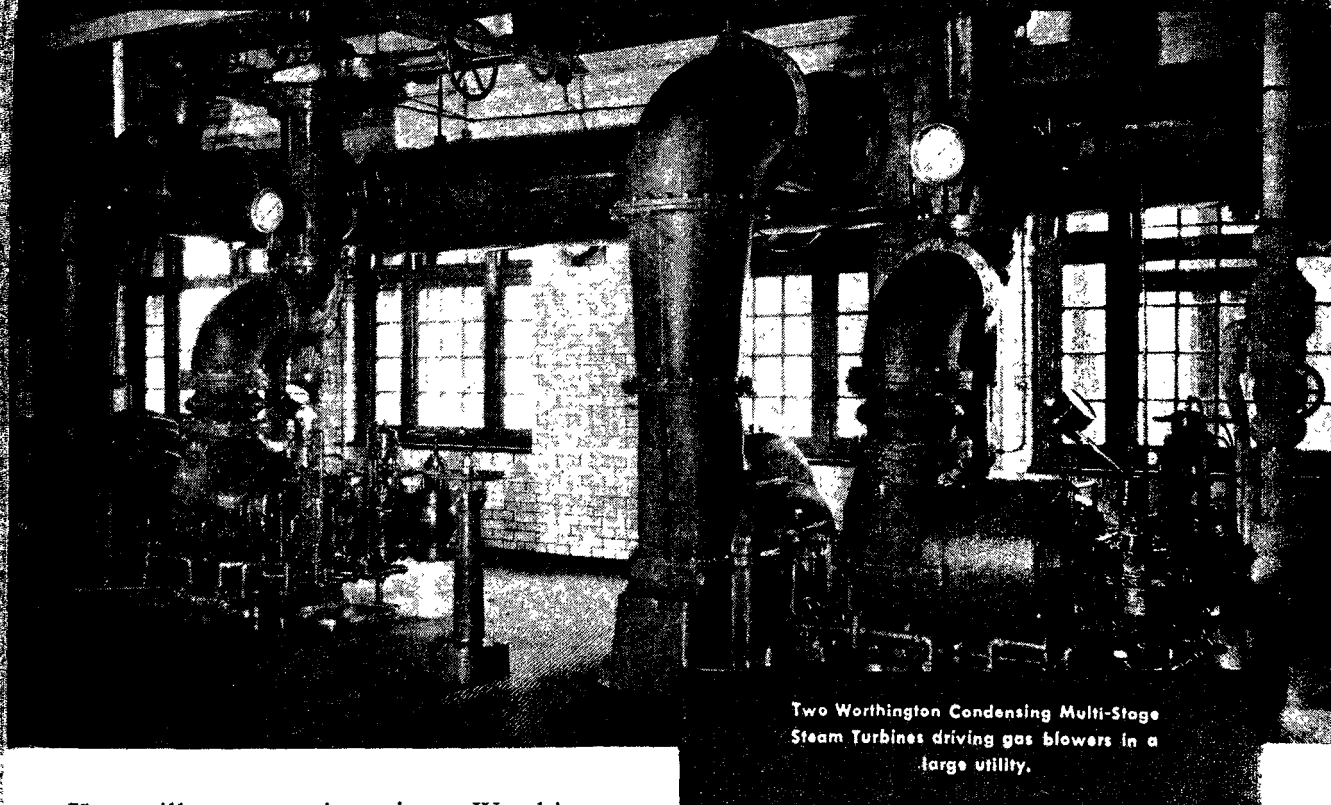
Many of these pumps have been in continuous service for more than two decades and show every evidence of their ability to continue serving satisfactorily for many years more.

Whatever your pump problems — put them up to Warren.

WARREN
STEAM PUMP COMPANY, INC.
WARREN, MASSACHUSETTS

MORE POWER FROM YOUR STEAM

...with Worthington Multi-Stage Turbines



Two Worthington Condensing Multi-Stage Steam Turbines driving gas blowers in a large utility.

You will want to investigate Worthington Multi-Stage Steam Turbines for either condensing or non-condensing service. Worthington's familiarity with all phases of steam power and specialized knowledge of Steam Turbine engineering account for *low maintenance* and *smooth, dependable economic operation*.

Low steam consumption is inherent in the design of these turbines, built in sizes from 100 HP to 10,000 HP for operation on high or low pressure steam and for speeds up to 9000 RPM. For full descriptive literature, write *Worthington Pump and Machinery Corporation, Harrison, N. J.*

WHO USES THEM?

Worthington Multi-Stage Steam Turbines—condensing and non-condensing types—are now driving blowers, generators, pumps, line shafts, refrigeration compressors, air-conditioning units, paper machines, cane shredders, etc. Data that proves *there's more worth in Worthington* is available on request.

WORTHINGTON



**A GREAT
TEAM
IN
STEAM**



TS-1

Better because it's Seatless

Why has this blow-off valve become "standard" in over 12,000 boiler plants? Why is it today the universal choice of leading engineers for new boiler installations?

The answer is in the engineering reason behind the valve. It is *SEATLESS*. There is no seat to score, wear and clog with mud, scale and dirt.

Power plant operators hailed this seatless-design valve more than 25 years ago when it was first introduced. It eliminated a source of continual trouble and expense common with conventional type blow-off valves.

Since then constant mechanical and metallurgical research, aimed to meet new and more rigid service requirements, has made improved Yarway Seatless Blow-Off Valves the last word in insurance against boiler blow-down troubles.

See Yarway Blow-Off Valves, hear the seatless principle explained by Lowell Thomas in Yarway's color motion picture "There Is An Engineering Reason." It's available without charge for group showings. Write today.

Roger A. Martin, Southern Rep.
YARNALL-WARING COMPANY

Bona Allen Bldg.,

Atlanta 3, Ga.

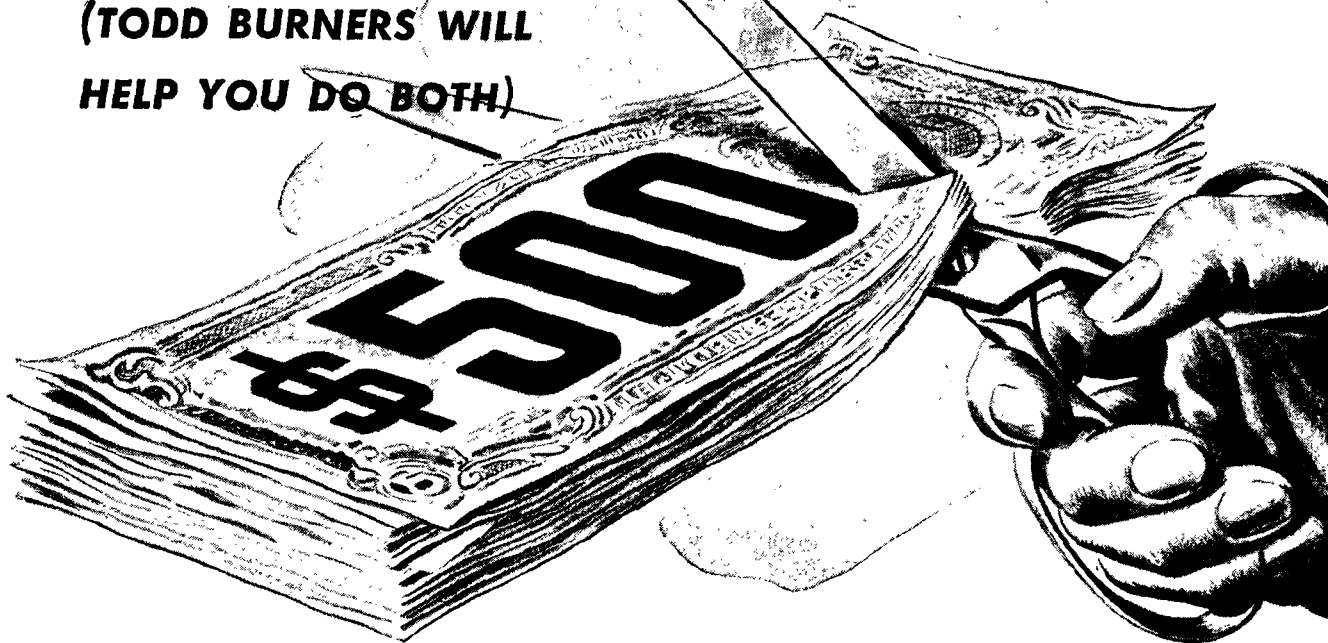
YARWAY

BLOW-OFF VALVES

SOUTHERN POWER & INDUSTRY for JANUARY, 1946

GET YOUR STEAM UP ... AND CUT YOUR COSTS DOWN!

(TODD BURNERS WILL
HELP YOU DO BOTH)



POWER will be needed—and how—for industry's great program of post-war production! But, more than ever, power engineers must watch cost figures...figure out new economies.

Consider seriously therefore the question of *modernizing* your boiler room through the installation of Todd Oil or Gas Burners.

Savings up to 10%, on the one hand...increased power on the other . . . for Todd Burners' instantaneous response to fluctuating demands produces *more* steam on *less* fuel consumption!

You pay less for maintenance with Todd, too, because Todd Burners can be operated automatically to meet changing load conditions.

Whether you are producing power and heat for industrial, commercial, or marine purposes, investigate the efficiencies and economies of automatic Todd Combustion Equipment.

Todd specialists, like the deeply-experienced Todd organization itself, are ready to solve your liquid and gaseous combustion problems.

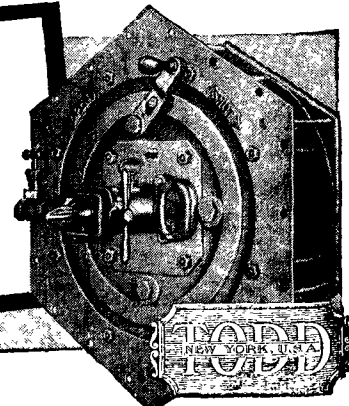


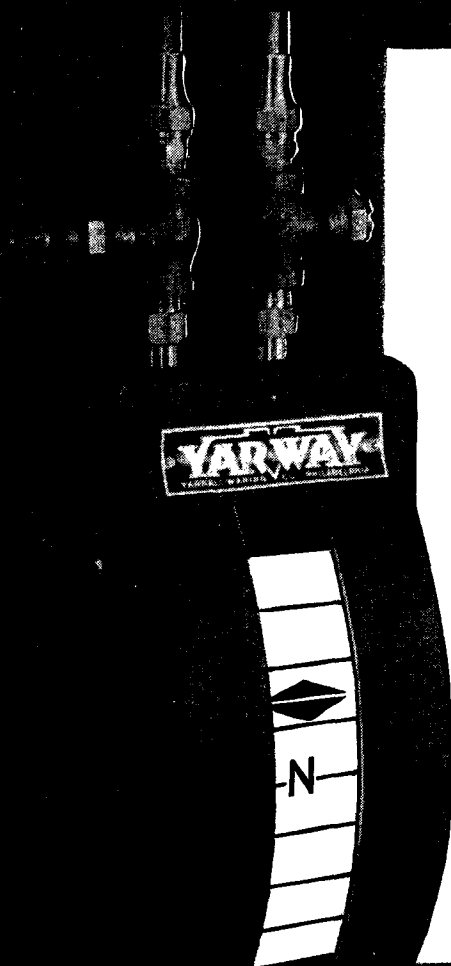
COMBUSTION EQUIPMENT DIVISION

TODD SHIPYARDS CORPORATION

601 West 26th Street, New York 1, N. Y.

NEW YORK, BROOKLYN, ROCHESTER, HOBOKEN, NEWARK, PHILADELPHIA, CHICAGO,
SO. PORTLAND, ME., BOSTON, SPRINGFIELD, MASS., BALTIMORE, WASHINGTON, DETROIT,
GRAND RAPIDS, TAMPA, GALVESTON, HOUSTON, MOBILE, NEW ORLEANS, LOS ANGELES,
SAN FRANCISCO, SEATTLE, TACOMA, MONTREAL, TORONTO, BUENOS AIRES, LONDON





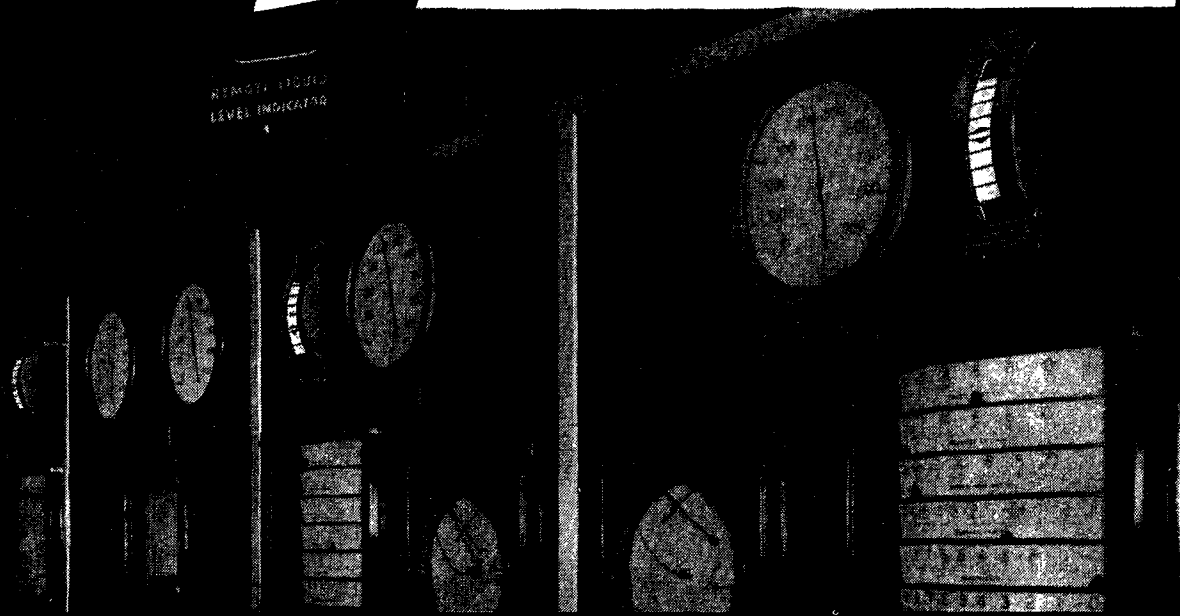
First they bought one . . . and it proved so satisfactory that now 22 Yarway Remote Liquid Level Indicators are on boiler room duty in four plants of this great rayon company.

That's the way the good word about Yarway Indicators is spreading. Plant after plant is finding that here at last is an instrument that gives safe, positive check on overhead water gages right down at convenient eye level . . . on a brilliant scale that is visible even in total darkness.

Yarway Remote Liquid Level Indicators are *accurate* because they are operated by the boiler water itself . . . by the pressure differential between a constant head of water and the varying head in the boiler drum. Indicating mechanism is perfectly balanced on jewelled bearings, and is never under pressure. Therefore, no stuffing boxes are required. Action is instant, constant, frictionless. Made for panel mounting or wall mounting, and suitable for all pressures up to 1500 psi.

Nearly 3,000 have already been bought for indicating boiler water levels, superheater pressure differentials, feed-water-heater levels and other liquid levels. Write for Bulletin WG-1821.

Roger A. Martin, Southern Rep.
YARNALL-WARING COMPANY
Bona Allen Bldg., Atlanta 3, Ga.



YARWAY REMOTE LIQUID LEVEL INDICATOR

LET INGERSOLL-RAND

AIR POWER

WORK FOR YOU!

IT CAN...

AERATE cultures as in yeast making
AGITATE liquids (by bubbling through them)
ATOMIZE water for humidification and washing
BLOW dust, dirt, scale, coal, soot
CONVEY grains, mail, packages
COOL materials and workers
CUSHION pistons and recoil mechanisms
DISPLACE liquids and gases
DRILL rock and metals
DRY fabrics, paper rolls
FORM rubber, glass, and wood in moulds
HAMMER rivets, nails, chisels, forgings
HOLD liquids under pressure
LIFT by piston or air-motor hoist
INFLATE tires, pontoons
OPERATE all kinds of Air Tools
OXIDIZE materials in furnaces and converters
PUMP water, oils, chemicals (by "air lift")
ROTATE grinders, motors, and machinery
SAND-BLAST against metal and stone surfaces
SCAVENGE spent gases from gun barrels
SPRAY paint, cleaning fluids, insecticides
SUPPLY air to mines, caissons, divers
VENTILATE rooms, tunnels, mines
VIBRATE sifters, mixers, concrete
WHISTLE as an alarm or signal

And a thousand-and-one other time- and money-saving jobs.

1-716

Ingersoll-Rand builds
and applies both
the COMPRESSORS
that generate the
AIR-POWER and the
TOOLS that use it

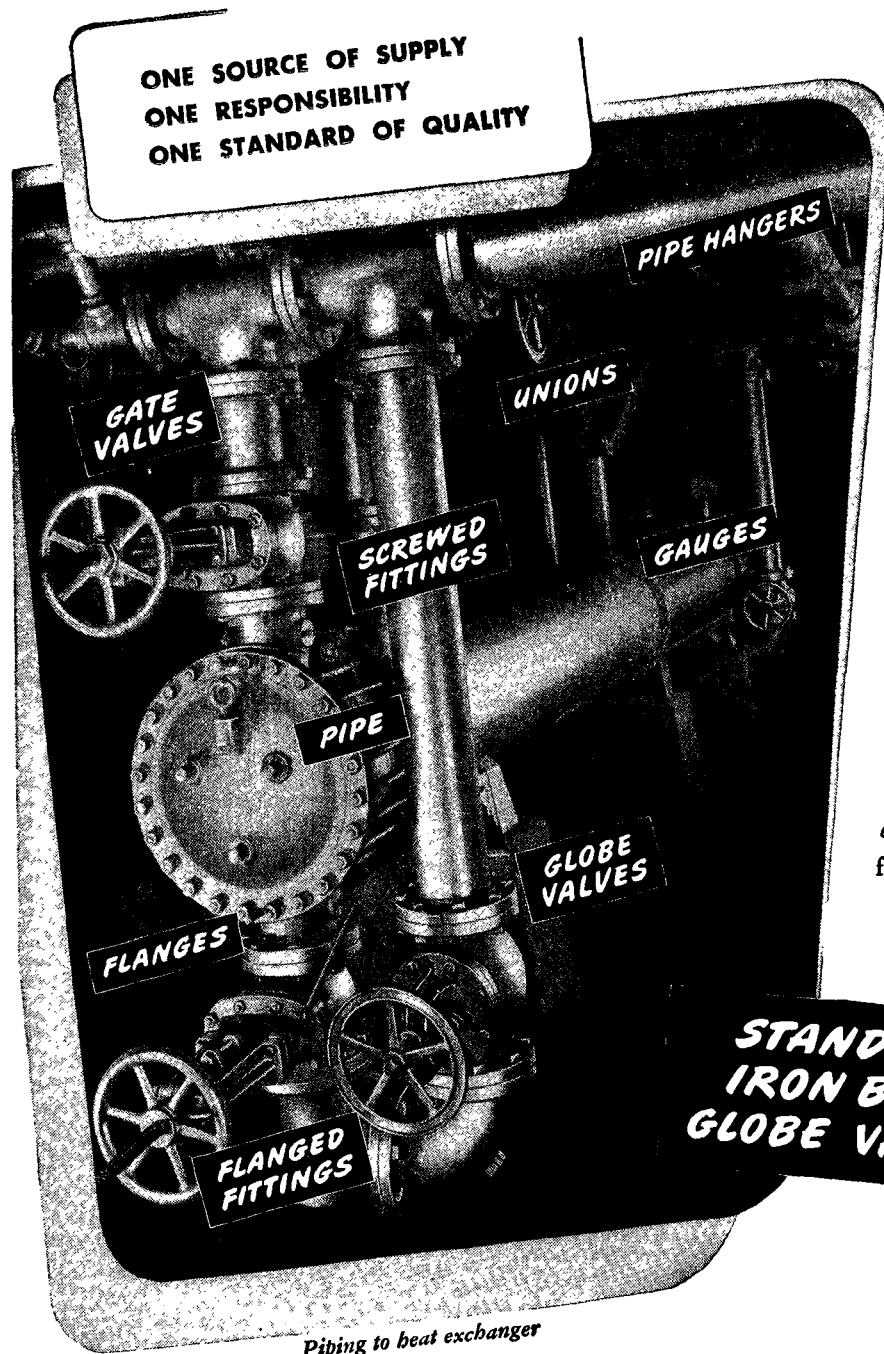
Ingersoll-Rand

11 BROADWAY, NEW YORK 4, N. Y.

SOUTHERN POWER & INDUSTRY for JANUARY, 1946

For "User's Choice" of Piping Materials ... it's the Complete CRANE Line

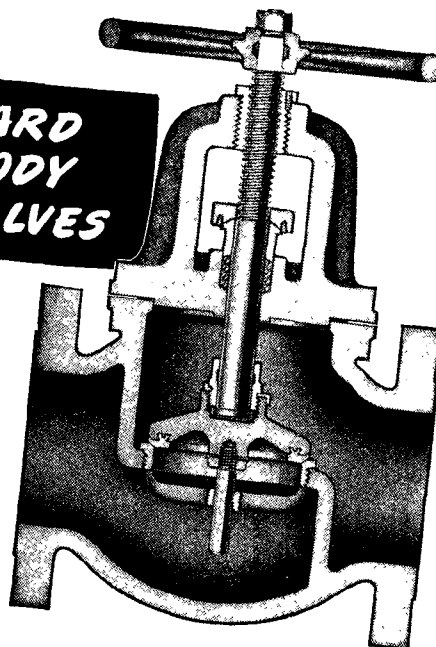
ONE SOURCE OF SUPPLY
ONE RESPONSIBILITY
ONE STANDARD OF QUALITY



Piping systems operate under varying conditions. What conditions should dictate your choice of piping materials, you can best determine. Then Crane helps you meet those specific requirements with the world's largest line of valves, fittings, pipe and piping accessories for all applications. By demonstrating the merits of all types of materials, Crane, with 90 years' experience, enables you to choose correctly for every need.

Ordering from the Crane line simplifies all piping jobs. Your Crane branch or Wholesaler supplies all materials. You're sure to get a better installation and better performance with all parts of uniform quality, backed by single responsibility. This *complete* Crane service is *made-to-order* for your peacetime program.

STANDARD
IRON BODY
GLOBE VALVES



SERVICE RECOMMENDATIONS:

Crane Standard Iron Body Globe and Angle Valves meet all general service requirements with working pressures up to 125 pounds steam. Brass-trimmed valves are recommended for steam, water, and fluids non-corrosive to brass or iron; all-iron valves for fluids that corrode brass but not iron. Also available with choice of composition discs for steam, hot water, cold water, air, oil, and other services. In sizes from 2 in. up—with screwed or flanged ends. Crane also makes iron body globe and angle valves in all-iron; with brass trim; and with composition disc; in sizes from 1/4 to 2 in. Rated at 150 pounds steam, 250 pounds cold. See your Crane catalog, pages 143 to 151.

CRANE CO., General Offices: 836 S. Michigan Ave., Chicago 5, Ill. • Branches and Wholesalers Serving All Industrial Areas

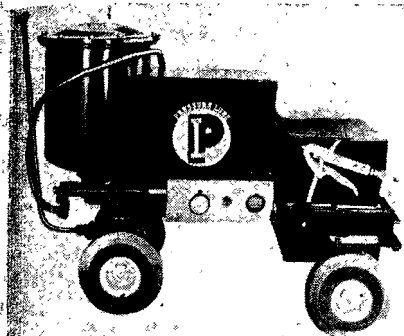
CRANE

VALVES • FITTINGS • PIPE
PLUMBING • HEATING • PUMPS

NEW EQUIPMENT—Continued

Portable Greasing Unit

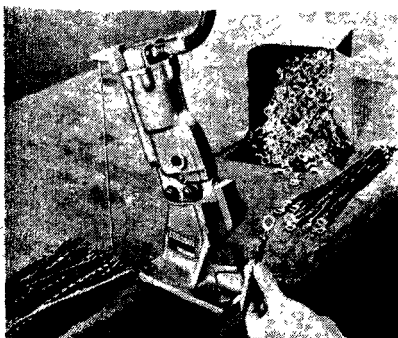
PRESSURELUBE, INC., 609 West 134th Street, New York 31, N. Y., have developed a new completely portable greasing unit.



Equipment can be supplied with a grease gun for every purpose and is available either with battery powered or gasoline driven motor. Flexible, economical operation is assured by its complete portability—no electric cord or air hose is required. Unit delivers up to 12,000 lbs., steady, consistent pressure which is instantly available to clear the most obstinate channel stoppages and effect complete lubrication of parts. Compact design increases portability.

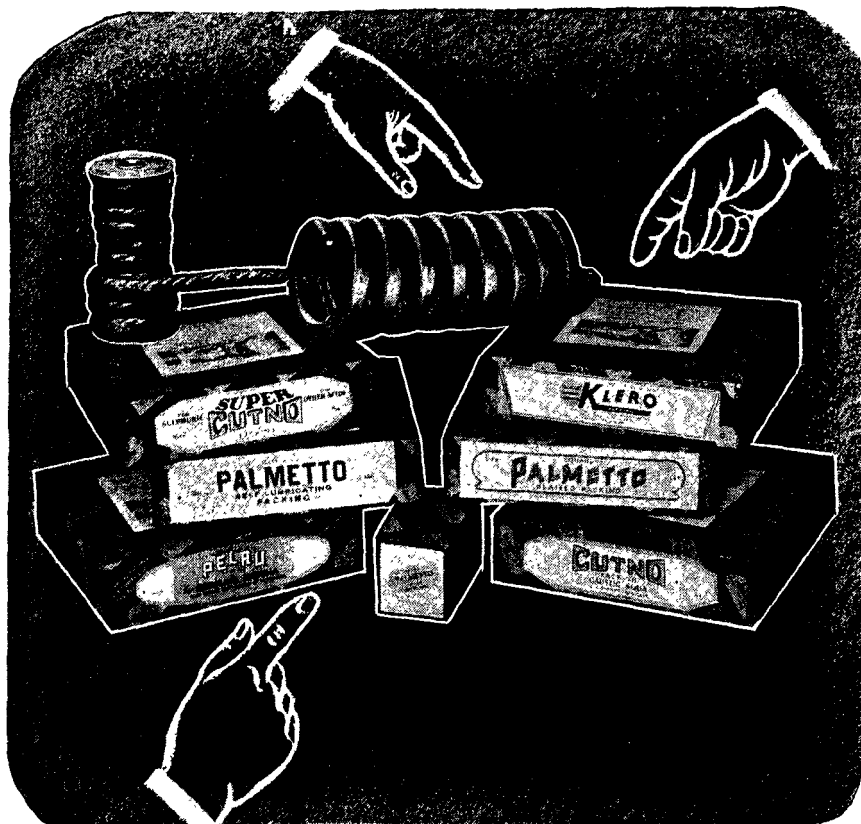
New High-Speed Pneumatic Tool For Making Electrical Connections

BURNDY ENGINEERING Co., Inc., New York 54, N. Y., have announced a new, bench mounted, pneumatic "Hyd-press" for installing "Hydent" (indent-type) connectors on small electrical wire and cable. The complete



connection is made in one quick, automatically controlled stroke of the press which indents the connector onto the wire at the same time the insulation grip is closed.

The die sets are tilted at a slight angle in order to make it easy for the operator to see that the work



PACKING SELECTIONS MADE EASY

You can always put your finger on the **RIGHT** choice for every service when you standardize on **PALMETTO** Packings.

That's because the **PALMETTO** line is **SIMPLE**, yet **COMPLETE**.

No complexities, no uncertainty . . . for each grade gives good results in a broad range of applications.

Our handy Packing Application Chart will help you make a selection for trial . . . write for your **FREE** copy.

GREENE, TWEED & CO.

Bronx Boulevard at 238th Street, New York 66, N. Y.
Plants at New York, N. Y., and North Wales, Pennsylvania

PALMETTO

High-Pressure
Folded Asbestos
Gaskets
Asbestos Metallic
Sheet Packing
Asbestos Metallic
Gasket Tape
NOW AVAILABLE

PALMETTO

Self-Lubricating

for steam, water, air. **PELRO** for oils.
CUTNO for alkalis. **SUPERCUTNO** (blue
asbestos) for acids. **KLERO** for foods.

PACKINGS

NEW EQUIPMENT—Continued

any used previously, virtually eliminates wear and replacement. Further details are given in Bulletin 49P.

Flexible Tubing

THE WARNER BROTHERS COMPANY, Bridgeport, Conn., have developed a new type of flexible tubing, non-collapsible under plus or minus pressures and retractable to about one-eighth its extended length, for port-

able or semi-permanent ventilation or any handling of air, gases or light solids.



A feature of the Spiratube construction is the method of spiral-stitching the spring core within the fabric. The inside surface is free of wire ridges, providing far less resistance to air flow and no obstruction to the passage of solids. Sharp bends can be made with only slight reduction of air flow and without the use of elbows or special fittings. The tubing is considerably lighter than metal duct or moulded tubing, and takes up less space when retracted. The standard Spiratube is made of long-fibre duck, having a bursting strength of 170psi; the fabric is processed fire-resistant and covered with tough, durable thermoplastic. It is furnished in standard diameters from 3 inches to 16 inches, and in lengths of 10, 15 and 25 feet.

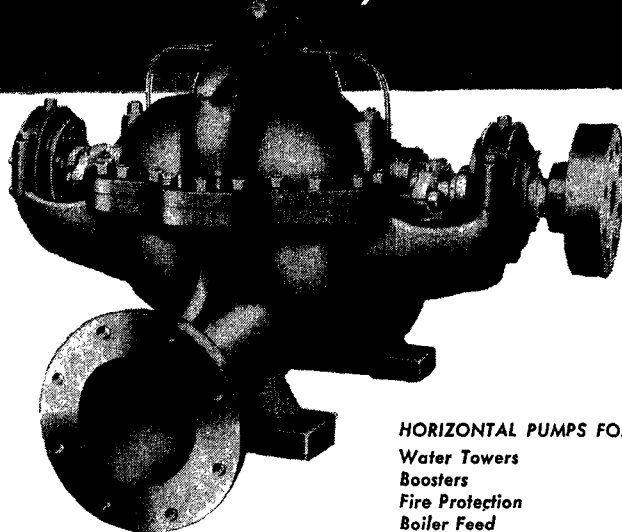
Continuous Duty

HORIZONTAL PUMPS

Precision-built by Peerless



Formerly
Dayton-Dowd



HORIZONTAL PUMPS FOR:

Water Towers
Boosters
Fire Protection
Boiler Feed
Condensate
Sewage
Chemicals

VERTICAL PUMP TYPES:

Deep Well Turbine
Hi-Lift (Moyno Type)
Centrifugal
Sewage
Jet
Shallow Well
Hydro-Foil (propeller)

Peerless (formerly Dayton-Dowd) Horizontal Centrifugal split case or solid volute pumps, single and multi-stage are found wherever reliability, dependability and economical operating are desired. Engineered and manufactured with a view to long life, Peerless Pumps are available for all classes of pumping requirements.

The right pump for the right job. All inquiries and specifications processed by trained engineers.

PEERLESS PUMPS

PEERLESS PUMP
DIVISION
Food Machinery Corp.

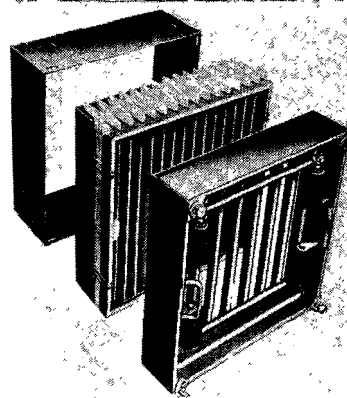


FACTORIES
LOS ANGELES 31, CALIFORNIA
301 West Avenue Twenty-six
QUINCY, ILL. * CANTON 6, OHIO

Electronic Air Filter

AMERICAN AIR FILTER COMPANY, 125 Central Ave., Louisville 8, Kentucky, announce the latest addition to their lines of electronic air filters, the Electro-Airmat in which the collector element is electrostatically charged Airmat paper. Introducing an entirely new principle in Electronic air filtration, the arrestance rating of the Electro-Airmat is 90% or better with atmospheric dust or smoke.

The filter weighs 40% less than Electronic filters having metal plate collectors and requires 30% less floor area.



Airmat is American Air Filter's trade name for a cellulose product composed of a number of piles of porous, tissue-like sheets formed of short cellulose fibers. It is unlike any other filtering media. When an electrostatic charge is applied to Airmat, the plies tend to separate and each individual fiber becomes a collecting electrode which attracts and holds the dust and smoke particles.

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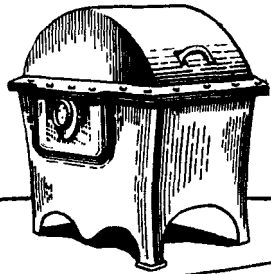
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... HERE'S ANOTHER JOB
WHERE OAKITE CLEANING
CAN SAVE YOU MONEY

Simplify Steam Condensate Meter Maintenance

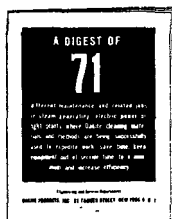
To maintain normal volumetric capacity of your steam condensate meter units, periodic overhaul and re-standardization are necessary.

You can speed up and simplify conditioning of your units for accurate recording of steam flow by adopting this performance-proved Oakite maintenance cleaning method.

Immerse meter drums in solution of Oakite Composition No. 24 or other recommended Oakite material. Then rinse. If lime-scale and rust are present, immerse units in solution of Oakite Compound No. 32. Rinse and neutralize. You will find that this low-cost method saves time; does a thorough job; restores full recording efficiency.

Send for FREE Digest Now!

Send today for FREE 20-page Digest describing successfully used Oakite materials and techniques that will help you expedite this and 70 similar maintenance jobs!



OAKITE PRODUCTS, INC.

23A Thames Street, New York 6, N. Y.

Technical Service Representatives Located in All
Principal Cities of the United States and Canada

OAKITE *Specialized*
CLEANING

MATERIALS • METHODS • SERVICE

Hygiene

(Continued from page 90)

- (3) See that the men and machines are properly equipped and ready to start on the job.
- (4) Check the number of men to do the job.

During the Day

- (1) Check against lost motion or lost time due to workmen waiting on material.
- (2) Check or observe workmen to see that orders and instructions are thoroughly understood and being carried out properly.
- (3) Check for the proper use, distribution and temporary storage of materials on the job.
- (4) See that tools and equipment are returned to their proper places when not in use.
- (5) See if there are too many or too few men on the job.
- (6) Be always ready to listen to comment on or suggestions offered by workmen.
- (7) Any orders given on the job should be double checked to see that they are clearly understood.
- (8) Check the handling of materials and tools by the workmen on the job to see that such handling is done in accordance with standard practices and is done safely, economically and easily.
- (9) As the workmen inspect their own work as they finish it and you yourself check the jobs as they are done, check materials being wasted or thrown away which can be salvaged.
- (10) See that all warning devices and guards are placed.
- (11) See that all necessary protective devices such as goggles and safety belts are worn.

At the End of the Day

- (1) See that all materials, tools, and equipment are stored away for the night.
- (2) See that all salvaged or returned materials and junk are properly accounted for and prepared for disposal.
- (3) Check all necessary items to be included in daily reports.
- (4) Make all necessary daily reports, not allowing them to accumulate.
- (5) Record all data necessary for weekly, monthly, and end of the job reports. Do not trust your memory.

End of the Job

- (1) Check in all equipment and tools, noting condition as well as type and number.
- (2) Make all necessary arrangements for the next job to be done, checking to see how it ties into the job just finished.
- (3) Check all returned material, salvage, and junk for proper disposal.
- (4) See that all necessary reports have been made and forwarded.

(5) See that all engineering sketches, blueprints, and other data have been corrected and posted in order that engineering and accounting records may be complete.

Some Things to Check at Various Times

- (1) Check the progress of men under your supervision to see if they are advancing in the craft art and in the general understanding of the work they are supposed to do.
- (2) Maintain cooperative relationships with other foremen and other departments.
- (3) Maintain proper human relationships with the men under your supervision.
- (4) Watch the job continually to see that any suggestions made are passed on for proper consideration.
- (5) Watch your labor turn-over:
 - (a) Try to appreciate cost of labor turn-over.
 - (b) Maintain the proper type of discipline.
 - (c) Watch the progress of men in regard to wages and promotion.
 - (d) Keep the man on the job that he likes and can do.
 - (e) Be fair and impartial in your treatment of the men.
 - (f) Be fair and square in your criticisms and inspection.
 - (g) Study and analyze the company's policies, especially those in regard to wages and working conditions in order that you might interpret them properly to the men.
- (6) See if you are getting the most production possible from the workmen.
 - (a) Check yourself as to your instruction and direction.
 - (b) Check your attitude as to comments and suggestions.
 - (c) Check yourself in the way you give orders to the men.
 - (d) Be sure that you rate your men on a fair and impartial basis.
 - (e) Check your men continually for physical and mental suitability.
 - (f) Be on the alert for human problems.
- (7) Take advantage of every opportunity to improve yourself.
 - (a) Attend foremen's conferences.
 - (b) Study everything that you can get your hands on that will help you with your job.
 - (c) Consult with other supervisors in other departments in order to learn about their jobs and thus improve your own methods.
 - (d) Take advantage of every opportunity to learn more about the prevention of accidents.
 - (e) Keep informed of all the latest methods and ways of doing the various jobs which come under your supervision.
 - (f) Watch for changes in materials, tools, and equipment.
 - (g) Keep yourself informed not only on the things pertaining to your job but to those things which will make you a well-rounded, well-balanced man as well as a foreman.

TEMPLETON RETURN STEAM TRAPS

for Pumping, Boiler Feeding, Draining, Heating and Vacuum Lines

Pumps Water at any temperature or pressure.

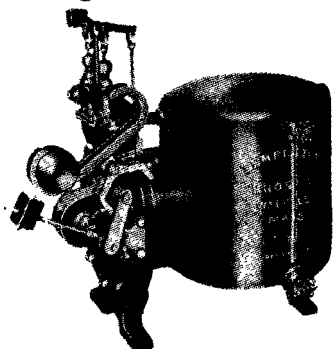
Open float cannot burst or waterlog.
Valves and Seat Bronze or Stainless Steel.

Sizes 1 in. to 4 in. inlet and outlet.

Capacity 2500 lbs. to 60,000 lbs. water discharge per hr.

Ask for catalogue and prices

TEMPLETON BROS., INC.
699 Main St. Walpole, Mass.



Blazing THE ... DESIGN FOR 1000°F

TEMPERATURE CONTROL...

Final steam temperature control with an all-convection type superheater invariably requires a compromise between two limiting conditions.

FIRST—when furnace exit temperatures to the superheater are high enough to obtain the desired control range, slagging of the boiler and superheater surfaces may result.

SECOND—when gas temperatures to the superheater are low enough to prevent slagging, the desired control range cannot be met.

The necessity for compromise can be eliminated by using a combination radiant and convection type superheater. Slagging in the boiler and superheater can be eliminated and a high final steam temperature maintained over a wide load range.



FOSTER

ENGINEERING TRAIL

FINAL STEAM TEMPERATURE

FIRST...

The first high pressure public utility steam generating unit designed for 1000°F. final steam temperature will go into service during 1946 at the Atlantic City, N. J. station of the Atlantic City Electric Company. Capacity is 310,000 lb. steam per hour at a pressure of 1550 psi. This marks another milestone in design progress for high-pressure, high-temperature steam generating units.

PROBLEM...

The engineering problem here was to design a superheater which could deliver steam at 1000°F. final temperature over a wide load range, and in addition, satisfy the second condition of slag-free operation.

SATISFYING BOTH CONDITIONS...

The Foster Wheeler combination radiant and convection type superheater satisfies both requirements. Offsetting characteristics of the two superheater types balance to yield an almost constant final steam temperature over a wide load range. As the load increases the steam temperature from the radiant section decreases, while temperature from the convection section increases. Condenser type control provides what regulation is necessary to maintain a steady 1000° over the load range of 130,000 lb. to 310,000 lb. steam per hour.

The second condition—freedom from slagging—is the result of combining radiant and convection heat-absorbing surfaces, permitting the specified temperature of 1000° to be obtained, while furnace exit temperatures to the convection superheater are kept below the slagging point.

FOSTER WHEELER CORPORATION
165 Broadway • New York 6, N. Y.

WHEELER



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