C. A. Dunham Company

Administrative and General Offices

450 E. Ohio Street, **Chicago, Ill.**

Factories: MARSHALLTOWN, IOWA; MICHIGAN CITY, IND.; TORONTO, CANADA

SALES OFFICES

AKRON, OHIO
ALBANY, N. Y.
ALLENTOWN, PA.
ATLANTA, GA.
BALTIMORE, MD.
BANGOR, ME.
BIRMINGHAM, ALA.
BOSTON, MASS.
BUFFALO, N. Y.
CHAMPAIGN, ILL.
CHARLOTTE, N. C.
CHATTANOOGA, TENN.
CHICAGO, ILL.
CINCINNATI, OHIO
CLARKSBURG, W. VA.
CLEVELAND, OHIO
DALLAS, TEXAS
DAVENPORT, IOWA
DENVER, COLO.
DES MOINES, IOWA
DETROIT, MICH.
DULUTH, MINN.
EL PASO, TEXAS
GRAND RAPIDS, MICH.
GREENVILLE, S. C.
HARRISBURG, PA.
HOUSTON, TEXAS
HUNTINGTON, W. VA.
INDIANAPOLIS, IND.
JOHNSTOWN, PA.
JOLIET, ILL.
KALISPELL, MONT.
KANSAS CITY, MO.
KINGSTON, PA.
LITTLE ROCK, ARK.
LOS ANGELES, CALIF.
LOUISVILLE, KY.
MEMPHIS, TENN.
MILWAUKEE, WIS.
MINNEAPOLIS, MINN.
MISSOULA, MONT.
NEWARK, N. J.
NEW HAVEN, CONN.
NEW ORLEANS, LA.
NEW YORK, N. Y.
OKLAHOMA CITY, OKLA.
OMAHA, NEBR.
PHILADELPHIA, PA.
PITTSBURGH, PA.
PLATTSBURGH, N. Y.
PORTLAND, ORE.
POUGHKEEPSIE, N. Y.
PROVIDENCE, R. I.
RICHMOND, VA.
ROCHESTER, N. Y.
ST. LOUIS, MO.
SALT LAKE CITY, UTAH
SAN ANTONIO, TEXAS
SAN FRANCISCO, CALIF
SEATTLE, WASH.
SPRINGFIELD, MASS.
SYRACUSE, N. Y.
TAMPA, FLA.
TOLEDO, OHIO
TRENTON, N. J.
WASHINGTON, D. C.
WICHITA, KAN.

C. A. Dunham Co., Ltd.,
1523 Davenport Road,
TORONTO, ONT., CANADA

C. A. Dunham Co., Ltd.,
(of the United Kingdom)
18 ST. THOMAS ST., S.E. 1, LONDON

Over eighty sales offices in the United States, Canada and the United Kingdom bring Dunham Heating Service as close to you as your telephone. These representatives are available for engineering counsel in correct selection of Dunham Systems and Appliances for any type of building. The accumulated experience of the entire Dunham organization is put at the disposal of the Heating and Ventilating Engineer. This cooperation is available for *Modernization Work*, as well as for new construction in industrial, commercial and other projects.

DUNHAM DIFFERENTIAL VACUUM HEATING

The advantages of the Sub-Atmospheric principle which governs steam distribution in Dunham Differential Vacuum Heating Systems are utilized in three distinctive applications. Modifications of past standards of heating, such as the Vacuum Return Line systems and the Vapor systems, are definitely improved by relating certain Dunham equipment. The use of this equipment is explained in the 1935 Dunham Hand Book (No. 514).

1. **The Dunham Differential Vacuum Heating System for High Duty**—This is a two-pipe system giving excellent room temperature control and winter air conditioning. The pressure, the temperature and the volume of steam in circulation are varied under a control which is a normal function of system operation. The wide range over which the vacuum and quality of steam in the radiators is regulated (from atmosphere to 25 in.) establishes correct rates of heat emission with radiators either complete or partially filled as required. A continuous valuation of heat requirements under positive temperature control may be secured through nine thermostats in a building, or zone of a building. The Hugh Duty Differential System is a functioning part of the Dunham Average Temperature Control System.

2. **The Dunham Differential Vacuum Heating System for Low Duty**—The design of this system embraces equipment of the same general type as used in the High Duty System. Its fuel economy closely approaches that system but it does not claim the same preciseness of temperature control as characterizes the High Duty System. However, the principle of control is the same as in that system; the radiator temperatures are varied and radiators may be either completely or partially filled according to the heat loss requirements. The vacuum, however, is limited to fifteen inches. The Low Duty System can be very effectively related to existing buildings in changing

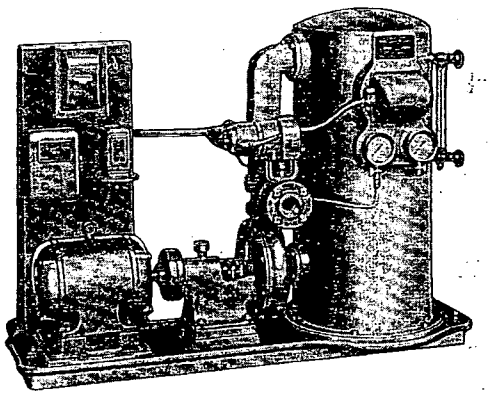
over ordinary vacuum return line systems to differential operation. One or more thermostats coupled with Dunham Heat Balancer may be used with a Low Duty System.

3. **The Dunham One-Pipe Vacuum Heating System with Sub-Atmospheric Steam**—In this system the range of steam temperatures and pressures is ample to give great flexibility of operation in the lower range of vacuums. This system is designed primarily to enable owners of existing one-pipe systems to obtain the benefits of the Dunham Differential Vacuum principle of operation by rearranging the system to operate on that principle. The change-over can be made without extensive cutting of floors or walls. Systems having air line will usually require no such cutting.

Dunham Line of Pumps for Differential Vacuum Heating Systems and for Vacuum Return Line Heating Service

This line of pumps is characterized by an entirely new and improved Vacuum Producing Element of exceptional quietness and high efficiency; by a Discharge Valve which is rugged and reliable and by a new Control Equipment Mounting. These, with other refinements result in an outstanding piece of equipment.

These pumps are built in eleven sizes, ranging from capacity of 2500 to 150,000 sq ft of radiation inclusive. The "VR" Series pumps are furnished with Accumulator Tank with automatic units—and without Accumulator Tank for continuous operating units. They meet the requirements of the Vacuum Return Line Heating Pump Manufacturers' Section of the *Hydraulic Institute*, which is likewise the adopted standard for the *American Society of Heating and Ventilating Engineers*. It represents the true test for best practice of a Vacuum Return Line Heating Pump.



"DV" Series Pump for Dunham Differential Vacuum Heating System
"VR" Series Pump for Dunham Vacuum Return Line Heating Service

For 1935

THE DUNHAM HAND BOOK

Dunham Hand Book No. 514 will be issued early in 1935. It has been prepared with a two fold purpose. (1) To clarify the principles applied in Sub-Atmospheric Steam Heating and which are utilized in the Dunham Differential Vacuum Heating System. (2) To describe the component parts of the System and their coordinated characteristics.

A handy volume of 448 pages covering Principles, Design and Equipment, Applications, etc., including other Dunham Systems and Dunham Appliances, general heating data and tables. Write to the General Offices in Chicago now for your copy. It will be mailed promptly upon publication.