

C. A. Dunham Company

General Offices: Dunham Bldg., 450 East Ohio St., CHICAGO, ILL.

Factories: MARSHALLTOWN, IOWA, MICHIGAN CITY, INDIANA AND TORONTO, ONT., CAN.

Special Sales Office, WASHINGTON, D.C. (Munsey Bldg.), Col. W. H. Riblet

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Central Division Offices
450 E. Ohio Street, Chicago, Ill.

Western Division Offices
617 W. 7th Street, Los Angeles, Calif

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BOSTON, MASS., 136 Federal St.
BUFFALO, N.Y., 232 Delaware Ave.
CLARKSBURG, W.Va.,
212 Exponent Bldg.
GREENSBORO, N.C.,
915 American Bank Bldg.

GREENVILLE, S.C., P. O. Box 563
HARRISBURG, Pa., 2216 N. Fifth St.
HUNTINGTON, W.Va., 530 First Hunt-
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JOHNSTOWN, Pa., 244 Market St.
KINGSTON, Pa.,
302 Kingston Corners Bldg.
NEWARK, N.J., 972 Broad St.
NEW HAVEN, CONN., 30 Whitney Ave.
NEW YORK, N.Y., 101 Park Ave.

PHILADELPHIA, Pa., 1500 Walnut St.
PITTSBURGH, Pa., 3002 Grant Bldg.
POUGHKEEPSIE, N.Y., 38 Fulton Ave.
PROVIDENCE, R.I., 49 Westminster St.
ROCHESTER, N.Y., 972 Westminter Bldg.
SYRACUSE, N.Y., 306 O. C. S. B. Bldg.
TRENTON, N.J., 219 E. Hanover St.
WASHINGTON, D.C., 327 Munsey Bldg.
WHITE PLAINS, N.Y., 199 Main St.
(Bar Bldg.)

CENTRAL DIVISION

Special Sales Office, 450 East Ohio Street, Chicago, C. E. Roscoe

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CHATTANOOGA, TENN.,
1201-03 Volunteer Bldg.
CHETENNE, WYO., 430 Boyd Bldg.
CHICAGO, ILL., 450 East Ohio St.
CINCINNATI, OHIO,
1231 Union Trust Bldg.
CLEVELAND, OHIO,
430 Terminal Tower Bldg.
COLORADO SPRINGS, COLO.,
1424 E. Platte Ave.
DALLAS, TEXAS,
408 Dallas National Bank Bldg.

DAVENPORT, IOWA, 305 Security Bldg.
DENVER, COLO., 414 West Colfax Ave.
DES MOINES, IOWA,
710 Old Colony Bldg.
DETROIT, MICH., 2988 E. Grand Blvd.
DULUTH, MINN., 316 Glencoe Bldg.
GRAND RAPIDS, MICH.,
1003 Grand Rapids Trust Bldg.
HOUSTON, TEXAS, 911 Electric Bldg.
INDIANAPOLIS, IND.,
Board of Trade Bldg.
IRONWOOD, MICH., 6 Albert Bldg.
JOLIET, ILL., P. O. Box 1086

KANSAS CITY, Mo., 615 City Bk. Bldg.
LOUISVILLE, KY., 1342 Sparks Bldg.
MEMPHIS, TENN., 355 Madison Ave.
MILWAUKEE, WIS., 901 Empire Bldg.
MINNEAPOLIS, MINN., 132 So. 10th St.
NEW ORLEANS, LA., 419 Maritime Bldg.
OMAHA, NEB., 527 Peters Trust Bldg.
PEORIA, ILL., 1303 Peoria Life Bldg.
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SAN ANTONIO, TEXAS,
3005 Smith-Young Tower
TOLEDO, OHIO, 1918 Vermont Ave.
WICHITA, KAN., 1100 E. Douglas Ave.

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SALT LAKE CITY, UTAH, 204 Dooly Bldg.
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232 Monadnock Bldg.

C. A. Dunham Co., Ltd.
(of The United Kingdom)

18 St. Thomas St., S.E. 1, London, England.
Agencies: Birmingham, Eng.; Leeds, Eng.; Liverpool,
Eng.; Newcastle-on-Tyne, Eng.; Glasgow, Scotland; Belfast,
Ireland; Paris, France; Munich, Germany; Copenhagen,
Denmark; Gothenburg, Sweden; Wellington, N.Z.



This Service is delivered through over eighty Sales Offices throughout the United States, Canada and the United Kingdom. These Branch and Local sales offices bring Dunham Heating Service as close to your office as your telephone. Consult your telephone directory for the address of our office in your city. An engineer will counsel with you on any project.

DUNHAM DIFFERENTIAL VACUUM HEATING SYSTEM

Heating with Steam of Variable Temperatures—Cool Steam (133 deg. Fahr.) Warm Steam (133 deg. to 212 deg. Fahr.); Hot Steam (Above 212 deg. Fahr.)

Principles and Design

The principle of the Dunham Differential Vacuum Heating System is based on the fundamental laws of heat flow and heat processes. The basis of the theory is briefly

summed up in the statement of its object—to maintain steady temperatures inside a building throughout the heating season, irrespective of the daily and hourly fluctuations of the outside weather.

No Complicated Equipment Required

The Differential Vacuum Heating System accomplishes this without any complicated or delicate equipment, or any greater variety of appliances than is used by the ordinary Vacuum Return Line Heating System. No larger or special Boiler is required on this system than on any other. Any type of Boiler suitable for heating work and of high efficiency can be used.

Easily Adaptable to Change-over From Existing Vacuum Return Line Systems

An ordinary, well-designed, Vacuum Return Line System can be changed-over to the Dunham Differential System. Radiation does not have to be disturbed and in most instances existing piping may be used with only slight changes.

The system uses steam as a heating medium. Steam is supplied at variable temperatures from 133 deg. up to 212 deg. and higher if so required. The 133 deg. temperature corresponds to 25 in. of vacuum (at sea level), and 212 deg. to zero on the gauge. By furnishing steam at this wide range of temperatures, it is possible to vary the heat output of the radiation thus preventing overheating.

Based on Bed-Rock Laws of Physics

This system is simple in design, easy to install and very economical in operation.

Location	Altitude Feet	Boiling Point
Airplane Alt. Rec.	38,704	
By Lieut. McCready		
Dunham Dif. Syst.	(37,881)	133.0°
Mt. Everest	29,002	149.2°
Mt. McKinley	20,000	167.3°
Pike's Peak	14,180	179.6°
Mt. Hood	11,225	186.1°
Denver	5,279	199.7°
Sea Level	0	212.0°

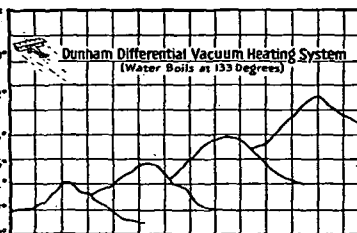


Fig. 1220A

No new principle is used to attain the long sought combination of comfortable heat, with real economy. The application of the Dunham Appliances which utilize this important principle is the only thing new. These appliances are *attention-compelling and revolutionary*. They have made the Dunham Differential Vacuum Heating System the outstanding heating development of the decade.

The temperature of the steam is governed by the Dunham control equipment and the Dunham Differential Vacuum Pump, which removes the air from the system, thereby reducing the pressure on the water in the boiler, or causing the steam to expand through Reducing Valves when they are used.

The term "Differential" is applicable because a relatively constant differential in pressure between the radiator and the return is maintained, so that the air and water will constantly flow out of the radiators. The steam is induced to completely fill them. Due to this "Differential" complete circulation is obtained and the radiators throughout the building are heated uniformly.

THE HEAT EMITTED BY A RADIATOR DEPENDS ON THE TEMPERATURE DIFFERENCE BETWEEN THE RADIATOR AND THE AIR OF THE ROOM.

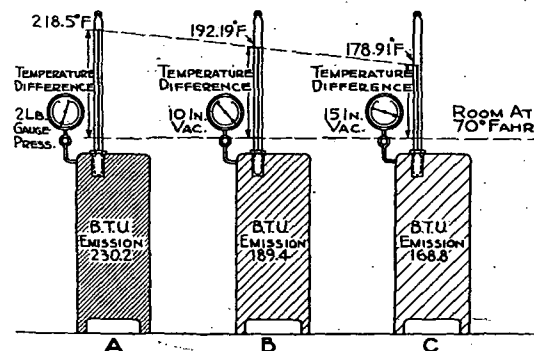


Fig. 1083A

Heat Emission from Radiation Under Vary- ing Pressure and Tem- peratures

The heat given off by the radiator is proportional to the difference in temperature between the room and the radiator. By varying the temperature of the radiator, the building temperature can be kept constant, and the heat given off by the radiator kept in proportion to the heat loss from the building. By operating the system at varying degrees of pressure or vacuum the temperature of