Webster

Systems of Steam Heating

1943 General Catalog

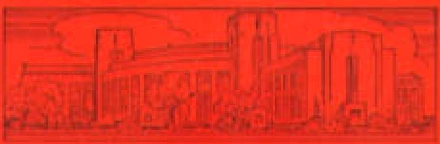
WARREN WEBSTER & CO. CAMDEN, N.J.

STEAM Heats America . . . .

Fifty years of experience—fifty years of study and experiment—fifty years of checking and re-checking taught America that the fastest, the surest, the safest and the most economical method for heat distribution is steam.

Steam meets the economy specifications in the great low-rent multiple housing projects because it combines low first cost, low operating cost, long life and year-round comfort.

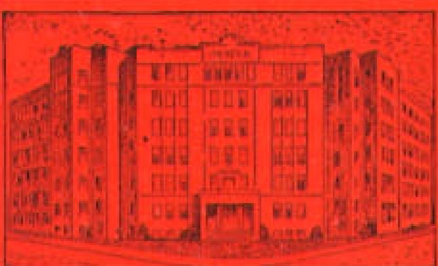
Steam provides the luxury heating values demanded in great hotels and fine apartments because it is quick to respond and easy to control.



Cardinal Hayes Memorial High School, New York, N. Y. This outstanding Catholic educational building was erected in 1940-41 and equipped with a Webster Moderator System of Steam Heating. Architects—Eggers & Higgins; Consulting Engineer—Syska & Hennessy; General Contractor—George A. Fuller Co.; Heating Contractor—Almirall & Co., Inc.

Steam is the preferred heating medium in air-conditioned buildings because of easy, close control. Where air conditioning is a likely eventuality, steam heating is a sound initial investment.

Steam heats the most modern buildings in America today and it is no surprise to find modern Webster Moderator Systems in a preponderant number of these fine buildings.



From the day the Webster Moderator System went into operation in the Presbyterian Hospital, Newark, N. J., steam distribution was noticeably improved. Coal consumption was reduced 591 tons in one year.

Every day more and more existing buildings are securing the advantages and economies of modern steam heat with the Webster Moderator System. In hundreds of cases modernization has paid for itself in four years or less out of savings effected.

Figured as an investment a Webster Moderator System is more likely to be self liquidating than any other building improvement.

WEBSTER SYSTEMS
OF STEAM HEATING

Webster Systems of Steam Heating are all basically two-pipe systems of steam heating, known as vacuum or vapor systems. These *modern* Webster Systems should never be confused with old fashioned steam heating or with crude one-pipe steam systems. While utilizing steam at low pressures and thereby incorporating all of the many advantages inherent in its use, the *modern* Webster Systems of Steam Heating provide a combination of features which makes them particularly deserving of consideration for buildings of almost every type.

Steam Supply

Modern Webster Systems take steam from *any* source at *any* pressure. In most cases they are supplied from low pressure sources, usually low pressure boiler plants which may burn coal, coke, oil, gas or other fuels. Or they may take steam from a "city main." Where a high pressure source exists steam pressure is reduced to the desired pressure through a pressure reducing valve before being supplied to the heating system.

Steam Distribution

Steam at low pressure is ideal for distribution. It goes from place to place by virtue of the pressure created in its generation, and surprisingly little pressure indeed is sufficient to cause it to move from the point of supply to the point of use. *No fans or pumps are necessary when heat is moved in the form of steam.*

Steam distribution piping can be arranged with the utmost flexibility. Steam mains may run in a loop around the circumference of a building, or a trunk main may run directly through the center with branches taken off at right and left. The distribution main may be located in the basement with vertical connections rising to the various floors. Or if desired, the distribution mains may be located at the top floor with vertical connections feeding downward. In other instances distribution mains may be located at an intermediate level, with risers feeding both upwards and downwards. There are practically no restrictions to the arrangement of distribution piping when you use a Webster System of Steam Heating.

Distribution piping is ordinarily insulated to reduce heat loss. However, where it is desired to keep cost at a minimum, the distribution piping may be considered a part of the effective heating surface with a consequent reduction in the size of the radiators required. Easy and quiet distribution, which is both quick and effective, is assured by selection of proper sizes of pipes and by proper grading. This perfect distribution is further assured by selection of proper size and type of Webster Radiator Supply Valves and Webster Return Traps for each radiator. Webster Thermostatic or combination Float-And-Thermostatic Traps are used at appropriate locations in the supply mains in order to assure that the distribution piping will be kept automatically cleared of air and water of condensation.

All radiators in Webster Systems get steam at the same time and substantially in proportion to the need for steam. This important result is obtained through the installation of accurately-sized metering orifices in Webster Radiator Supply Valves and also, where required, by use of Intermediate Metering Orifices at suitable points in branch mains.

Radiators

The great flexibility of Webster Systems of Steam Heating is again illustrated by the wide choice offered in the selection of radiators or heat transfer surfaces. Many Webster Systems employ the widely used conventional cast iron "standing" radiation, either exposed in the room or concealed behind grilles. Cast iron convectors may, however, be used interchangeably.

In many other installations Webster System Radiation is employed. This non-ferrous heating surface includes a substantial furniture steel cabinet which may either be exposed or concealed within the walls. Inside this cabinet is placed a single unitary structure which incorporates a Webster Supply Valve with orifice, a copper tube and aluminum fin heat transfer surface, and Webster Thermostatic Trap together with two solid brass union connections.

When Webster System Radiators are used a complete unit is provided, requiring only the piping to and from the unit. Among the advantages obtained by the use of Webster System Radiators, aside from concealment,

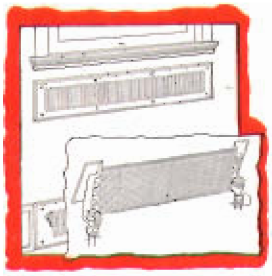


Fig. 1. The unique Webster System Radiator goes logically with the Webster Moderator System. Compact, concealed, it "converts" gently warmed air. Low outlet air temperatures result from the same turbulence principle producing low *surface* temperatures in iron radiators . . . gives same comfort results.

is the delivery of *a maximum amount of heat from a given amount of space occupied.* Comparison of the space required for a Webster System *Steam* Radiator with the corresponding space required for a cast iron steam radiator will show a substantial space saving. Comparison with the corresponding size of radiator required for a hot water system is still more marked.

Where space conditions make it desirable, Webster-Nesbitt Unit Heaters may be employed in Webster Systems, or unit heaters of other makes, unit ventilators or fin surface. *In fact, all types of heat transfer surface are operated at their best when steam is provided through a Webster System of Steam Heating.*

Control

Each Webster System can be effectively controlled to assure maximum economy and comfort. The wide flexibility of Webster Systems is further illustrated when the subject of control is considered. The simplest form of control is a Webster Supply Valve. Here the purchaser of a Webster System has a choice of a simple sturdy on-and-off valve which will close tightly with a small turn of the handle. Or a Webster Modulation Valve may be selected giving a full range of manual adjustment.

Aside from the control accomplished by manual supply valves, Webster Systems may be used with thermostatic control of supply valves on radiators, and with the complex controls frequently used with school unit ventilators and other complete temperature control systems.

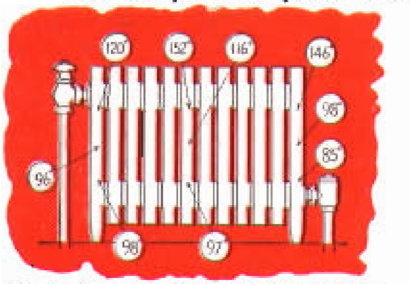


Fig. 2. Actual proof of low radiator temperatures! Here are actual temperatures at nine points and showing average radiator temperature of 112° F. . . . due to scientifically controlled turbulence.

A group of unique Webster Central Controls is available for most installations using so-called direct radiation (whether it be "standing" cast iron, cast iron convector or non-ferrous convector). These Webster Central Controls are available from a relatively inexpensive unit to the comprehensive control required for a multiplicity of buildings served from a central plant, as for example, an entire University group of buildings.

Webster Systems with Webster Controls, from the simplest to the most elaborate, offer certain extremely important fundamental characteristics. Comfort, rather than exact temperature control, has been the prime objective. This has been attained by providing a system and control in which the radiators are *always pleasantly warm . . never cold . . and never unpleasantly hot.*

Webster Central Controls work like an automobile engine throttle. They *speed up* or *slow down* the heating of the radiators and eliminate stop-and-go "traffic" in the heating system. The days when the objection could be raised that, with steam, radiators are too hot, have gone forever with *modern properly controlled Webster Systems*. Due to the combined effect of balanced steam distribution through orifices and throttling central controls, radiators in Webster Systems of Steam Heating may now have low radiator temperatures comparable with those obtained previously only with hot water.

Examine the illustration in Figure 2. The temperatures shown in this illustration are taken from *actual* readings of a radiator in a Webster Moderator System of Steam Heating. With steam at atmospheric pressure and consequently 212° F. temperature in the supply piping, radiator temperatures nevertheless average only 112° F. This unique result is not due to "high vacuum" but to the creation of a scientific turbulence which produces a close inter-mixture of steam and air right in the radiator. How this turbulence is produced in cast iron radiation is shown in the illustration of Fig. 3. But do not make the mistake of thinking that it is *only* with cast iron radiation that this effect is obtained. Equal and even superior results are obtained with convectors and particularly with Webster System Radiators where the *outlet air temperatures are always low* and heating is effected in colder weather by the more rapid circulation of *gently warmed air.*

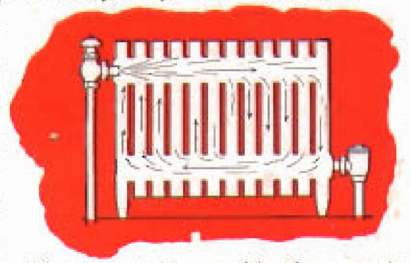


Fig. 3. Turbulence resulting from metering steam into radiators through jets at high velocity produces a close intermixture of steam and air right in the radiator and results in low radiator temperatures in mild weather . . . without resort to high vacuum. Individual control at the radiator is provided by the Webster Supply Valve. A Webster Radiator Trap keeps the radiator freed of condensation at all times.

Where desired, vacuum returns may be provided with vacuum up to 15 inches of mercury. Such vacuum return installations facilitate quick heating-up with resulting economy, particularly in office buildings and similar structures.

Webster Control Systems

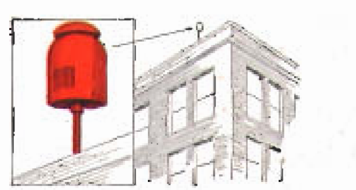


Fig. 4. Webster Outdoor Thermostat reliably forecasts occupants' needs, increasing steam delivery automatically and before occupants feel "chilly."

Webster Moderator Systems are "controlled-by-the-weather" with an automatic Outdoor Thermostat. One or more Variators, hand operated, can be used to modify the Outdoor Thermostat for quick heating-up, occupancy changes, etc. The Type E-4 Electric Moderator System (see pages 4, 5 and 6) provides continuous steam flow and is in general suitable for medium to large buildings and groups of buildings requiring one or more control valves. The Air Moderator System (pneumatic-electric operation) provides continuous steam flow for large buildings or groups of buildings requiring three or more control valves. The Type EH-10 Moderator System is a single zone pulsating flow control for small to medium size buildings. The Type EH-3 Electric Moderator System is a synchronized pulsating flow control for large buildings or groups of buildings where multi-zoning is desirable. *Webster Hylo Systems* are provided for smaller buildings. With these systems adjustment for changes in outdoor temperature is accomplished manually.

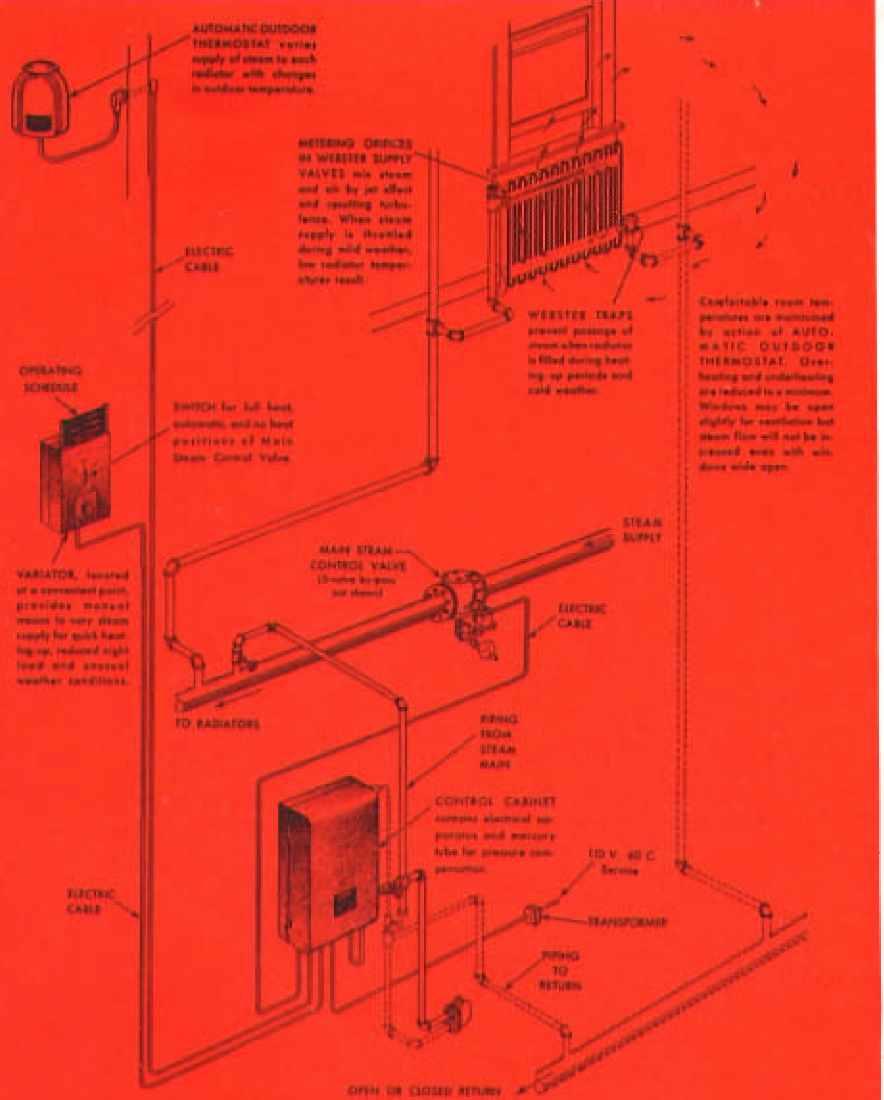


Fig. 5. Standard Arrangement of Webster Moderator System Using a Single Main Steam Control Valve

WEBSTER E-4 ELECTRIC MODERATOR SYSTEM

A Service Bulletin giving complete mechanical details and operation and maintenance instructions is available to supplement the brief description on this page and the next. Ask for Service Bulletin S-952.

The Webster Type E-4 Moderator System is an electrically-operated central control providing *continuous* but automatically graduated or throttled steam flow to all radiators. An *Outdoor Thermostat* automatically varies the rate of steam delivery to radiators with changes in outdoor temperature. A *Variator*, manually operated, modifies the action of the Outdoor Thermostat for such requirements as quick heating-up, changes in occupancy, and weather conditions other than temperature. Experience has shown that greater economy is possible when these factors are provided for by manual adjustment. Optional equipment includes (1) pilot light on Variator; (2) automatic overheat limit Indoor Thermostat and (3) electric time switch for automatic heating-up, return to normal, and shut-off.

Application

The Webster Type E-4 Moderator System is suitable in general for medium to large sized buildings heated by two-pipe orificed systems using low pressure steam from any source.

It is provided in a standard arrangement (Fig. 5) using a single Webster Main Steam Control Valve. For most installations of average size where occupancy conditions are uniform throughout the building, the single valve arrangement is adequate and will be preferred because of lower first cost. Or two valves may be provided with a dual Outdoor Thermostat. For large installations, particularly where occupancy conditions vary in different portions of the building or in different buildings in a group making a multiplicity of valves desirable, a single Outdoor Thermostat plus a multi-zone Thermostat Control Cabinet might be used.

How It Works

For the purpose of describing the Type E-4 Moderator System, Fig. 5 will be used. Steam may be delivered from high or low pressure boiler or from any other source. Pressure reducing equipment should be used if initial steam pressure is 15 lb. per sq. in. or more. Return piping may be either "open" or "closed," as the E-4 Moderator Control regulates the pressure difference and will function equally well regardless of whether the pressure in the return piping is at atmosphere or below.

The Main Steam Control Valve is adjusted automatically by the electrical Moderator Control apparatus. The valve is motor-operated. The Moderator Control serves simply to reverse the direction of the motor, causing it to move the valve in the closing direction when less steam is required and in the opening direction when more steam is required.

The electrical Outdoor Thermostat provides the automatic "Control-by-the-Weather" feature varying steam flow in accordance with changes in outdoor temperature. At 70° F. outdoor temperature the Main Steam Control Valve will close almost entirely. At the extreme of 0° F. outdoor temperature (or − 10° F. or + 10° F. etc., depending on climate) the Outdoor Thermostat will cause the valve to open sufficiently to keep the radiators filled with steam. At intermediate outdoor temperatures, the Main Steam Valve is adjusted proportionately and radiators are fractionally or partially filled with steam. The position of the Control Valve thus selected automatically by the Outdoor Thermostat may be advanced or reduced by the Variator to give more or less steam than is called for by the outdoor temperature.

Compensation for Pressure Changes

Fluctuations in boiler pressure, in vacuum, in number of radiators turned on, etc., change the pressure difference in the heating system from that called for by the joint action of Outdoor Thermostat and Variator. These changes in pressure difference are compensated for automatically by a pressure-actuated mercury tube in the Control Cabinet. See Fig. 13.

One end of this tube is connected to the steam supply main and the other end to the return main (see Fig. 5). If, for example, the supply pressure is unduly increased, mercury rises in the tube to unbalanced resistances contained therein, and the Main Steam Valve begins to close. When the pressure difference decreases to that called for by the control equipment, the resistances are balanced and the Main Steam Valve stops. A reverse action takes place when the pressure difference falls below that called for by the Control equipment.

WEBSTER TYPE E-4 MODERATOR SYSTEM EQUIPMENT

Fig. 6. **Automatic Outdoor Thermostat** Is $8\frac{7}{8}$ In. Diameter by $11\frac{1}{2}$ In. High

Automatic Outdoor Thermostat

Provides automatic "Control-by-the-Weather." It is simple, rugged and compact. Interior parts are mounted on cast iron base and sealed by a metal housing. Entire device is protected from direct rays of sun by a metal shield. Ample space between shield and housing is provided for air circulation. Thermostatic element is a bimetallic coil expanding and contracting to move a contact arm over an electrical resistance. Change in resistance energizes control valve motor which adjusts the Control Valve. At 70° F. or higher outdoor temperature the Control Valve is completely closed.

Installation—Placed on roof or outside wall using vertical pipe stand or horizontal bracket of conduit with condulett. Fittings for mounting not furnished with Thermostat. Must be connected to Control Cabinet by two No. 14 rubber covered, single braided wires to carry 24 volts. Approx. wt. is 8 lbs.

Variator

A small metal cabinet containing (1) adjustable knob for manual control of the steam supply and (2) 3-way switch to close Main Steam Control Valve, to place Valve under control of Outdoor Thermostat and Variator, i. e., Automatic, and to open valve at full heat position, and (3) operating schedule card holder. One Variator required for each valve controlled.

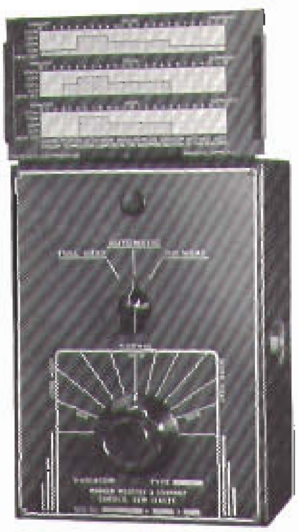


Fig. 7. **The Variator is** $6\frac{5}{16}$x$11\frac{7}{8}$x5 **In. in Size**

Operation — Modifies action of Outdoor Thermostat. Turning knob to left reduces steam supply; turning right increases supply by desired *percentage*. Used principally for heating-up during early morning hours and for reduced evening or night heating. Occasionally for exceptional weather conditions such as winds, hot sun, cloudiness, etc. However "normal" setting will take care of average conditions of wind, sun and shade.

Installation—Can be located on wall at any convenient operating station—the boiler room, superintendent's office, beside private exchange, etc. Adjustment is simple and may be made by stenographer or telephone operator. Must be connected to Control Cabinet by four No. 14 rubber covered, single-braided wires to carry 24 volts. Approx. wt. 7 lbs.

Main Steam Control Valve

Globe pattern, semi-balanced, double-seated disc type. Valve seats and discs are phosphor bronze. Bodies are cast iron made with best gray iron from metal patterns. All valves have flanged bodies but companion flanges are not included.

A standard induction type reversing motor opens and closes the valve through lever and linkage.

Installation—Installed in steam main usually with conventional 3-valve by-pass. One-valve by-pass may be used where considered adequate. Must be connected to Control Cabinet by 3 No. 14 rubber covered, single-braided wires to carry 24 volts for valve sizes up to 8 inches inclusive; three wires through relay (24 volt to 110 volt) for 10 and 12 inch valve sizes.

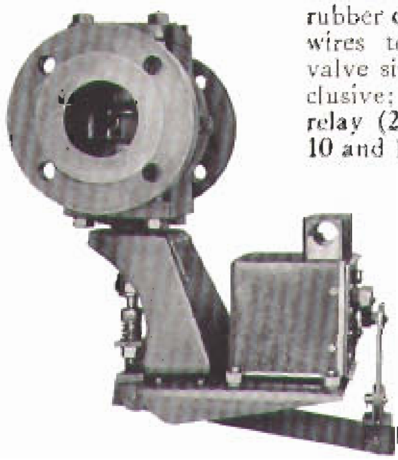


Fig. 8. Type E-1N Main Steam Control Valve. Made in $1\frac{1}{2}$ In. to 8 In. Sizes. Type E-1 for 10 In. and 12 In. Sizes

Pressure Control Cabinet

Contains standard electrical apparatus such as resistances, relays, etc., in addition to specially designed mercury contact U-tube. Has hinged cover for accessibility, with lock. One cabinet required for each valve controlled.

Installation — Bolted or screwed to wall near Control Valve. Electrical service (100 watts, 110 volts, 60 cycle a-c) to operate control system is brought thru transformer (110-24) to this cabinet. For d-c current, a Rotary Converter should be provided. Piping connections made from cabinet to steam and return mains. A Webster Size 00026-O Drip Trap and Relief Valve are included. App. wt. 70 lbs.

Fig. 9. Pressure Control Cabinet Is 14x22x7 In. in Size. Tube at Right Extends 9 In. Below Cabinet

WEBSTER E-4 MODERATOR SYSTEM

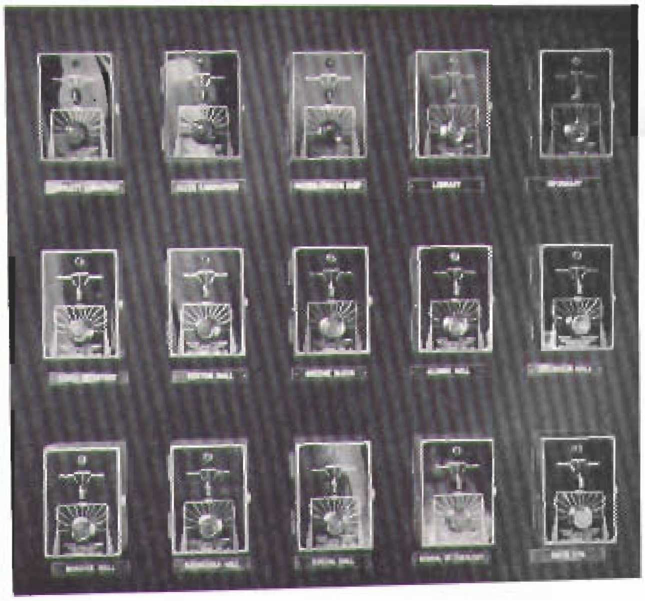


Fig. 10. Fifteen buildings at Alfred University, Alfred, N. Y., are controlled from this panel which holds 15 Webster Variators of the Type E-4 Moderator System.

Multi-Zone Installations

For large buildings or groups of buildings where zoning is specified, a Webster Type E-4 Moderator System with two or more Control Valves may be used. Colleges and universities, large hospitals, religious and public institutions, housing projects, etc., can often benefit by a multi-zone Webster Type E-4 Moderator System.

Even Boiler Loads—The Webster Type E-4 Moderator System is a *true* continuous flow type and boiler loads will be even at all times whether control equipment is installed in each building or whether it is all placed at a single point such as the boiler plant or machine room.

In a multi-zone installation, each zone or building has its own Webster Control Valve, Pressure Control Cabinet, and Variator making it possible to shut off or vary heat supply independently of other zones or buildings. Location of the manually-operated Variators is optional. They can be placed in each zone or building, or mounted together at a single central operating station at added cost for the extra wiring to the central point. The Webster Pressure Control Cabinet must be installed near its Control Valve.

Fig. 11. Webster Thermostat Control Cabinet used with Webster Outdoor Thermostat for multi-zone installations is 22 in. long, 6 in. deep and 7½ in. high.

A two-zone arrangement would employ one Webster Outdoor Thermostat of the dual type. Three to 8 zones would use a single Outdoor Thermostat with a Thermostat Control Cabinet which is 22" x 6" x 7½" in size. This Cabinet contains a motor-operated rotating shaft on which are mounted resistors, one for each zone or building. Occasionally the conditions at an individual building or institution make it desirable that each zone have its own Outdoor Thermostat.

Special Equipment

Special equipment is provided with the Webster Type E-4 Moderator System to meet the individual heating and operating requirements of some buildings and institutions. This equipment, described in the following paragraphs, is available at added cost.

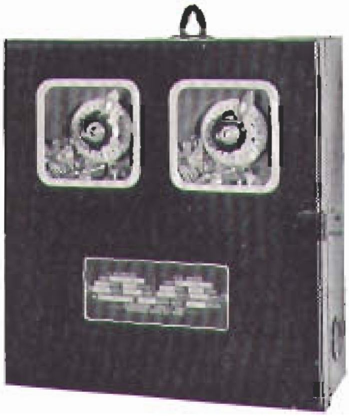


Fig. 12. Duplex Time Switch KADH-12 makes certain operations of Webster Moderator System fully automatic. Cabinet is 9½ in. wide, 10¼ in. high, and 3¾ in. deep.

Time Switches—When it is desired that certain operations of the Moderator System be fully automatic, Time Switches are used. Switch KAH-12 provides (1) night shut-off and (2) morning turn-on. Duplex Switch KADH-12 provides (1) night shut-off and (2) morning turn-on at heating up rate and (3) return to normal after heating up period. These Time Switches are complete with cabinets and are generally installed adjacent to the Webster Variator. Operation of switch motors is by 24 volt 60 cycle alternating current.

Variator Indicating Lamp lights when Main Steam Control Valve is open. Bull's eye is located on face of Variator. Lamp is controlled by an auxiliary mechanical switch installed on the Control Valve. This arrangement is particularly helpful where Variator has been placed at a considerable distance from Control Valve.

Automatic Overheat Limit can be provided by indoor thermostats which are wired to Webster Variator. Plain or clock type thermostats are available. In operation, they close Webster Main Steam Control Valve when desired high temperature is reached. Time Switch operation can be combined with these indoor thermostats.

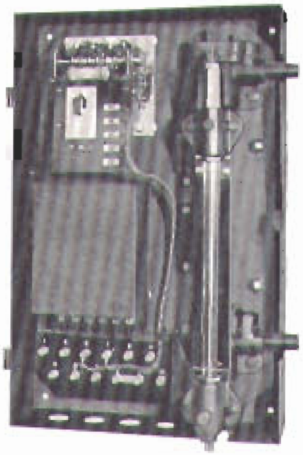


Fig. 13. Webster Pressure Control Cabinet with cover removed. Alternating Drainer is shown in upper left corner. Pressure-controlling mercury tube (read page 4) is at right.

Alternating Drainer is an automatic switching and cycling device located in the Webster Pressure Control Cabinet when required. One use is to compensate for undersized risers or trapped laterals. Another use is to make possible the application of Webster Type E-4 Moderator Control to certain existing one-pipe steam systems. An important application is to provide mild weather control of risers used as heating surface in bathrooms and kitchens of apartments, dormitories, etc. The Alternating Drainer accomplishes its purposes by combinations of normal operation, full heat, and no heat intervals.

WEBSTER EH-10 MODERATOR SYSTEM

Fig. 14. Webster EH-10 Moderator Control Cabinet is approximately 7½ in. wide, 11⅞ in. high, and 7¼ in deep. Weight is 17 lbs.

The Webster EH-10 Moderator System is a single zone, central heat control of the *pulsating flow* type. It is applicable to a Webster Control Valve (see page 5) placed in the supply main of a building served by "central station" steam or to directly control burner, stoker, blower or draft damper motor. This Webster System has been designed chiefly for the small and medium sized building.

Control is accomplished by varying the length of "ON" intervals during which steam is delivered to radiators. The latter are usually equipped with Webster Metering Orifices. The control units of the EH-10 Moderator System are the Control Cabinet shown in Fig. 14 and an Outdoor Thermostat which is attached to the Cabinet by capillary tubing. Schedule clock for automatic turn-on at heating-up rate, return to normal operation, and night shut-off can be provided. Indoor thermostat, with or without clock, is optional.

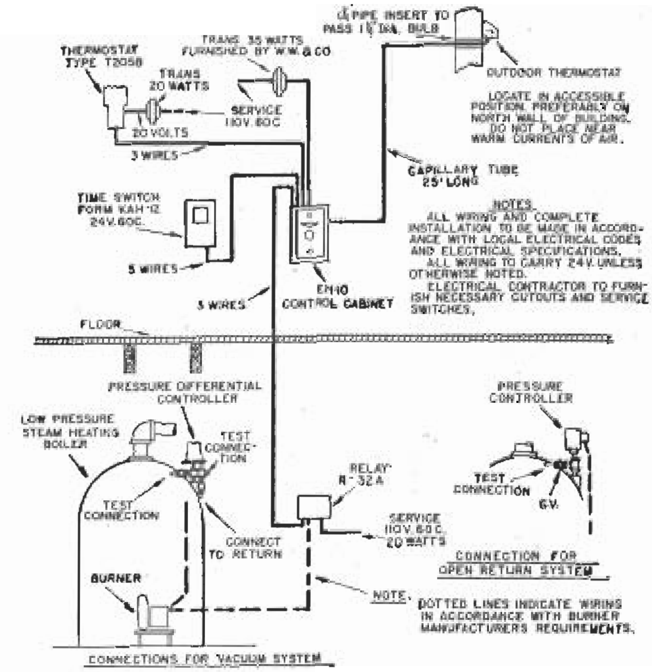


Fig. 15. General arrangement of Webster EH-10 Moderator System controlling burner of steam boiler. Time switch and indoor thermostat are optional equipment. The EH-10 Moderator System is used also with stoker, blower, draft damper motor, or steam control valve.

WEBSTER SP HYLO VARIATOR SYSTEM

A central control of the graduated, *continuous flow* type which varies steam supply to the entire heating system in accordance with changes in outdoor temperature. Provides a simple, rugged and dependable control for the smaller building. Consists of Type SP Hylo Steam Variator Cabinet (Fig. 16) and Type E-1N Main Steam Control Valve (Fig. 8, page 5). Adjustment of control dial causes motor to position Control Valve in steam main. Ordinary pressure variations in supply and return mains are compensated for automatically by sensitive bellows. Adjustment of the temperature dial may be made by reference to thermometer located outdoors, or remote reading thermometer may be mounted near control cabinet. Time Switch for automatic turn-on and shut-off, or indoor thermostat for automatic overheat limit shut-off are optional.

Applicable to two-pipe orificed systems, either open return or vacuum, using low pressure steam from any source. May also be applied with minor modifications to directly control modulating stokers, motor operated draft dampers on hand-fired coal boilers, or blowers.

Fig. 16. Webster Type SP Hylo Variator Cabinet, approximately 12¼ in. wide, 11⅛ in. high, and 8¾ in. deep, may be located at a convenient operating point. Dial is adjusted when outdoor temperature changes and when more or less than normal heat is required. A switch gives remote shut-off. A lamp indicates that system is in operation. A schedule card (not illustrated) is placed on frame on top of cabinet. This frame adds 3½ in. to height of cabinet.

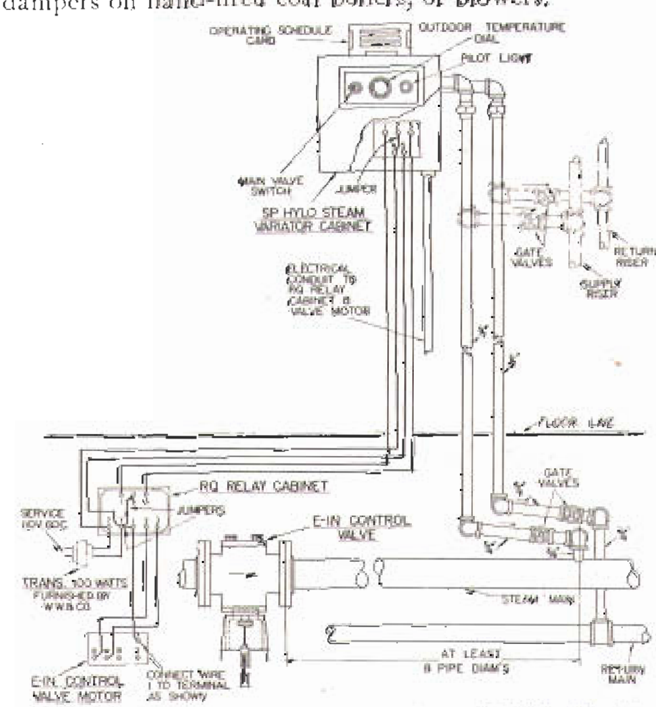


Fig. 17. General Arrangement of Webster SP Hylo Variator with Type E-1N Control Valve in Steam Main

WEBSTER EH-3 MODERATOR SYSTEM

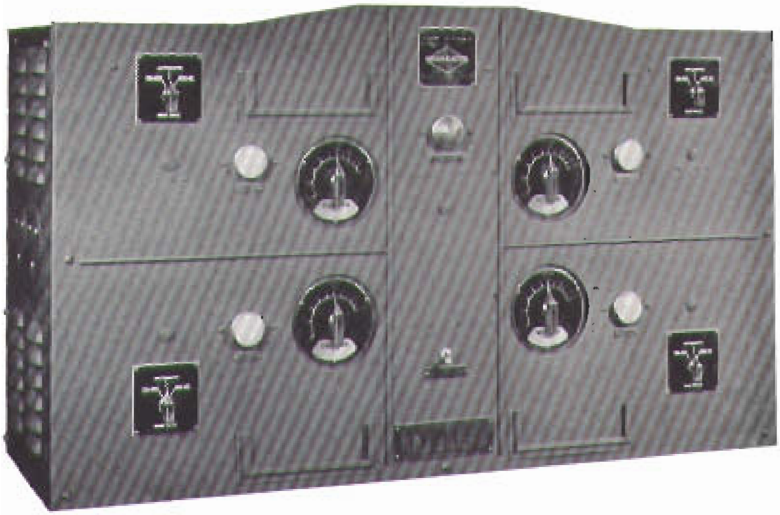


Fig. 18. Webster Type EH-3 Moderator Control Cabinet for Four Zones or Buildings. This Cabinet Is Approximately 37 In. Long, 21 In. High and 13 In. Deep. Weight is 350 pounds.

The Webster EH-3 Moderator System is a multi-valve, *pulsating flow* heat control particularly advantageous for groups of buildings or a zoned building served from a single steam source and controlled from a single central operating station. Undue fluctuation in demand on boiler and central station load is avoided by automatic synchronization of the operation of the several Steam Control Valves, a patented feature. There is no undue fluctuation in boiler pressure or in rate of return of condensate to boiler or to point of disposal.

Equipment Required

Is electrical and consists of Webster Outdoor Thermostat, Control Cabinet and Steam Control Valve equipment. An Outdoor Thermostat is located on the outside wall of roof of the central operating station. A Control Cabinet (Fig. 18) placed at a convenient point in the operating station is connected to the Outdoor Thermostat by 3 wires. A Main Steam Control Valve serves each building (or group of buildings if desired).

These Valves are connected to the Control Cabinet by low voltage wires in cables which can be run in the steam main tunnel, underground in "Parkway" cable or in conduit, or overhead on poles. Relay Cabinet is required when Valve is more than 400 feet from Cabinet.

The Automatic Outdoor Thermostat is similar to that used with the Webster Type E-4 Moderator System and is illustrated and described on page 5. Time Switch may be added to provide automatic turn-on and shut-off.

The Control Valves are Webster Type E-1N or E-1 (see Fig. 8) which in conjunction with pressure controlling devices, maintain a constant pressure difference between supply and return mains during "valve open" intervals.

The Control Cabinet contains the mechanism which produces the "pulsating flow" operation, opening and closing the Control Valves in accordance with the cycle selected by the Outdoor Thermostat and Variator. Snap Switches for opening and closing the Control Valves, other switches and pilot lights for the various electrical circuits, are included.

A small by-pass is sometimes placed around the Webster Main Control Valve to heat the mains in the morning or after a shut-down. A small motorized valve may be placed in this by-pass to shut off steam when latter is required.

The correct "on" interval is selected automatically by the Outdoor Thermostat in accordance with the outside temperature. On the Control Cabinet is the Variator which allows operator to manually modify the automatic outdoor control. In effect, this Variator allows operator to increase or decrease steam delivery to take care of weather and occupancy conditions other than outdoor temperature. A Variator is generally provided for each building or zone; however, if a number of buildings have similar heating schedules they can be grouped and controlled with one Variator.

WEBSTER AIR MODERATOR SYSTEM

The Air Moderator System is a *continuous-flow*, central control employing compressed air and electricity as mediums for operation. Applicable to large zoned buildings or groups of buildings using two or more main Steam Control Valves.

Uses Outdoor Thermostat (see Fig. 6, page 5) to automatically vary the steam supplied to entire heating system (all zones) for changes in outside temperature. Variators, one for each zone, provide supplementary manual control for heating-up, to increase or decrease heat for unusual weather or occupancy conditions, and for shut-off. Each Variator includes a lamp which lights when heat is on and a frame for operating schedule cards prepared for each installation. One or more Control Valves can be controlled from each Variator, adjustment of which changes steam flow to all Control Valves in that zone in same proportion. The required number of Variators is furnished assembled as a unit.

Main Steam Control Valves are Webster Type E-1N and E-1 described on page 5 and in Figure 8. Motors energized by Webster Valve Operator adjust Control Valves. Pressure fluctuations in supply and return mains are compensated for automatically by Valve Operators. An air compressor is furnished where compressed air supply is not already available.

How It Works

Air from compressor passes through reducing valve to Thermostat Control Cabinet. Electric Outdoor Thermostat in circuit with motor-controlled air valve produces "pilot" air pressure proportional to outdoor temperature. This "pilot" air pressure controls separate air flow from Compressor through Air Regulating Cabinet to Variators, providing all Variators with air pressure proportional to outdoor temperature. Adjustment of individual Variators changes air pressure to Valve Operators in zone. These Valve Operators adjust Control Valves and thus produce corresponding steam pressure differences in heating system of zone.

IMPORTANT—The Vacuum and Vapor Steam Heating Specialties listed on these pages comply fully with Part 1076, Schedule VIII, Limitation Order L-42 issued on April 25, 1942, by the War Production Board.

WEBSTER IRON RADIATOR VALVES

Webster Type "WB-P" Valve

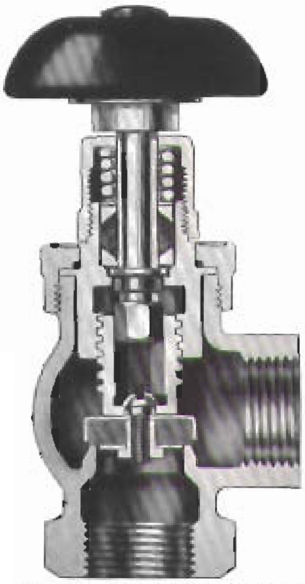
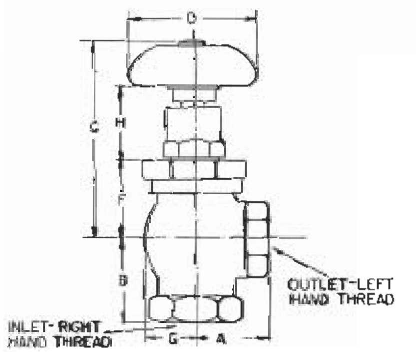


Fig. 19. Webster Type "WB-P" Iron Radiator Valve.

The Webster Type WB-P Supply Valve (Series 600P) with iron body has been designed to conserve critical metals. Elimination of union nut and nipple releases machine tool hours for war work. Outlet connection has female left-hand threads. Installation to radiator is by right and left-hand pipe nipple. This valve is made in ¾ and 1-in. sizes with angle body only. Furnished with wheel (mushroom) handle.

The Type WB-P Valve meets fully specifications calling for a "spring packless" valve. A heavy spring automatically maintains pressure on die-molded metallic ring packing.

Although packing seldom requires renewing, this valve is so designed that old packing ring can be removed and new installed while pressure is on the heating system.



While primarily for low pressure steam heating service, the Type WB-P Valves are entirely suitable for hot water heating. Furnished with or without leak hole as desired.

Pressures

For low pressure vapor and vacuum steam heating service. Maximum pressure is 75 lbs. per sq. in.

TABLE I. Dimensions of Type WB-P Valves

Size, Inches		Symbol	Approximate Dimensions, Inches						
Inlet	Outlet		A	B	C	D	F	G	H
¾	¾	W603PHF	1½	1½	3½	2¼	1½	1	1⅝
1	1	W604PHF	2	1⅝	4⅛	2½	1¾	1¼	1⅝

TABLE II. Information for Ordering

Size, Inches	Symbol	Approximate Net Weight, Pounds	Code Word
¾	W503PHF	1¾	Ilrakjed
1	W604PHF	2½	Iraklit

Construction Features of Webster Type "WB-P" Valve

(1) Non-heat conducting wheel handle opens valve in less than a turn.

(2) Heavy spring automatically maintains pressure on the packing to prevent steam leakage.

(3) Extra deep and wide Acme form threads on valve stem nut give unusual strength and provide ease in opening.

(4) High quality gray cast iron body. Note strength at all points.

(5) Renewable Jenkins composition seat disc assures tight closing.

(6) Die-molded metallic ring packing prevents leakage and lubricates valve stem. Can be repacked under pressure.

(7) Bonnet nut (cap) is high quality gray cast iron. Arrows show direction of turning.

(8) Fully machined bonnet holds all parts in alignment.

Webster Iron Double Service Valve

Simplifies piping in down-feed supply to radiators in one-story buildings, such as cantonments, military hospitals, ordnance plants etc. Combines thermostatic drip trap for down-feed riser and supply valve for radiator or convector. Saves six or more items of pipe and fittings—saves critical materials—saves steamfitter's time.

Cast iron body and cap. Phosphor-bronze trap diaphragm. Other internal parts brass. Furnished with female unionless inlet and outlet.

Installation by right-and-left nipple.

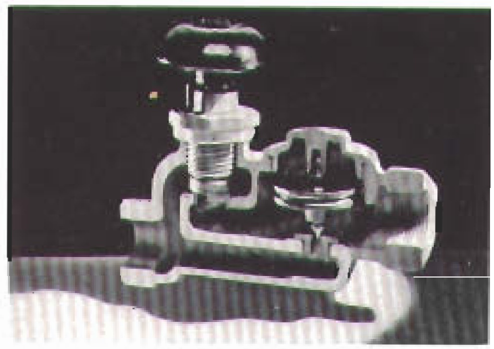


Fig. 20. Webster 173F Double Service Valve

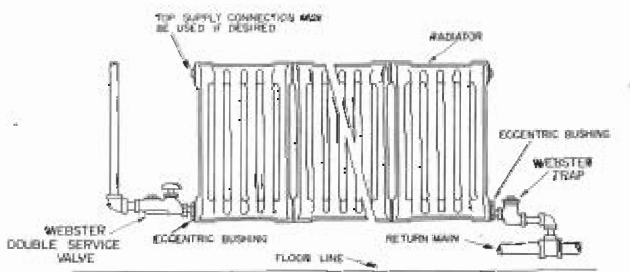
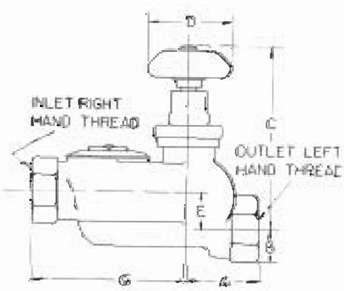


Fig. 21. Application of Webster Double Service Valve

TABLE III. Dimensions of Double Service Valves



Size In.	Symbol	A	B	C	D
¾	173F	2	¾	5⅜	2½
1	174F	2¼	1	5⅝	2½

Size In.	Symbo	E	G	Net Wt. Pounds
¾	173F	1	4½	6
1	174F	1	5½	7

All dimensions in inches and subject to slight variation.

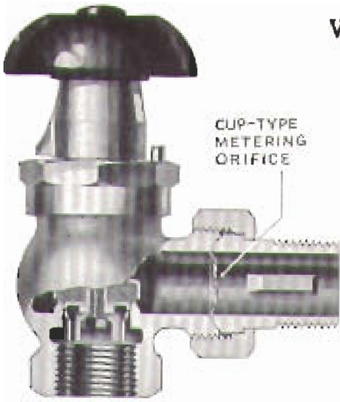


Fig. 22. Cup-type Metering Orifice Used in Radiator Supply Valve

Webster Metering Orifices

These are discs with a restricted opening, the size of which is determined by the amount of radiation, the distance (equivalent pipe length) of the radiator from the source of supply and, in tall buildings, the effect of altitude.

The size of orifices, to be installed at each radiator in Webster Systems is selected by the engineers of the nearest Webster sales office, who are equipped with complete data to make possible a proper selection.

The discs for cup, push-seat and nipple-type orifices are copper, brass or other metal to resist erosion and corrosion, amply thick to be free from vibration and shaped for silent operation. For concealed radiators and convectors, for special applications, for existing installations using earlier types of Webster Valves and for all valves of other makes these Orifices may be obtained in both standard and special types, to meet conditions and permit low cost modernization. Some of these types are shown in Fig. 26, 27 and 28.

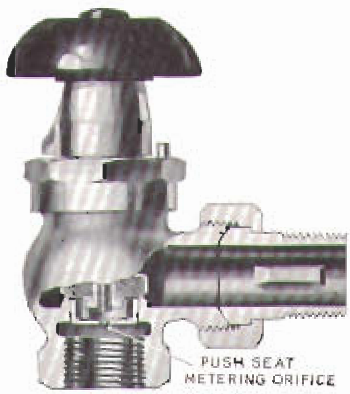


Fig. 23. Push-seat Metering Orifice Used in Radiator Supply Valve

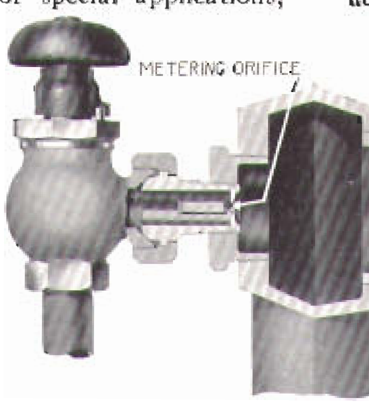


Fig. 24. Metering Orifice in Nipple of a Webster Supply Valve

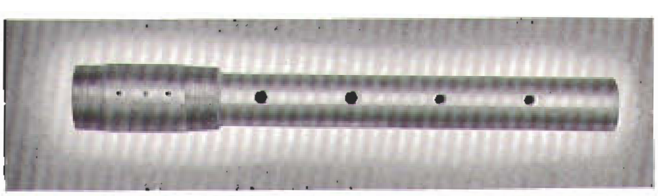


Fig. 25. Webster Manifold Coil Orifice Fitting (Patented)

Webster Manifold Coil Orifice Fitting

For balancing steam distribution in installations having large manifold pipe coils. At low pressure differences, steam is delivered through orifices with jet effect resulting in partial heating throughout *entire* length of coils. Fitting consists of metal pipe capped at one end and brazed at other end into heavy wrought iron pipe nipple. Nipple is screwed into end of coil header so that metal pipe projects into header in such position that a series of orifices drilled in metal pipe are directly opposite pipes of coil.

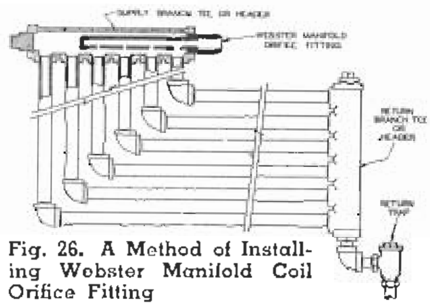


Fig. 26. A Method of Installing Webster Manifold Coil Orifice Fitting

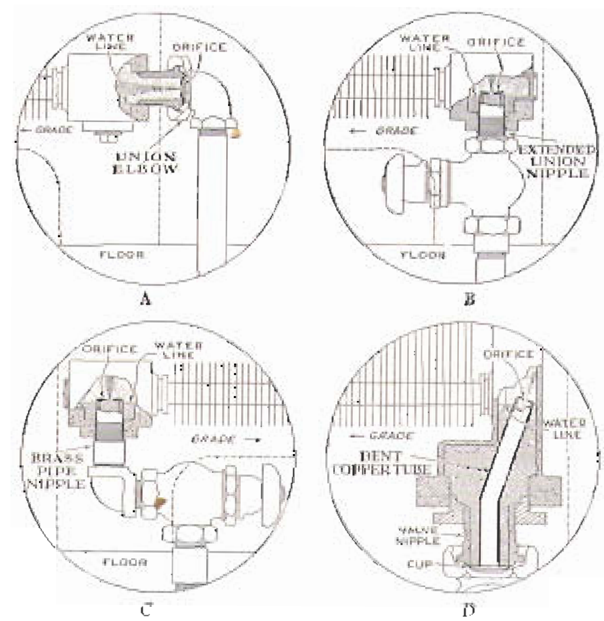


Fig. 27. These Special Webster Orifice Fittings Are Used for Concealed Radiation

Sketch A shows a standard cup-type orifice in a union elbow applied to cabinet radiation with end connections when supply valve is located below basement ceiling. Sketches B and C show method of orificing concealed radiation having bottom connections. In Sketch B, the orifice is furnished in an extended union nipple. In Sketch C it is furnished in an extended brass pipe nipple. Sketch D illustrates a Special Bent Tube Orifice used with concealed radiators having off-set type headers.

Intermediate Metering Orifices
(Patented)

Provided for installation in branch mains to assist in primary distribution in Webster Moderator and Hylo Systems of Steam Heating. Made of brass plate and provided with two attached copper asbestos gaskets and suitable lugs for mounting in pipe lines between union flanges and between companion flange and gate valve. They are supplied on special order in standard pipe sizes between 2 in. and 12 in. inclusive.

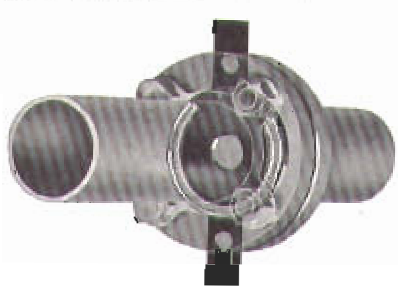


Fig. 28. Webster Intermediate Metering Orifice Between Union Flanges

WEBSTER IRON RADIATOR TRAPS

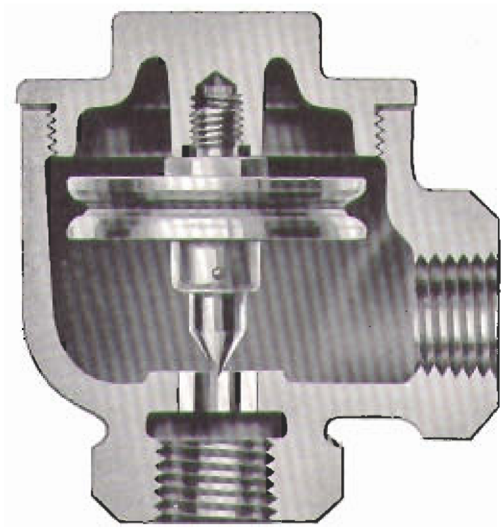


Fig. 29. Webster 702HF Iron Radiator Trap Conserves Critical Metals

"Old Ironsides," the war-time Webster Radiator Trap, not only effects maximum saving in critical metals but saves, in addition, needed machine tool hours through elimination of nut and nipple. Iron trap construction is not new to Webster. Experience in manufacturing iron body traps for more than 25 years has resulted in a successful design giving operating efficiency equal to earlier Webster Traps.

Construction Features

Body and cap are high quality gray cast iron assembled with steam-type gasket. Double thermostatic diaphragm is phosphor bronze, individually factory adjusted and tested. Diaphragms are compensated for pressure which means that they function efficiently at *all* pressures within their operating range. They do not close too quickly at certain pressures to hold up condensate while remaining open at other pressures to pass steam.

Brass valve piece is 60° cone type, factory adjusted. Flush installation of brass seat makes trap practically self-draining.

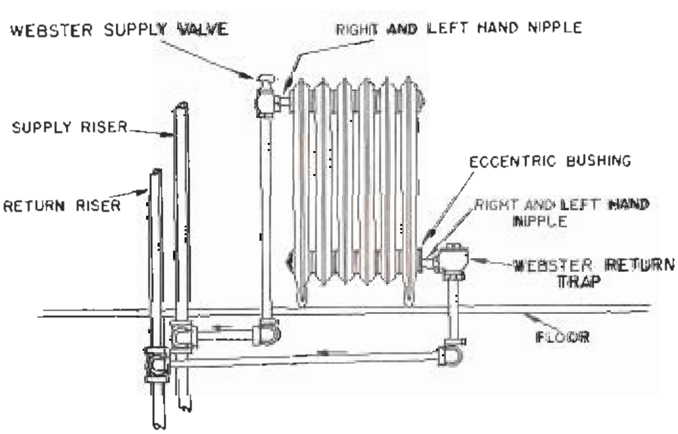


Fig. 30. Method of Connecting Webster Radiator Trap and Webster Supply Valve with Female Inlet and Outlet to a Standard Radiator Using Right-and-Left Hand Nipple

How to Install Trap with Right-and-Left Pipe Nipple

The trap inlet is a female connection with left-hand thread. Attachment to radiator is with short right-and-left hand nipple. First, draw up nipple (wrench tight) in eccentric bushing of radiator. Then remove nipple while counting number of turns. A crayon or color pencil mark on both bushing and nipple will be helpful in making the count. Next draw up nipple (wrench tight) in trap. Then remove nipple while counting number of turns.

Now start nipple in the part which required most turns. Suppose, for example, six turns were required to tighten nipple in radiator bushing and four turns in trap. You would therefore start nipple in bushing and give it two turns. Next start nipple in trap also. Turn until tight in both bushing and trap.

Pressures

Webster Series 7-HF Traps with iron body are designed for low pressure vapor and vacuum steam heating service. Maximum pressure is 25 lbs. per sq. in.

TABLE IV. Recommended Ratings in Sq. Ft. E. D. R.

The ratings below are conservative and not full-flooded capacities. Applications requiring use of higher ratings should be referred to the Company or its Representatives. When writing give full details of proposed use. Select trap by rating, not by pipe size. For Webster Systems using metering orifices, it is recommended that the selection of traps be based on ¼ lb. per sq. in. pressure difference.

Symbol	Size	Pressure Difference Across Trap in Lb. per Sq. In.								
		¼	½	1	1½	2	5	10	15	25
Ratings in sq. ft. e.d.r.*										
702HF	½	85	120	165	200	235	370	530	640	840
713HF	¾	165	230	330	400	465	730	1050	1300	1640
723HF	¾	290	410	580	700	810	1280	1840	2300	2900

*Based on 240 B.t.u. per sq. ft. per hour.

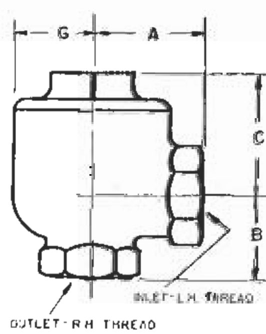


TABLE V. Dimensions*

Symbol	A	B	C	G
702HF	1⅝	1⅜	1⅝	1⅛
713HF	2⅜	1⅝	1⅝	0⅝
723HF	2 11/16	1⅝	1 1/16	0⅞

*Dimensions in inches and subject to slight variation.

TABLE VI. Information for Ordering

Size Inches	Symbol	Approximate Net Weight, Pounds	Code Word
½	702HF	1⅛	Iramam
¾	713HF	2⅛	Iromelk
¾	723HF	3⅛	Iranit

WEBSTER SERIES 26 HEAVY DUTY DRIP TRAPS

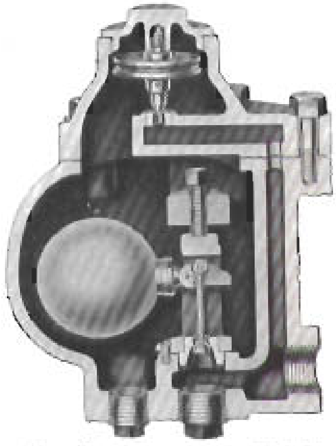


Fig. 31. Webster Size 0026-T Heavy Duty Drip Trap

Series 26-T — Heavy duty traps, capable of handling large volumes of condensation and air, and at the same time compact and light in weight. Suited for drips of mains, blast radiation, unit heaters, hot water generators, fan heater coils, and similar applications. The specification calling for a heavy duty, float-type trap is fully met, while the advantages of the thermostatic element and ease of installation are both retained. Side outlet opening of ample size permits the discharge of water, or water and air. In the bottom of the trap are plugged clean-out openings. The most used sizes (00026, 0026. 026) incorporate the *outward opening* discharge valve—a feature which permits the valve to open when excessive pressures prevail, and thus prevent waterlogged piping or equipment.

Construction Features: Standard models are fitted with stainless steel or brass valve pieces and seats on water discharge end. Thermostatic air vent diaphragms are phosphor bronze while valve pieces and seats are brass. Other interior parts are iron, copper or brass. Cast iron bodies and covers.

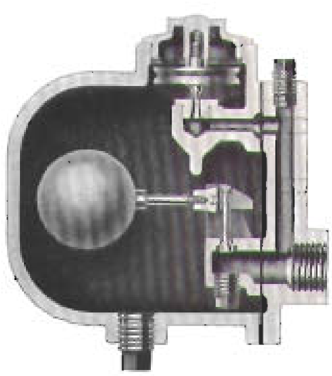
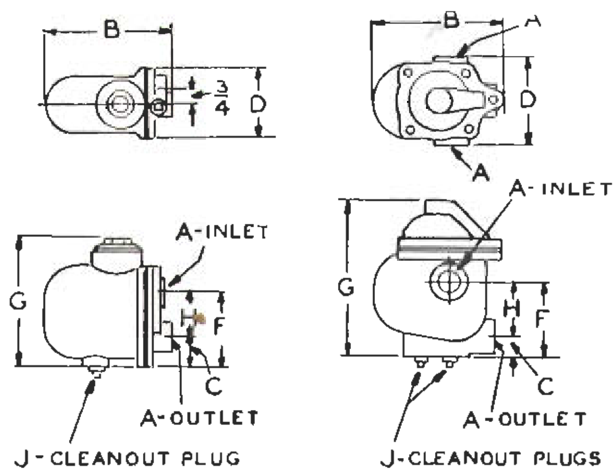


Fig. 32. Webster Heavy Duty Drip Trap, Size 00026-T

A choice of two inlet openings in opposite sides of body and two outlet openings at bottom is provided to sizes 0026 and 026. Size 00026 has one inlet opening and one outlet on cover plate. Light in weight, so that it may be handled easily and mounted in pipe line without other support. Sizes 126, 226 and 326 have single end inlets and outlets. These larger sizes require a supporting bracket when installed. Maximum working pressure, 15 lb. per sq. in. *See table IX for ratings.*

TABLE VII. Dimensions of Webster Series 26 Drip Traps



00026-T design — 0026-T and 026-T designs

Symbol	A	B	C	D	F	G	H	J	Net Wt.
00026-T	3/4	6 5/8	1 1/2	3 3/4	3 1/8	6 5/8	2 3/8	1/2	10 3/4
00026-O	3/4	6 1/8	1 1/2	3 3/4	3 1/8	6 3/8	2 3/8	1/2	10 1/2
0026-T	1	6 3/8	1 1/8	4 1/2	3 15/16	8 5/8	2 11/16	1	13 3/4
0026-O	1	6 3/8	1 1/8	4 1/2	3 15/16	7 1/16	2 11/16	1	12 3/4
026-T	1 1/4	8 3/16	2 1/2	5 1/8	5 5/8	10 1/2	3 1/4	1 1/4	20 1/2
026-O	1 1/4	8 3/16	2 1/2	5 1/8	5 5/8	8 1/16	3 1/4	1 1/4	19 1/2

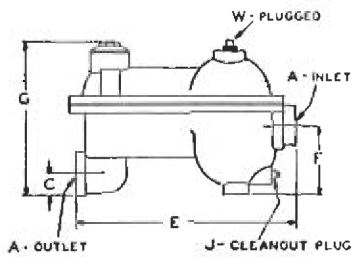


TABLE VIII.
Dimensions of Webster Heavy Duty Traps, Sizes 126, 226, 326

Symbol	A	C	E	F	G	J	W	Net Wt.
126-T	1 1/2	1 3/8	15	4 5/8	10 1/2	1/2	1	48
126-O	1 1/2	1 3/8	15	4 5/8	9	1/2	1	43
226-T	2	1 3/8	18 5/8	5 1/2	12	1/2	1 1/4	62
226-O	2	1 3/8	18 5/8	5 1/2	11 5/8	1/2	1 1/4	57
326-T	2	1 5/8	19 3/4	6 1/8	13 1/4	1/2	1 1/2	80
326-O	2	1 5/8	19 3/4	6 1/8	12 1/4	1/2	1 1/2	74

All dimensions in inches and subject to slight variation. Weight in pounds

TABLE IX. Capacities of Series 26 Heavy Duty Drop Traps in Lbs. Water Per Hour

At Various Pressure Differences Across Trap in Lb. per Sq. In.

These are actual test capacities based on continuous discharge from fully flooded traps with water at or about steam temperature. While Models T and O are shown to have the same capacities, actually Model T will have somewhat larger capacity because of its ability to quickly discharge air through the thermostatic by-pass. This by-pass will also handle additional condensate until rising temperature closes it. General practice is to select trap with capacity twice that of maximum indicated load requirements.

Size	Symbol	1/10	1/4	1/2	1	1 1/2	2	5	10	15
3/4"	00026-T and O	90	140	200	280	350	400	600	780	850
1"	0026-T and O	250	350	500	750	940	1100	1640	2100	2300
1 1/4"	026-T and O	350	550	800	1150	1400	1600	2400	3000	3500
1 1/2"	126-T and O	670	1060	1500	2100	2600	3000	4300	5600	6380
2"	226-T and O	1100	1770	2500	3550	4350	5000	7200	9250	10350
2"	326-T and O	2560	4150	5850	8350	10200	11700	18700	26400	32500

No allowance made for pressure drop in the connecting piping between radiation and trap or from trap through run-out to return.

CONVERSION FACTORS: To convert ratings given in lb. per hour of water to sq. ft. E.D.R. at 240 Btu., multiply by 4. To convert ratings given in sq. ft. E.D.R. at 240 Btu. to lb. per hour of water, divide by 4.

Series 26-O—Similar to the Model 26-T Drip Trap but without thermostatic element. Used where concentration of air does not occur, such as on ends of mains and risers, flash tanks and dripping gravity heating systems into vacuum return lines. Provision is made for external air by-pass.

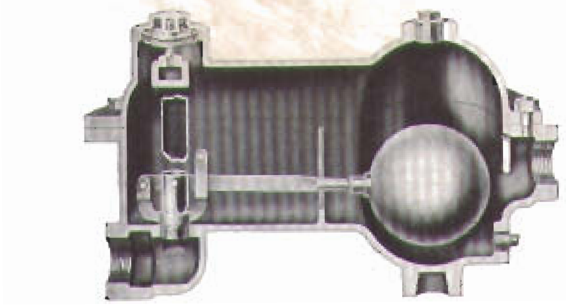


Fig. 33. Webster Size 126-T Heavy Duty Drip Trap

Webster Dirt Strainers and Pockets

Placed in return lines of steam heating systems to catch dirt, rust, scale and other particles, preventing them from impairing the tightness of traps. More dependable than pockets made of pipe and fittings, cost less to install, and are more easily cleaned.

Where the probability of dirt is greater than normal, Series 78 Dirt Strainers should be used in place of Series 26 Dirt Pockets.

Fig. 34. Size 526 Dirt Pocket

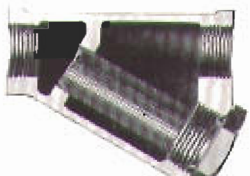
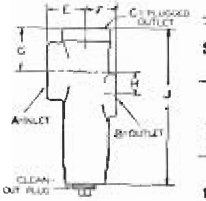


Fig. 35. Size 782 Dirt Strainer

Maximum working pressure, 15 lb. per sq. in., except Series "78," which is 150 lb. per sq. in.

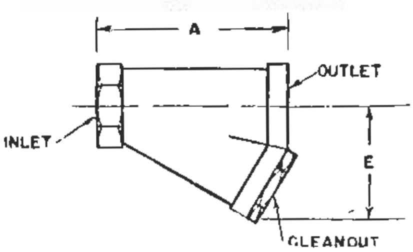
TABLE X. Dimensions of Webster Series "26" Dirt Pockets



Symbol	A	B	C	E	F	G	H	J	Net Weight
526	1 1/4	1	1	1 3/4	1 3/8	1 7/8	1	6 7/8	4
826	2	1 1/4	1 1/4	2 1/8	1 3/8	2 1/16	1 1/2	7 7/8	5 3/4
1026	2 1/2	1 1/4	1 1/2	2 5/8	1 3/4	2 3/4	1 5/8	9 3/4	8 3/4
1226	3	1 3/4	1 1/2	2 3/4	1 3/4	3 1/16	1 7/8	10 5/8	9 3/4

All dimensions in inches and subject to slight variation. Weight in pounds.

TABLE XI. Dimensions of Webster Series "78" Dirt Strainers
Maximum working pressure 150 lbs. per sq. in.



Symbol	Dimensions in Inches				Net Weight Pounds
	Inlet	Outlet	A	E	
782-1	3/8	3/8	3 3/4	2 1/4	1 3/8
782-1	1/2	1/2	3 3/4	2 1/4	1 3/8
784-1	3/4	3/4	4 3/8	3 1/8	2 3/8
784-1	1	1	4 3/8	3 1/8	2 3/8
786-1	1 1/4	1 1/4	6 1/4	4	6 1/4
786-1	1 1/2	1 1/2	6 1/4	4	6 1/4
788-1	2	2	7 1/4	4 3/4	9

Models listed above have painted cast iron bodies.

Brass body models, natural finish without plating, are available in sizes from 3/8 in. to 2 in. inclusive. Write for information.

Webster Traps for "Process Steam"

Series "78"— A thermostatic trap used to discharge air and water from heating coils and any apparatus using steam at process pressures, i.e., 15 to 150 lb. per sq. in. Built in four sizes: 3/8, 1/2, 3/4 and 1 in. There are two classes: Class 2 for pressures of 15 to 60 lb. and Class 3 for pressure of 60 to 150 lb. Steam brass body and cover. Monel metal or phosphor bronze diaphragm. Stainless steel or brass valve piece and seat insert. Standard body has union male inlet and female outlet as shown in Table XII. Can be furnished in two special body models on order: Model F with unionless female inlet and outlet connections, Model S with male soldered inlet with union and standard threaded female outlet. Models F and S available in sizes 780, 781, 783 and 784 only.

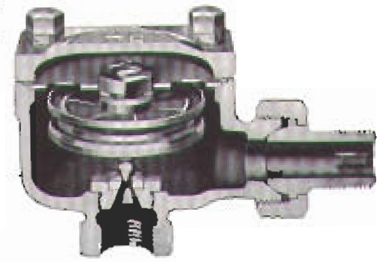


Fig. 36. Webster Size 782 Trap

Series "79"— Float-and-thermostatic traps designed for normal working pressures between 15 and 150 lb. per sq. in. For use where large volumes of very hot condensate must be handled more quickly than is possible by thermostatic traps alone. Condensate is passed through float controlled outward opening valve while air is discharged into return piping through thermostatic vent and integral bypass. Compact and light and readily mounted in a pipe-line without other support.

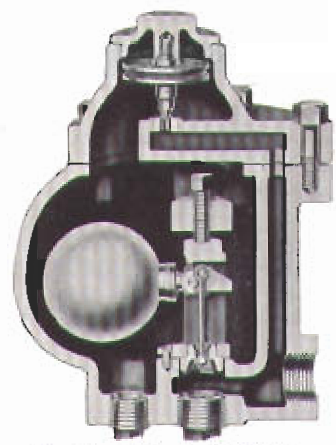


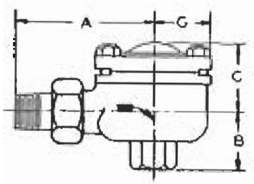
Fig. 37. Webster 794-T Trap

Cast iron body, composition gasket, and cover are bolted together with steel cap screws. Valve piece and stem are phosphor bronze while seat is Stainless Steel. Air vent unit is thermostatic element of Webster 780 Trap.

Made in five pressure classifications as shown in Table XIV, the only difference being in the size of the float controlled valve seat opening. Model 794-O without thermostatic vent is available.

Roughing-in dimensions same as Size 0026-T Trap in Table **VII**. Available with 1 in. inlet and outlet which can be readily bushed for smaller size.

TABLE XII. Dimensions of Webster Series "78" Traps



Symbol	Inlet Outlet	A	B	C	G	Net Weight
780 †	3/8	†2 11/16	1 3/16	1 11/16	1 1/4	1 1/2
781	1/2	2 3/4	1 5/16	1 11/16	1 1/4	1 5/8
782*	1/2	•3 5/16	1 7/16	1 15/16	1 5/8	3
783	3/4	3 13/16	1 7/16	2 5/8	1 13/16	4 1/4
784	1	4 1/2	2	2 1/16	2 5/8	7

All dimensions in inches and subject to slight variation. Weight in pounds.

†780 Trap furnished with 3/8-in. female nipple on special order. Dimension A = 2 3/4 in.

*782 Trap furnished on special order with 3/8-in. male nipple, also 3/8-in. or 1/2-in. female nipple to fit standard 1/2-in. union nut. Dimension A = 3 3/8 in.

NOTE—780 and 781 Traps have screwed cap; other sizes, bolted cap.

TABLE XIII. Capacities of Webster Series "78" Traps in Lb. Water per Hour.

Capacities given are actual flooded capacities with condensate 10° F. lower than corresponding steam temperature at operating steam pressure. When condensate to be handled is 5° F. lower than steam temperature, maximum capacity can safely be taken at 1/4 of the figures in Table **XX**. It is good practice to select thermostatic traps on the basis of capacities at the lower temperature difference.

NOTE: **Capacities at normal working pressures are given in bold face type.**

Class 2—Working pressures up to 60 lb. per sq. in.

Trap Symbol	Pressure Differential, Lbs. per Sq. In.											
	5	15	25	30	40	50	60	80	90	100	125	150
780-2	190	**300**	**360**	**400**	**440**	**480**	**530**	590	620	650	700	760
781-2	200	**310**	**380**	**420**	**460**	**510**	**550**	620	650	680	740	800
782-2	350	**550**	**680**	**740**	**830**	**920**	**1000**	1100	1170	1220	1350	1450
783-2	560	**880**	**1080**	**1160**	**1300**	**1430**	**1530**	1700	1790	1870	2040	2210
784-2	970	**1520**	**1870**	**2020**	**2280**	**2460**	**2680**	3020	3150	3320	3620	3860

Class 3—Working Pressures Up to 150 Lbs. per Sq. In.

Trap Symbol	Pressure Differential, Lb. per Sq. In.											
	5	15	25	30	40	50	60	80	90	100	125	150
780-3	150	250	300	320	370	400	**430**	**480**	**510**	**540**	**590**	**630**
781-3	170	270	340	360	400	440	**480**	**530**	**560**	**580**	**640**	**680**
782-3	250	400	500	540	600	660	**720**	**810**	**850**	**890**	**980**	**1060**
783-3	310	480	600	650	720	780	**850**	**950**	**1000**	**1050**	**1160**	**1250**
784-3	680	1050	1300	1400	1570	1750	**1850**	**2100**	**2200**	**2300**	**2500**	**2700**

*Pressure differentials given in this table refer to pressure at inlet of trap and in return line. Select trap to handle maximum condition. For normal working pressures up to 60 lb. per sq. in., use Class 2 Traps even though occasional pressures may go above 60 lb. For normal pressures between 60 lb. and 125 lb., use Class 3 Traps. In this table ratings are given above 60 lb. for Class 2 Traps and below 60 lb. for Class 3 Traps merely to show performance at these special pressures.

TABLE XIV. Capacities of Webster Series "79" Traps in Lb. Water per Hour.

These are actual test capacities based on continuous discharge from fully flooded traps with water at or about steam temperature. Due to outward opening valve and thermostatic by-pass, capacities during heating-up (i.e. cooler condensate) are greater than those shown. General practice is to select trap with capacity twice that of maximum indicated load requirements.

Symbol	Pressure Differential in Lb. per Sq. In.											
	5	15	25	30	40	50	60	80	90	100	120	150
Class 2A—Working Pressures 15 to 30 Lb. per Sq. In.												
794-T-2A	1260	**1900**	**2320**	**2500**								
Class 2B—Working Pressures 30 to 60 Lb. per Sq. In.												
794-T-2B	630	930	1150	**1200**	**1340**	**1440**	**1540**					
Class 3A—Working Pressures 60 to 90 Lb. per Sq. In.												
794-T-3A	320	470	580	630	700	750	**800**	**880**	**920**			
Class 3B1—Working Pressures 90 to 120 lb. per Sq. In.												
794-T-3B1	230	360	440	470	530	570	610	680	**700**	**720**	**760**	
Class 3B2—Working Pressures 120 to 150 Lb. per Sq. In.												
794-T-3B2	180	260	340	360	400	440	470	540	560	580	**640**	**700**

Ratings at Normal Working Pressures are given in **Bold Face** type.

Webster Series 23-A Heavy Duty Traps

For use at steam pressures up to 50 lb. per sq. in. Float-type heavy duty trap for large quantities of condensate. Does not include integral air vent. Air may be vented by petcock, or through a Webster 780 Class 2 Trap located in an external by-pass. Available in 1, 1 1/2 and 2-inch sizes.

TABLE XV. Dimensions of Webster Series 23-A Traps

Symbol	A	A'	C	E	F	G	W	Net Weight
0123-A	1	1	1	12 5/8	3 1/8	7 5/8	1/2	30
123-A	1 1/2	1 1/2	1 3/8	15	4 5/8	9	1	43
223-A	2	2	1 5/8	18 3/4	5 1/2	11 5/8	1 1/4	58

All dimensions in inches and subject to slight variation. Weight in pounds.

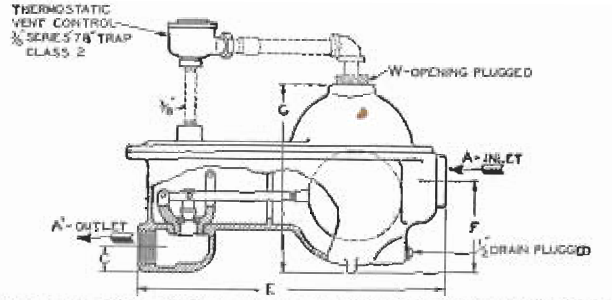


TABLE XVI. Rated Capacities of Webster Series 23-A Traps in Lb. Water Per Hour

Symbol	Pressure Difference (Lb. Per Sq. In.)					
	10	15	20	30	40	50
0123-A	1200	1400	1600	1900	2100	2300
123-A	2000	2400	2700	3200	3600	4000
223-A	4900	5800	6500	7700	8700	9600

Webster Series 26 Grease or Hylo Traps

For draining oil separators on exhaust steam lines or feed-water heaters or for removing oil from drip points of low-pressure steam lines. Also for use with Webster Series 23 Hylo Vacuum Controller.

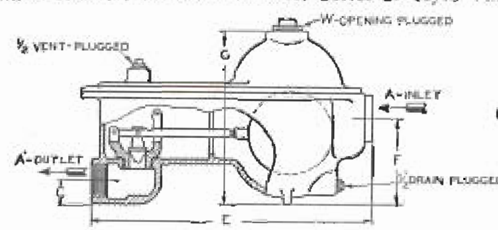


TABLE XVII. Dimensions of Series 26 Grease or Hylo Traps.

Symbol	A	A'	C	E	F	G	W	Net Weight
0126-O	1	1	1	12 5/8	3 1/8	7 5/8	1/2	30
126-O	1 1/2	1 1/2	1 3/8	15	4 5/8	9	1	43
226-O	2	2	1 5/8	18 3/4	5 1/2	11 5/8	1 1/4	58

All dimensions in inches and subject to slight variation. Weight in pounds.

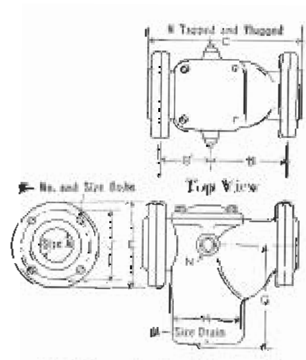
Webster Suction Strainers

Installed ahead of vacuum pump to prevent dirt and scale, brought down with condensation from heating system, from damaging pump with resultant troubles.

A tapping is provided for introduction of cold water make-up when that is desired; another for connection to a vacuum gauge. Made of heavy cast iron with flanged connections. Companion flanges included as standard. Cleanout cover is bolted on with rubber gasket joint. Screen basket is made of sheet brass with No. 4 holes (.045 in. dia.), 225 holes per sq. in. and is easily removable for cleaning. Maximum working pressure, 15 lb. per sq. in.

Fig. 38. Webster Suction Strainer

TABLE XVIII. Dimensions of Webster Type "Y" and Suction Strainers



All dimensions in inches and subject to slight variations.

Size A	B	B'	C	E	G	H
2	5 3/8	4 3/8	12	6	6 7/8	5 1/8
3	6 3/8	4 3/8	13 3/4	7 1/2	8 3/8	5 5/8
4	8 1/16	5 13/16	16 3/8	9	10 3/8	7 1/8
5	9 3/8	6 3/8	18 3/8	10	12 3/8	8 3/4
6	10 15/16	7 1/16	20 1/2	11	13 3/4	9 3/8
8	14 1/8	9 3/8	27 3/4	13 5/8	21	14 1/2
10	17 1/4	11 1/4	32 1/4	16	24 3/8	16 3/4
12	21	12 5/8	38	19	29	20

Size A	J	K	M	N
2	4 3/4	4-5/8x2	1/2	3/4
3	6	4-5/8x2 1/4	1/2	3/4
4	7 1/2	8-5/8x2 1/2	1/2	3/4
5	8 1/2	8-3/4x2 3/4	1/2	3/4
6	9 1/2	8-3/4x2 3/4	1/2	3/4
8	11 3/4	8-3/4x3 1/4	3/4	1
10	14 1/4	12-7/8x3 1/2	3/4	1
12	17	12-7/8x3 3/4	3/4	1

Webster Type "Y" Strainer

For use on water lines to remove sediment, hair, leaves, etc., and thus protect pumps and other machinery. Used extensively for swimming pools and supply lines of railroad water tanks. Exact duplicate of Suction Strainer except screen basket which is of heavier material and has No. 11 holes (0.1 in. dia.) and 49 holes per sq. in.

Webster Lift Fittings

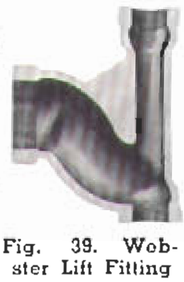


Fig. 39. Webster Lift Fitting

The improved design of Webster Lift Fittings makes possible quicker starting of the lift and retains all the advantages of the earlier design.

Used in pairs where condensation is to be lifted to a higher level. More efficient than "lifting pockets" made of standard fittings; require less time, and cost less to install.

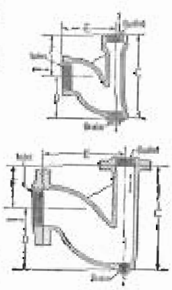
Sizes ¾ to 8 in. Made of cast iron. Maximum working pressures 15 lb. per sq. in. or 29 in. of vacuum.

Write for Bulletin B-713D

TABLE XIX. Dimensions of Webster Lift Fittings.

Symbol	Inlet (Size)	Outlet	C	D	E	F	Drain
24LF	¾	⅜	3½	1⅜	2¾	1¾	⅜
24LF	1	½	3¾	1⅞	3⅛	1⅞	½
24LF	1¼	¾	4¾	2⅜	3½	2⅜	¾
24LF	1½	¾	5½	2¾	4¼	2¾	¾
24LF	2	1	7¼	3⅜	4½	3⅜	1
24LF	2½*	1¼	8¾	4⅜	6½	4⅜	1
24LF	3*	1½	9¼	5¾	7½	4	1
24LF	4*	2	11⅝	6⅜	9¼	5	1
24LF	5*	2½*	13⅝	8⅛	10¾	5½	1
24LF	6*	3*	15⅝	9⅝	12	6	1
20LF	8*	4*	25¼	16¼	17	9	1

All dimensions in inches and subject to slight variation.
*Flanged. Other connections screwed.



Webster System Gauges


Fig. 40. Webster System Gauge

Compound steam gauges employing the Bourdon tube principle. Accuracy in the range of operating pressure (10 in. vacuum to 5 lb. pressure) assured by a patented retard design. Dial is graduated to read from 30 in. vacuum to 30 lb. pressure with 1 oz. intervals from 0 to 5 lb. and ½ in. intervals from 0 to 10 in. vacuum.

Enclosed in steel case finished crystal black. Nickel plated flared ring surrounding dial. Zero adjustment accomplished by slotted screw on the dial face. Internal siphon eliminates unsightly exposed siphon and protects Bourdon tube from steam temperatures.

Furnished in two sizes: a 3½-in. dial with ⅛-in. male bottom connection and a 5-in. dial with ¼-in. male bottom connection. Non-retard type gauge furnished in 5-in. size when desired.

Write for Bulletin B-730

Series 23 Webster Hylo Controller

Individual buildings of a group of individual sections of a building served by a single source of vacuum may require different degrees of vacuum for proper steam circulation. Use of Webster Hylo Controllers and related equipment provides means to maintain different yet constant degrees of vacuum at various points throughout the heating system. Once adjusted it is not necessary to change the Controller as it automatically maintains proper circulation.

Write for further information.

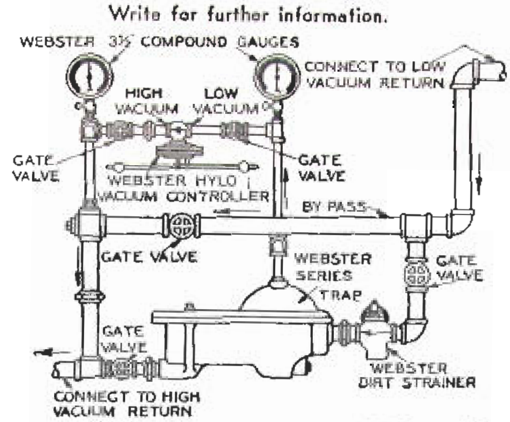


Fig. 41. A Method of Connecting Webster Hylo Controller and Related Equipment

Webster Vacuum Breakers

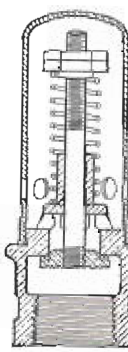


Fig. 42. Webster Size ¾ Inch Adjustable Vacuum Breaker

For automatic breaking of vacuum at pre-determined setting in heating systems, feed water heaters, hot water generators, industrial pressure chambers, etc. Sizes ¾, 1, and 1¼ inch are *adjustable* on the job. Size ⅛ inch for radiators is factory adjusted. Made of brass and non-corrosive materials throughout. Set to open at 2 inches vacuum unless otherwise specified.

Write for Bulletin B-716A

Webster Sight Glasses

For observing discharge of traps, flow of condensation, etc., in piping of standard heating systems. Used also in condensate discharge lines from slashers and drying cans in textile mills, drying cylinders in paper mills, etc. For working pressures of low vacuum to 15 lb. per sq. in. Body of cast brass, iron, or nickel. Observation ports of heavy plate glass. Made in sizes from ½ to 2 inch.

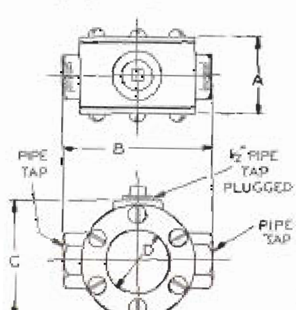


TABLE XX. Dimensions of Webster Sight Glasses

Size In.	A	B	C	D	Net Weight
½	1¹¹⁄₁₆	3¾	3	1⅝	2
¾	1¹⁵⁄₁₆	3⅞	3	1⅝	2¼
1	2⁵⁄₁₆	4	3	1⅝	2¾
1½	3⅛	6	4⅝	2¾	6½
2	3⅜	6⅛	4⅝	2¾	9¼

All Dimensions in inches and subject to slight variation. Weight in pounds.

Webster Water Accumulators

Placed in pipe line connecting diaphragm of pressure reducing valve to steam main. Provide a large volume of water between diaphragm and main to (1) prevent damage to diaphragm because of high temperatures and (2) assure a practically constant static head of water which eliminates fluctuations in static pressure.

Made of cast iron in two sizes. Maximum working pressure 15 lb.

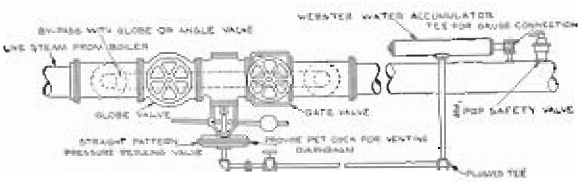
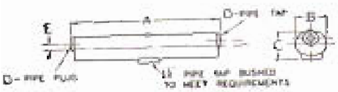


Fig. 43. Mothod of Installing Straight Pattern Pressure Reducing Valve Using Wobstor Wator Accumulator

TABLE XXI. Dimensions of Webster Water Accumulators



Net Weight in Pounds
235 = 18   236 = 31

Symbol	A	B	C	D	E
235	18¾	4	3⅛	¾	⅝
236	21¼	7½	4⅜	1¼	11/16

All dimensions in inches and subject to slight variation.

Fig. 44. Webster Type C Expansion Joint, Crosshead Guided, Double Slip

Webster Expansion Joints

The Webster Expansion Joint line now includes the well-known Ross Design formerly made by Ross Heater and Manufacturing Co., Inc., of Buffalo, N. Y. Joints of crosshead guided (Type C), and internally guided (Type N) are available. They can be used in steam, hot water, hot oil, hot gas, and condensate return lines. Combinations of metals and packing meet various operating requirements of pressure and temperature. Made in single slip and double slip models and in most widely used pipe sizes.

Write for Bulletins

Fig. 45. Cutaway View of Webster Type N Expansion Joint, Internally Guided, Single Slip

Webster Vacuum Pump Governor

Used to govern flow of steam to steam-driven vacuum pumps. Maintains a constant degree of vacuum in return mains and prevents pump from racing, if vacuum in return mains should be lost. Has cast iron frame and body. Rubber composition diaphragm. Steel spring. Brass body, double seated valve.

Standard valve furnished for pressures up to 150 lb. per sq. in. Special valve available for pressures over 150 lb. and under 200 lb. or for superheat. Valves range in size from ¾ inch to 3 inches inclusive.

Write for further information.

Fig. 46. Webster Vacuum Pump Governor

Webster Steam Separators

Remove excess condensation from live steam lines and thus protect engines, turbines, pumps, compressors, and other steam-driven apparatus from damage due to this excess water. Made in both horizontal and vertical types. Vertical type especially used as a receiver at engine throttle to absorb pulsations in steam flow. Horizontal type effective in removing water from compressed air lines.

Made as one-piece iron casting for maximum pressure of 200 lb. per sq. in. Sizes from 1½ in. to 12 in. inclusive.

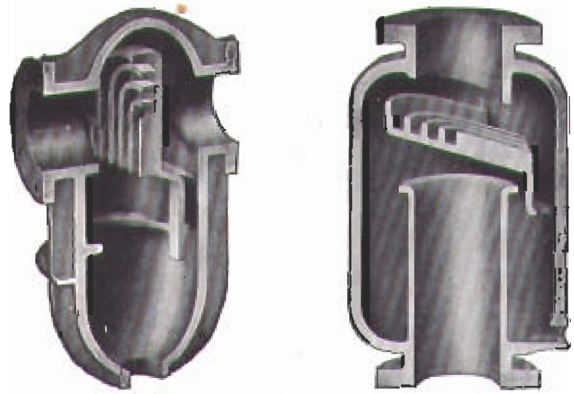


Fig. 47. Webster Steam Separators, Horizontal Typo at Left, Vertical Type at Right

Webster Oil Separators

Placed in exhaust steam lines to remove cylinder oil from steam before latter is condensed and used for boiler feed, or for direct heating of water.

Body and cover are cast iron. Steel baffles of the double-hook, multi-baffle type. Entire interior is removable through handhole for cleaning and inspection.

Horizontal type made in sizes 1½ in. to 12 in. inclusive; Vertical type in sizes 3 in. to 10 in. inclusive. Maximum working pressure, 15 lb. per sq. in.

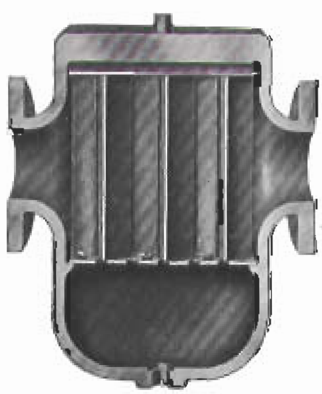


Fig. 48. Webster Oil Separator, Horizontal Type

WEBSTER TYPE R SYSTEM EQUIPMENT

Service Bulletin S-650 giving complete mechanical details of the Webster Type "R" System is available to supplement the brief description on this page. Popular "Don Graf" Data Sheets are also available for those desiring information in that form.

Quick circulation, despite variations in boiler pressures, is assured in Webster Type "R" Systems through the combination of the Webster Boiler Return Trap and Vent Trap. Air escapes from the system through the Webster Vent Valve. Water returns direct to the boiler by gravity at low pressures. An increase of pressure causes the Webster Boiler Return Trap to fill and operate, equalizing the pressure and making positive the prompt return of water to the boiler. Units are made to provide five sizes of the Webster Boiler Return Trap and Vent Trap combination, having the range of capacities given in Table XXII.

Each Type "R" Combination should include a Webster Series 78 Dirt Strainer and (2) Webster 45° Check Valves.

WEBSTER TYPE V SYSTEM is a modification of the Type R System in that the Boiler Return Trap is not used. Applicable to installations of 1000 sq. ft. or less, using oil burner, stoker, or gas burner with vaporstat, lockswitch or protector relay and one or more key-room thermostats. Write for piping details.

Webster Boiler Return Trap

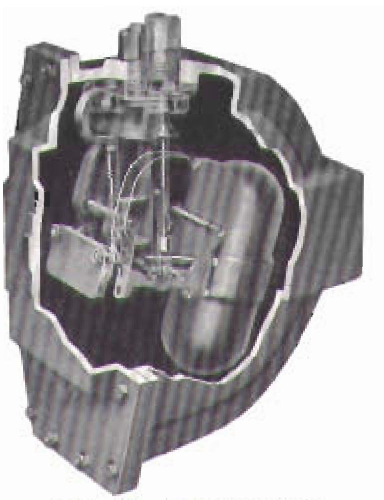


Fig. 49. Webster Size 40-80 Boiler Return Trap

Positive acting, reciprocating device for returning water to boilers in Webster Type "R" Systems. Construction is shown in Fig. 49. The float is of heavy gauge metal with no exposed seams. The entire mechanism is held in place by two studs and is removable as a unit. It turns on a single Monel Metal shaft. Steam Valve opens quickly when high level is reached. No wire drawing. Valves are all-metal and self-aligning. Operation is silenced by stainless steel bumper springs.

Webster Vent Trap

Used alone or with the Webster Boiler Return Trap, to provide a dependable method of removing air from heating systems and automatically preventing its return, at the same time making overflow of condensation impossible.

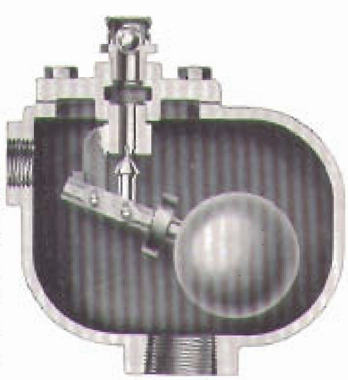
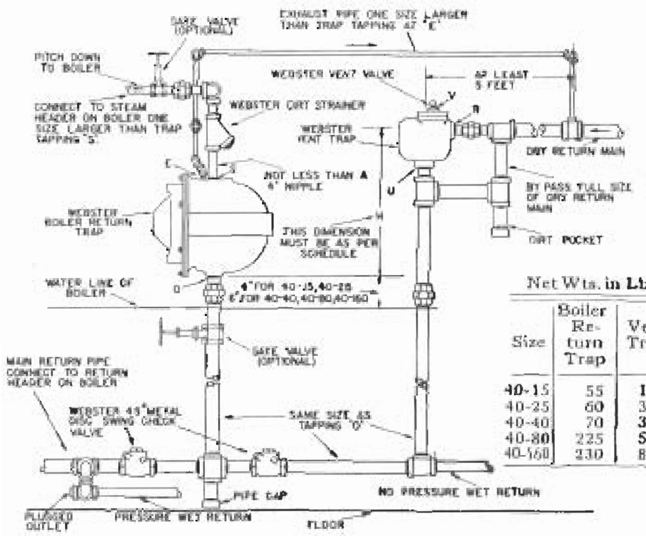


Fig. 50. Webster Size 40-40 Vent Trap with Separate Vent Valve

Webster Damper Regulator

Controls and maintains pressure of only a few ounces. Used with hand-fired, anthracite coal-burning low pressure boilers in Webster Vacuum and Type "R" Systems when normal operation is from 2 ounces to a maximum pressure of 2 lb. per sq. in. at boiler. Applicable in stoker-fired installations *only in exceptional cases* when damper regulation controls air supply damper; with oil-burners *only when throttling type burner is used.*



Net Wts. in Lb.

Size	Boiler Return Trap	Vent Trap
40-15	55	14
40-25	60	30
40-40	70	30
40-80	225	57
40-160	230	87

Fig. 51. Conventional Arrangement of Webster Type "R" System Equipment. Gate Valves Are Optional

TABLE XXII. Data and Ratings for Webster Type "R" System Basement Equipment (Refer to Fig. 51)

Rating Sq. Ft. Direct Radiation	Size Boiler Return Trap	Tappings			Size Vent Trap	Number of ½-in. Vent Valves	Tappings			Dimension	Size Dirt Strainer	Size Check Valves (2 Required)
		E	O	S			R	U	V	H		
0– 1500	40-15	½	1¼	¾	40- 15	1	1	1	½	15	783	1¼
1501– 2500	40-25	½	1½	¾	40- 40	1	1¼	1½*	½	17	783	1½
2501– 4000	40-40	½	2	1	40- 40	1	1¼	2	½	17	784	2
4001– 8000	40-80	¾	2½	1¼	40- 80	2	1½	2½	¾	24	785	2½
8001–16000	40-160	¾	3†	1¼	40-160	3	1½	2½	1	26	785	3

*Bushed—2"x1½". †Flanged (Flanges and bolts furnished).
All dimensions in inches and subject to slight variation.

Webster Boiler Protector

Provided to prevent breakage in low pressure cast iron boilers when the water level becomes inadequate. Automatically feeds to boiler when water level drops to 1 in. above bottom of gauge glass. Body is made of cast iron with three principal parts bolted together. Interior parts of copper, brass or Monel Metal to withstand corrosion. Seamless float actuates Monel Metal cone pilot valve on sharp-edged Monel Metal seat. Water valve with special Jenkins composition disc actuated by difference in water pressure between exterior and interior of Sylphon Bellows.

Adapted to almost all types of low pressure heating boilers where maximum pressure will not exceed 15 lb. per sq. in. Maximum cold water main pressure should not exceed 150 lb. per sq. in.; minimum must not be less than 25 lb. per sq. in.

Made in one size, Model 34 with ¾-in. connections. Also Model 34C-1 with electrical cut-out switch.

Catalog B-727D and instruction bulletin available on Webster Boiler Protection.

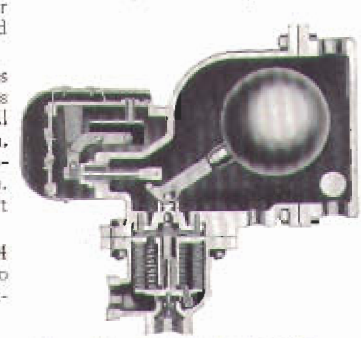


Fig. 52. Model 34C-1 Webster Boiler Protector, with Electrical Cut-out Switch

WEBSTER-NESBITT UNIT HEATERS

ALL PRODUCTS LISTED ARE NOW AVAILABLE WITH ALL-STEEL COILS

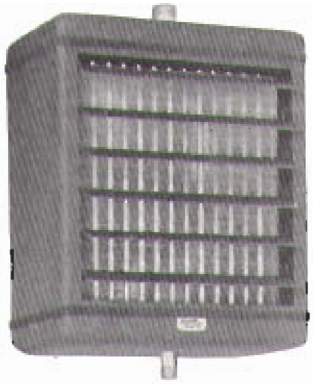


Fig. 53. Webster-Nesbitt Standard Propeller-Fan Unit Heater

For complete rating tables, dimensions and application data, communicate with the nearest Webster sales office or send for Publication W-N-111

Webster-Nesbitt Unit Heaters are manufactured by John J. Nesbitt, Inc., Holmesburg, Philadelphia, Pa., and are distributed solely through WARREN WEBSTER & COMPANY, Camden, New Jersey.

Webster-Nesbitt Standard Propeller-Fan Unit Heaters provide a proved method of heating small and medium size enclosures such as stores, offices, garages, factories, and other structures having comparatively low ceilings.

The field of application for "Little Giant" Propeller-Fan Unit Heaters is broad, extending to practically every condition in which unit heating is indicated. Direct use of the high velocity principle has its greatest advantages in industrial plants, warehouses, garages, armories, and similar places.

For the heating of large spaces the Webster-Nesbitt Blower-Fan Giant Heater is recommended.

Webster-Nesbitt Unit Heaters are designed to circulate large volumes of air at comparatively low temperatures. By this method the heated air is mixed thoroughly with the room air to reduce overheating in upper areas and temperature stratification, and to assure quick heating, low fuel cost, and greater comfort for room occupants.

Standard Ratings—All ratings are based on tests made in accordance with Standard Test Code of the Industrial Unit Heater Association and the American Society of Heating and Ventilating Engineers.

WEBSTER-NESBITT STANDARD PROPELLER-FAN UNITS

The new, improved Webster-Nesbitt Standard Propeller-Fan Unit Heaters have been designed to incorporate four characteristics proved by wide experience to be essential to both proper application and satisfactory performance.

1. Selective Range of Sizes—There are eight distinct casing sizes, and these are further subdivided by variation in heating elements or fan design to produce a total of 21 basic capacities. Heating capacities at basic conditions vary from 22,300 to 338,000 B.t.u. per hour; air deliveries from 540 to 4800 c.f.m.

2. Quiet Operation—All fans have blades of exceptionally large areas and of a shape to impart a gradual acceleration to the air stream. Ample spacing is maintained between the fan and heating element. Single, two-speed, or multi-speed motors of sleeve bearing type, equipped with isolators. All the foregoing factors contribute toward quietness in operation.

3. Durable Lightweight Heating Elements—Extended fin-and-tube type, constructed of condensing tubes and plate-type fins.

4. Modern Casing Design—Heavy furniture steel casings, die-formed and electrically welded into a sturdy, integral unit. Black featherweave finish. Compact, suspended type.

Table XXIII. Capacities (At Maximum Fan Speeds), Dimensions and Net Weights

Additional capacities can be secured by the use of lower constant-speed motors, two-speed or multi-speed motors. See Publication W-N 111.

Model No.	Basic Rating at 2 lbs. Steam 60° Entering Air							Overall Dimensions in Inches				Fan Diam. in.	Tapping Size Inches		Net Weight, Lbs.
	Motor R.P.M.	Motor H.P.	C.F.M. at 70°	Final Temp.	B.T.U. per Hr.	*E.D.R.	Outlet Velocity F.P.M.	Width	Height	Depth of Casing	Depth Casing Motor		Steam	Return	
105	1725	1/20	540	98	22,300	93	910	12	16½	8¾	20½	10	1	¾	50
106	1725	1/20	500	113½	29,000	121	865	12	16½	8¾	20½	10	1	¾	51
108	1725	1/20	470	128	34,700	145	835	12	16½	8¾	20½	10	1	¾	52
120	1725	1/20	770	115	46,000	192	840	15¾	19½	12	24½	12	1¼	1	77
127	1725	1/20	750	127	54,500	227	820	15¾	19½	12	24½	12	1¼	1	78
146	1140	1/12	1100	114½	65,000	271	850	17¾	21½	12	26	14	1¼	1	94
148	1140	1/12	1020	129	76,300	318	815	17¾	21½	12	26	14	1½	1	96
166	1140	⅛	1500	113	86,300	360	875	19¾	23½	12	26	16	1½	1	104
167	1140	⅛	1450	121	96,000	400	860	19¾	23½	12	26	16	1½	1	106
168	1140	⅛	1425	128	105,000	437	850	19¾	23½	12	26	16	1½	1	107
205	1140	⅙	2000	115½	120,500	502	785	23¾	27½	12	26¼	20	2	1¼	120
206	1140	⅙	2480	110½	136,000	566	965	23¾	27½	12	26¼	19½	2	1¼	122
207	1140	⅙	2400	118	151,000	629	945	23¾	27½	12	26¼	19½	2	1¼	124
208	1140	⅙	2300	126	165,000	688	920	23¾	27½	12	26¼	19½	2	1¼	125
246	1140	¼	3280	112	185,000	770	915	27⅞	31½	12	27	24	2½	1¼	140
247	1140	¼	3200	120	208,000	866	910	27⅞	31½	12	27	24	2½	1¼	143
248	1140	¼	3150	127	229,000	955	905	27⅞	31½	12	27	24	2½	1¼	146
267	1100	⅓	3780	121	250,000	1040	900	30	33½	12	27¾	26½	2½	1¼	212
268	1100	⅓	3700	127	269,000	1120	890	30	33½	12	27¾	26½	2½	1¼	215
287	1100	⅓	4900	118	308,000	1285	990	32½	35½	12	27¾	28	2½	1¼	225
288	1100	½	4800	125	338,000	1410	985	32½	35½	12	27¾	28	2½	1¼	221

*For copper. *Reduce 10% for Steel Heating Elements*

SERIES F UNIT HEATERS

With Non-metallic Casing for Use in Lobbies, Corridors, Offices

The Webster-Nesbitt Series F Centrifugal Fan Unit Heater is designed for use where quietness and appearance count. It is now available with non-metallic casing only, in floor type, of two sizes to correspond with Models No. 432 and 602 Series F Unit Heaters as shown in our Publication W-N 105. Unit consists of two or four double inlet, forward-curved fans, scroll housings, quiet-operating single-phase, 60-cycle 110 or 220-volt motor, steel fin-and-tube heating element and non-metallic casing. Provides circulation, quick heating and even distribution.

Capacities based on 2 lbs. steam and 60° entering air. Range from 208 to 380 sq. ft. e.d.r.—567 to 1200 c.f.m. Suitable for all steam pressures and temperatures up to 200 lbs. gauge saturated.

For complete engineering details write the nearest Webster office.

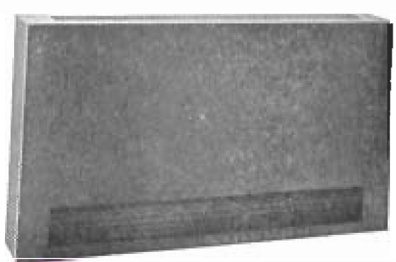


Fig. 54. Webster-Nesbitt Series F Unit Heater with Non-metallic Casing

WEBSTER-NESBITT UNIT HEATERS

ALL PRODUCTS LISTED ARE NOW AVAILABLE WITH ALL-STEEL COILS

Fig. 55. Webster-Nesbitt Blower-Fan Giant Heater

CONSTRUCTION FEATURES

Casing—End sheets are formed of heavy gauge furniture stock steel, securely braced with cross channels, all joints welded. Front panels are attached by self-tapping screws and are removable for access to fans, dampers, and heating element.

Available with non-metallic casing. Particulars on request.

Fans—Forward curve multiblade type with blades welded to hub plate and outer ring; entire assembly accurately balanced.

Heating Elements—Heating surface for Standard and Thermadjust Giants constructed of ½ in. steel condensing tubes with flat steel fins (copper when permitted by government regulation).

Capacities—Under basic ratings of 60° entering air and 2 lbs. steam pressure and at maximum fan speeds, capacities range from 125,000 B.t.u./hr., 3330 c.f.m., 96.5° F.T. to 1,008,000 B.t.u./hr., 16,000 c.f.m., 124° F.T. Many other capacities can be obtained from each size unit by reduction in motor horsepower and fan speed. Capacities indicated are for copper. Reduce 10% for steel heating elements.

THE WEBSTER-NESBITT GIANT

Sturdy blower fan unit for the economical heating of large areas, Webster-Nesbitt Giants are "giants" of endurance and performance; available in three basic types:

Standard (Non-Thermadjust) Type—Used principally where heating is by recirculation only, and where constant heat-output is desired during period of operation. Start and stop control may be manual or through thermostat.

Thermadjust Type—Employs dampers in front of casing and over face of heating element to provide mixing of unheated and heated air, producing heat output in accordance with requirements, and continuous circulation of air volume. Mixing dampers may be manually controlled or automatically controlled through thermostat operating damper motor. Saves steam, prevents spotty heating, provides constant air circulation and even heat distribution.

Valve Controlled Type—Unit is of standard casing arrangement but equipped with Nesbitt Heating Surface with Steam-distributing Tubes which allows for automatic control of heat output by modulation of steam supply. Eliminates stratification of outlet temperatures and prevents surface from freezing when subjected to sub-freezing air temperatures. Admirably suited to problems involving ventilation.

SELECTION DATA

Types of Mounting—Webster-Nesbitt Giant Unit Heaters can be furnished in any of four types: floor-mounted, horizontal-suspended, wall-mounted, and inverted, available with either V-belt or direct drive.

Sizes—Webster-Nesbitt Giant Unit Heaters are built in nine different casing sizes, with four radiators available for each casing, making a total of thirty-six sizes from which selection can be made. High outlet discharge velocities, 1700 to 2100 ft. per minute, make it possible to distribute heated air over large areas with few units. The different size radiators make it possible to select units of reasonably low final temperature for all conditions of entering air and steam pressure.

Special Features—All types, Standard, Thermadjust and Valve Controlled Type may be equipped with recirculating and outside air connections, mixing boxes, dampers and wall boxes.

For rating tables, dimensions and application data, communicate with the nearest Webster sales office or send for Publication W-N 104.

"LITTLE GIANT" PROPELLER-FAN UNIT HEATERS

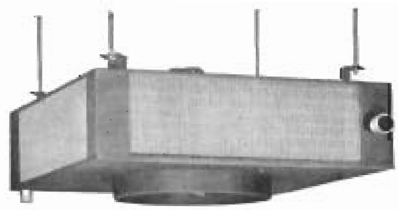
Table XXIV. Steam Capacities

Ratings—2 Lbs. Steam Pressure; 60° Entering Air
60-Cycle A.C. and Direct Current Motors

Model	Fan r.p.m.	Motor hp.	*B.t.u. Per Hr.	C.f.m. Std. Air	C.f.m. Final Temp.	Final Temp. °F.	E.D.R. Sq. Ft.	Outlet Velocity f.p.m.	Net Wt. Lbs.
10D-5 10H-5	1725	1/20	39,000	710	765	110.5	163	1265	65
10D-7 10H-7	1725	1/20	51,000	750	825	122.5	212	1375	75
12D-5 12H-5	1725	1/6	75,000	1440	1545	108.0	312	1815	110
14D-5 14H-5	1725	¼	90,000	2050	2170	100.5	375	2020	115
14D-7 14H-7	1725	¼	110,000	2200	2350	106.0	458	2190	145
16D-7 16H-7	1725	⅓	135,000	2700	2880	106.0	562	2060	165
18D-7 18H-7	1725	⅓	165,000	3200	3420	107.5	687	1840	205
18D-9 18H-9	1725	½	200,000	3500	3780	112.5	833	2030	235
19D-11 19H-11	1650	½	240,000	4100	4440	114.0	1000	2030	280
22D-9 22H-9	1140	½	265,000	5040	5400	108.5	1105	1875	315
22D-12 22H-12	1140	¾	315,000	5400	5770	113.5	1310	2000	355
26D-11 26H-11	1140	1	385,000	7800	8390	105.5	1605	2160	430
28D-12 28H-12	1140	1½	450,000	10000	10600	100.5	1875	2300	520
28D-16 28H-16	1140	1½	530,000	11000	11700	104.5	2210	2540	585

*Capacities indicated are for Steel Heating Elements.

Fig. 56 Down Blow Type



Designed to combine lightness and adaptability of propeller-fan unit heaters and performance characteristics generally associated with blower-fan units. Constructed on draw-through principle; air enters through a four-sided heating element and is discharged from propeller fan at high initial velocity. Four-sided heating element plus the draw-through principle provides large intake areas and a high B.t.u. capacity in compact space. High discharge velocity promotes effective use of heating capacity by insuring long travel, rapid diffusion, and positive direction of heated air-stream. "Little Giants" are easy to handle and may be suspended from building members.

Available with non-metallic casing. Send for particulars.

Fourteen unit sizes with capacity range from 39,000 to 530,000 B.t.u. per hour at basic rating conditions of 2-lb. steam pressure and 60° entering air. Air deliveries from 710 to 11,000 c.f.m. standard air.

See Publication W-N 114.

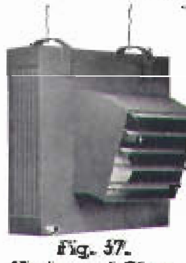


Fig. 57. Horizontal Blow

STEAM Heats America . . . .

WARREN WEBSTER & COMPANY

Established 1888 - Pioneers of Vacuum Steam Heating

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Printed in U. S. A.

Sept. 29, 1925. | 1,555,081

J. A. SERRELL ET AL

STEAM AND VENT TRAP APPARATUS

Filed April 27, 1923 | 2 Sheets-Sheet 1

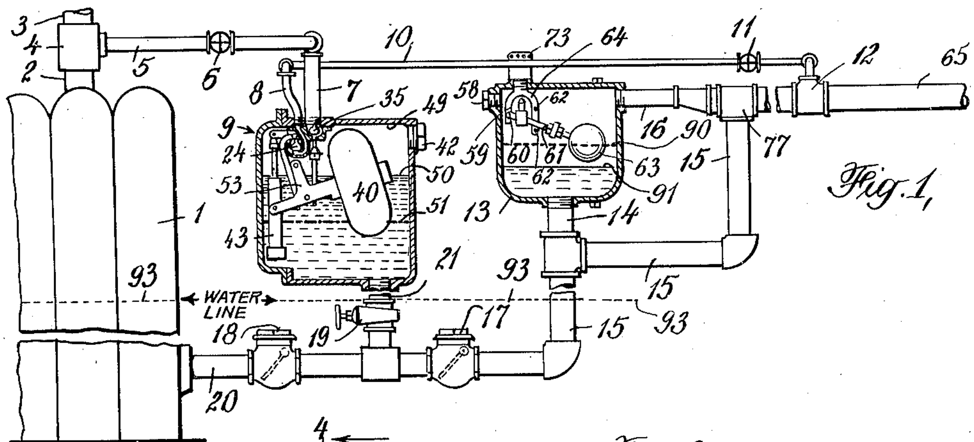

Fig. 1,

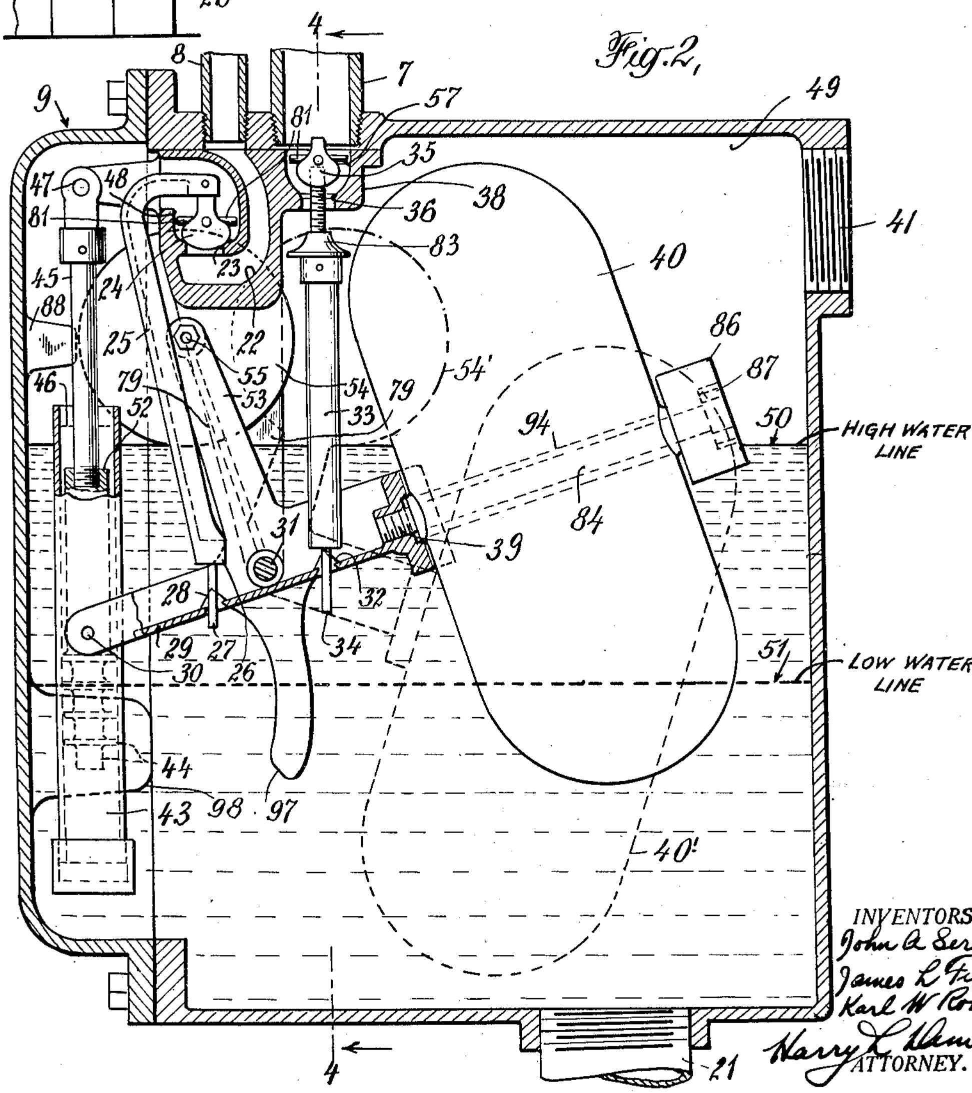

Fig. 2,

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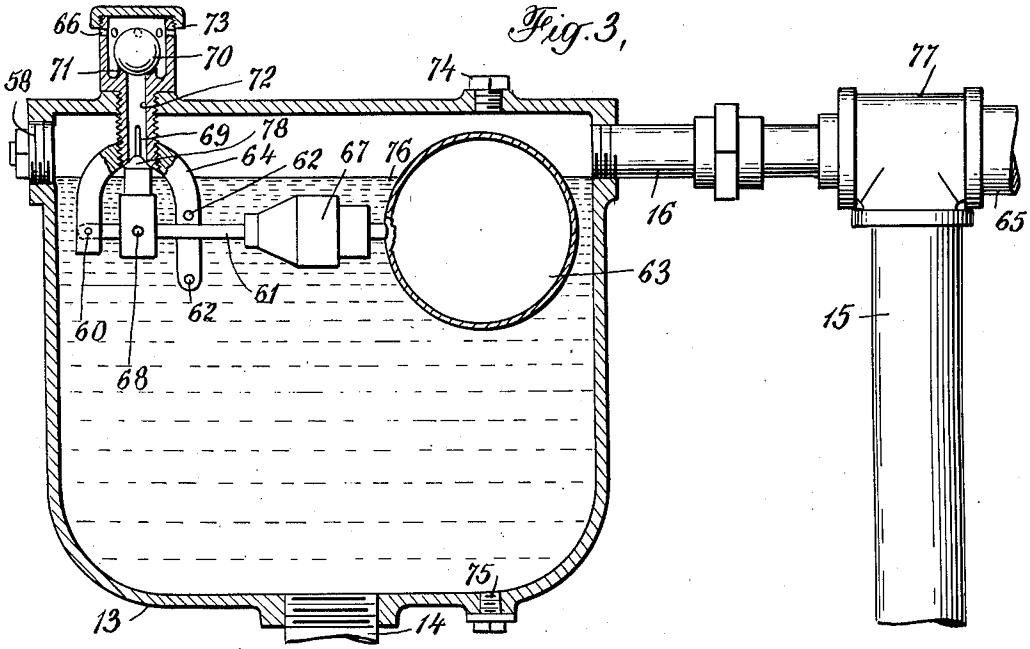
J. A. SERRELL ET AL

STEAM AND VENT TRAP APPARATUS

Filed April 27, 1923 2 Sheets-Sheet 2

Fig. 3,



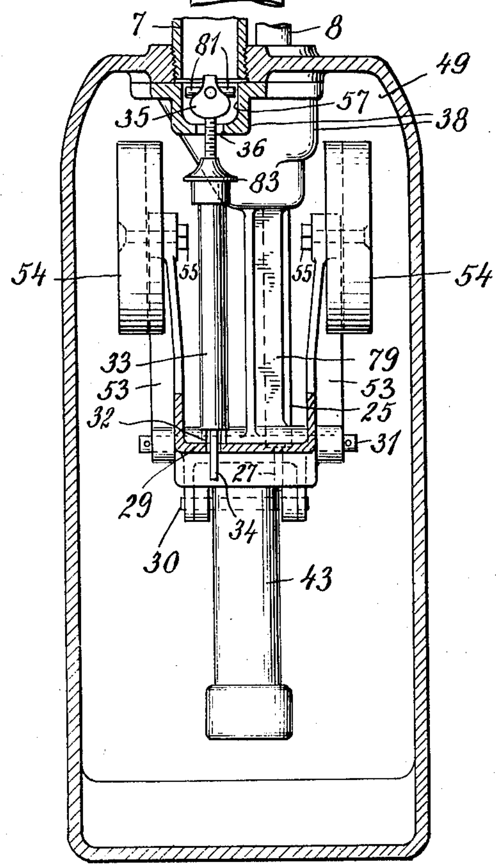


Fig. 4,

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James L. Fitts &
Karl W. Rohlin

BY

Harry L. Duncan
ATTORNEY.

Patented Sept. 29, 1925. 1,555,081

UNITED STATES PATENT OFFICE.

JOHN A. SERRELL, OF NORTH PLAINFIELD, JAMES L. FITTS, OF PENSAUKEN TOWNSHIP, CAMDEN COUNTY, NEW JERSEY, AND KARL W. ROHLIN, OF PHILADELPHIA, PENNSYLVANIA; SAID FITTS AND SAID ROHLIN ASSIGNORS TO WARREN WEBSTER AND COMPANY, OF CAMDEN, NEW JERSEY, A CORPORATION OF NEW JERSEY.

STEAM AND VENT TRAP APPARATUS.

Application filed April 27, 1923. Serial No. 634,944.

To all whom it may concern:

Be it known that we, JOHN A. SERRELL, a resident of North Plainfield, Somerset County, New Jersey, JAMES L. FITTS, a resident of Pensauken Township, Camden, Camden County, New Jersey, and KARL W. ROHLIN, a resident of Philadelphia, Philadelphia County, Pennsylvania, all United States citizens, have made a certain new and useful invention relating to Steam and Vent Trap Apparatus, of which the following is a specification, taken in connection with the accompanying drawings, which form part of the same.

This invention relates especially to boiler return and vent trap apparatus adapted for use in low pressure steam heating plants to receive and return the condensation water to the boiler. The return trap, which may advantageously be used for this purpose, comprises a casing connected to the wet and dry returns near the boiler and considerably, or at least somewhat above the boiler water level. A float device is arranged within this trap to automatically open and close the steam and the vent or exhaust connections to the trap so that it can automatically discharge the water into the boiler after receiving a charge of this condensation water from the dry return system. For this purpose a float device is arranged in the trap and preferably pivotally mounted so as to open these steam and vent valves alternately, and preferably a suitable controlling device is operatively connected to the float so as to promote its prompt operation when the water reaches or approaches the prearranged high and low water levels in the trap. For this purpose a controlling weight may be connected to the float, preferably at such an angle to the float lever arm that the turning moment of this weight changes sign during each movement of the float device so that the control weight or other device exerts a restraining action on the float in each extreme position; but as soon as the float begins to move in either direction this restraining action decreases in amount and finally becomes an accelerating force that continues and quickly completes the operating movement of the float even after the initial buoyancy of the rising float or its unbalanced weight when descending have ceased to be effective in promoting further movement. The operation of the float device is thus made so much more positive and definite that it is practically impossible for the float device to hang or stick in any intermediate position or to fail to properly operate the valves; and this increasing operating force of the controlling weight carries the float device so quickly and continuously from one extreme position to the other that the valves may advantageously be made of the more efficient unbalanced self-closing type.

It is advantageous in many cases to use this boiler return trap in connection with a vent trap of about equivalent water capacity which may advantageously be connected at a slightly higher level to preliminarily receive the condensation water and store the same during that portion of the cycle of operation when the return trap is discharging under boiler pressure; and then, when the float controlled valve in the return trap has operated to vent the pressure in the return trap, the condensation water which has accumulated in the vent trap can quickly flow into the return trap, this arrangement increasing the quickness of operation and capacity of the return trap and at the same time forming an emergency or auxiliary return device besides discharging the air from the dry return adjacent the boiler.

In the accompanying drawing showing in a somewhat diagrammatic way an illustrative embodiment of this invention:

Fig. 1 is a vertical section indicating the general arrangement of the return trap and vent trap and connected piping adjacent the boiler.

Fig. 2 is an enlarged vertical section through the boiler return trap.

Fig. 3 is a vertical section through the vent trap showing the vent valve closed, and

Fig. 4 is a transverse section through the boiler return trap taken substantially along the line 4—4 of Fig. 2.

As shown in Fig. 2, the boiler return trap may comprise a casing 49 of cast iron or other suitable material which may have a removable cover 9, bolted thereto so as to form a water tight joint. This casing may be formed with various inlet and discharge openings such as 21, 41, one or both of which may be connected to the piping adjacent the boiler. A steam pipe connection 7 and vent or exhaust pipe connection 8 are also provided in this casing adjacent a valve device 38 which is rigidly bolted or otherwise secured within the casing. The float device is movably mounted within the casing in any suitable way, and may be conveniently pivoted directly to the casing walls or to this valve device 38 which may be formed with a supporting bracket 79 for this purpose so as to properly support the float pivot 31 determining the oscillating movements of the float lever 29 and connected float 40. This elongated or cylindrical float may be secured to the float lever by the float stem 84 having its end 39 screwed into the lever which may be shaped so as to partly embrace this float and hold it in alignment when the float is bolted on this stem, which may extend through a central tube 94 in the float. It is usually desirable to have an adjusting weight such as 86 secured to the float lever or float so that it has the desired buoyancy in connection with the lever, and this interchangeable adjusting weight 86 may be secured on the end of this float stem 84 as by the counter-sunk nut 87.

The controlling device may be in the form of one or more controlling weights 54 cast or mounted on the float lever or device at a suitable angle to the float, and for this purpose one or more of these controlling weights 54, may if desired, be mounted on controlling arms 53 extending substantially at right angles to the float lever 29 so as to swing through a vertical line above the float pivot during the movements of the float device. The full line position of these parts in Fig. 2 corresponds to the upper extreme position of the float device when it has risen from its lower extreme position shown in dotted lines as soon as the water in the return trap reaches the high water line 50 indicated. At the beginning of this movement the nearly submerged float in the position 40′ has attained sufficient buoyancy so as to overcome the restraining action of the controlling weights 54′ in their dotted position in which their turning moment is opposed to the lifting action of the float; and this restraining action of the controlling weights 54 gradually decreases as the float device moves and brings the weights and their controlling arms more nearly above the float pivot 31. In this vertical position the weights exert no turning moment on the float lever, and their further movement beyond this vertical neutral position toward the full line position shown in Fig. 2 is accompanied by a gradually increasing accelerating or assisting action which they exert on the float device so as to promote its rising movement into this full line position. It is thus possible to have the restraining action of these one or more heavy controlling weights hold the float device practically stationary in its lower dotted position, while the water level in the return trap gradually rises from the low water line 51 to practically the high water line 50; and then when the float device finally starts upward, the increasingly accelerating action of the controlling weights insures its quick, continuous and effective upward movement which has ample power to operate the desired valves, preferably at about the mid part of the movement of the float device. In the same general way the controlling weight or weights exert a restraining action tending to maintain the float device in its full line extreme raised position until the water level has sunk practically to or adjacent the low water line 51; and then the weight of the float, which is unbalanced except for the very slight submerged portion below the low water line 51, is sufficient to start the float device in its downward swinging movement and overcome this initial restraining action of the controlling weights. The controlling weights similarly promote and accelerate this downward movement of this float device during its latter down stroke, since their turning moment in opposing this movement gradually decreases as the weights 54 near a vertical neutral position above the float pivot 31, and from that point onward the weights exert a gradually increasing action tending to force the float device downward into its dotted line position into the water remaining in the trap which considerably retards and cushions the last stage of this downward movement.

It is usually desirable to still further cushion these accelerated movements of the float device, and any suitable cushioning device may be employed in this connection, preferably of the fluid resistance or dash pot type. For this purpose a dash pot cylinder 43 may be connected to the float lever as by one or more pins or pivots 30 so that this cylinder is moved vertically whenever the float device operates. A plunger 52 having suitable plunger flanges 44 of such number and size as to give the amount of cushioning action desired may be mounted within this dash pot cylinder, and its connected stem 45 may be mounted as by the pin or pivot 47 to an extension or bracket on the valve device 38. Thus each movement of the float device produces a corresponding vertical movement of this dash pot cylinder so as to regulate and assist in cushioning this movement and minimize undesirable noise and impact of the parts. By having this cushioning cylinder 43 extend considerably above the water line in the trap casing it becomes filled up to about the point 46 with relatively pure water by condensation of the steam in the trap which forms a desirable cushioning fluid for this purpose. This dash pot device is preferably so arranged that as the float device descends into its dotted position the bottom of the cylinder 43 is brought into engagement with the lower end of the plunger so as to limit this downward movement; or preferably a stop projection 97 on the float lever engages a stop 98 cast on the casing cover 9 and planed or finished in the plane of the cover joint, so as to secure definite alignment. The movement of the float device in the other direction may be limited by similar positive stops or by the stops 88 formed on the cover 9 so as to be engaged by the controlling weights 54 when the float device has risen into its desired upper position. This makes more definite the extreme positions and the resulting restraining action exerted by these controlling weights, so that the movement and action of the float device may thus be rendered more definite and reliable.

While of course the proportions, arrangements, and operative connections of these parts can be varied considerably so long as the controlling weight or weights have an initial restraining moment tending to hold the float device stationary in each of its extreme positions, and then promoting and accelerating the movement of the float device when it once starts in either direction while the float exerts an initial starting impulse in each direction and finally resists or cushions the final stage of each movement; yet the illustrated arrangement is desirable in having the controlling weights and float rigidly connected into a unitary float device which minimizes noise and is quite effective in operation. The float 40 may have the vertically elongated or substantially cylindrical form shown, preferably at least several times as long as the rise in water level in the trap, which tends to promote the considerable angular movement of the connected float lever; and as seen in Fig. 4 this float lever may swing about the pivot 31 supported as by the centrally arranged supporting bracket 79, and this float lever may have the two symmetrically arranged lateral controlling arms 53, each of which have the substantial controlling weight 54 cast integral therewith or secured thereto as by the bolt 55. This leaves the central part of the float lever free for the operating connections for the valves which may comprise the steam valve 35 mounted on the weighted lifting rod 33 so as to cooperate with the valve seat 36, while the reduced stem 34, which may be provided at the lower end of this lifting rod, passes through an aligning aperture in the float lever on one or both sides of which suitable knife edge or other lifting members 32 may be formed to engage and raise the bottom of this lifting rod. Thus in the upper full line position of the float device these lifting members 32 have engaged this lifting rod and raised the steam valve 35 away from its seat 36 so that steam from the boiler or elsewhere may enter the return trap through the pipe 7 and passage 57; a deflector 83 of any suitable form being preferably arranged adjacent or upon the upper part of this lifting rod to laterally deflect this entering steam and prevent undesirable boring of the steam jet into and heating of the water in the trap, which means unnecessary steam condensation as well as undesirable noise. Guide fins such as 81 may be provided on this valve 35 so as to be loosely guided in the passage 57 and promote the lateral alignment of the valve during its vertical movement. The vent valve 24 may be mounted on a bent lifting arm 25 preferably having a similar reduced stem 27 extending through the float lever, so that the knife edge lifting members 28 can engage and raise the bottom 26 of this lifting arm and valve, when the float device moves into its dotted position shown in Fig. 2. This raises the valve from its seat 23 and opens the vent passage 22 communicating with the vent or exhaust pipe 8 in the casing so as to vent the pressure in the return trap and allow the condensation water to enter from the dry return until the water level rises to about the high water line 50 indicated. This vent valve 24 may be provided with similar guide fins 81 cooperating with the enlarged passage or valve chamber 48 so as to promote the lateral adjustment of the valve during these movements.

The return trap may be connected to the boiler as indicated in Fig. 1 and is preferably located considerably above the water line 93 of this boiler 1. If desired, the connection 21 may serve as a water inlet and outlet for this return trap, in which case the threaded opening 41 may be closed by the plug 42. This water connection 21 preferably comprises a cut off valve 19, which may be shut when the trap is being inspected or repaired, and this connection may lead into the wet return 20 at any convenient place adjacent the boiler, preferably between two check valves 17, 18. The return trap also has the steam pipe 7 connected to the boiler or to a steam riser 2, 3, therefrom, which may have the pipe and interposed shut off valve 6 connected to the T connection 4 in this riser. The vent or exhaust pipe 8 of the return trap is preferably connected through the pipe 10 and shut off valve 11 to the T connection 12 on the dry return 65 from the heating or piping system, which is preferably air vented adjacent this point. In this way whenever the return trap is vented by the lifting of the vent valve 24 shown more in detail in Fig. 2; the steam in the trap can pass through this vent or exhaust pipe 8, 10 into the dry return, where by imparting its heat to the water of condensation, it condenses without objectionable discharge into the atmosphere. It is also desirable to connect adjacent the return trap and preferably at a somewhat higher level, a vent trap 13 which may have a water connection with the dry return through the pipes 14, 15 and the T connection 77, while the pipe 16 above the water line equalizes the pressure in the air space in this trap with the adjacent part of the dry return pipe 65. When, for instance, the level of water in the return trap is at the high water line 50 and the trap begins to discharge under boiler steam pressure, the condensation water can no longer flow into the return trap from the dry return which in modulation or other low pressure heating systems may at times be at several pounds less pressure than the boiler steam pressure. The condensation water from the dry return therefore collects in this vent trap during this discharge period of the boiler return trap and may raise the water level in the vent trap from about the low water line 91 to the high water line 90, for instance. Then, when the return trap has discharged and its float device has descended and vented the steam pressure in its air space so as to reduce this pressure to about the pressure in the dry return 65, the somewhat greater height of the vent trap causes the water that has been received therein during the preceding discharge period to flow promptly into the return trap past the check valve 17 in connection with the additional condensation water that is being received from the dry return 65. This vent trap thus increases the effective water returning capacity of the return trap by reducing the time required to fill the same. Also in case the return trap is out of service the vent trap may be used alone in some cases, especially where the boiler is being run at relatively low pressure under mild weather conditions, for instance. Indeed, in such cases the pressure drop between the boiler and the dry return is some times so small that the gravity head in the vent trap is sufficient to force the condensation water back into the boiler past the check valve 17, 18, in which case the return trap does not need to operate, especially if the float valve of the vent trap closes, until the boiler pressure rises. This vent trap may be constructed as shown in detail in Fig. 3 in which the casing 13 is formed with a vent passage 72 and connected valve seat 71 for the light or hollow ball valve 70 which prevents ingress of air although allowing fairly free venting of any trapped air in this part of the system whenever the venting float valve 78 is withdrawn from its seat. A suitable cage or retainer device 73 of any desired construction may be arranged to protect and support the valve 70 in connection with its seat, and to vent through the holes 66 below the removable cover indicated any air discharged. A yoke such as 64 may be used to support the vent lever 61 and the vent valve 78 which may be pivoted thereto as by the pin 68 and may have a reduced guiding portion or stem 69 projecting upward in the vast passage 72. This yoke 64 may in some cases be screwed on the depending threaded portion of the vent pipe or passage which may thus be screwed into the casing and the vent lever may be pivoted in this yoke as by the pivot 60 and may, if desired, have its angular movement more or less limited as by the pins 62 in this slotted yoke between which the lever may oscillate. A light hollow float 63 may be mounted in connection with a suitable counterweight 67, so that in case for any reason the level of the condensation water rises to such a point as 76, the float rises and closes this vent valve 78 so as to prevent discharge of water from the vent trap. The vent trap may of course be provided with plugged holes such as 74, 75 and 58 for adjustment of the parts or other purposes, and a suitable hand hole and cover in one side of the trap may give access to the valve and other moving parts therein.

This invention has been described in connection with a number of illustrative arrangements, parts, proportions, materials, sizes and connections, and methods of operation and use, to the details of which disclosure the invention is not of course to be limited since what is claimed as new and what is desired to be secured by Letters Patent is set forth in the appended claims:

1. The return and vent trap apparatus for low pressure steam heating systems, comprising a return trap having a connection with the wet return adjacent the boiler, check valves provided in said wet return on each side of said connection, steam and vent connections with the air space of said return trap, steam and vent valves in said return trap controlling said steam and vent connections, a cushioned pivoted rigidly connected float device in said return trap comprising a float and an angularly arranged controlling weight exerting an initial restraining action on said float device to retain it in raised or lowered position until the water level has completely changed, said controlling device exerting a gradually decreasing restraining action and finally accelerating the movement of said float device in either direction, connections enabling said float device to alternately operate said valves during approximately the mid movement of said float device, and a vent trap connected between the dry return of the heating system and the return trap connec-

tion with the wet return of the boiler and located at a higher level than said return trap to receive condensation water during the discharge of said return trap and then supply such water thereto.

2. The return and vent trap apparatus for low pressure steam heating systems, comprising a return trap having a connection with the wet return adjacent the boiler, check valves provided in said wet return on each side of said connection, steam and vent connections with the air space of said return trap, steam and vent valves in said return trap controlling said steam and vent connections, a float device in said return trap comprising a float and an angularly arranged controlling weight exerting an initial restraining action on said float device to retain it in raised or lowered position until the water level has completely changed, connections enabling said float device to alternately operate said valves during approximately the mid movement of said float device, and a vent trap connected between the dry return and the return trap connection with the boiler and located at a higher level than said return trap to receive condensation water during the discharge of said return trap and then supply such water thereto.

3. The return and vent trap apparatus for low pressure steam heating systems, comprising a return trap having a connection with the wet return adjacent the boiler, a check valve provided in said wet return adjacent said connection, steam and vent connections with the air space of said return trap, steam and vent valves in said return trap controlling said steam and vent connections, a pivoted rigidly connected float device in said return trap comprising a float and an angularly operating controlling device exerting an initial restraining action on said float device to retain it in raised or lowered position until it quickly moves into its opposite extreme position after the water level has completely changed, connections enabling said float device to alternately operate said valves during the movement of said float device, and a vent trap connected between the dry return of the heating system and the return trap connection with the wet return of the boiler and located at a higher level than said return trap to receive water during the discharge of said return trap and then supply such water thereto.

4. The return and vent trap apparatus for low pressure steam heating systems, comprising a return trap having a connection with the wet return adjacent the boiler, a check valve provided in said wet return adjacent said connection, steam and vent connections with the air space of said return trap, steam and vent valves in said return trap controlling said steam and vent connections, a pivoted float device in said return trap comprising a float and an angularly operating controlling device exerting an initial restraining action on said float device to retain it in raised or lowered position until it quickly moves into its opposite extreme position after the water level has completely changed, connections enabling said float device to alternately operate said valves during the movement of said float device, and a vent trap connected between the dry return of the heating system and the return trap connection with the wet return of the boiler to receive water during the discharge of said return trap and then supply such water thereto.

5. The return and vent trap apparatus for low pressure steam heating systems, comprising a return trap having a connection with the wet return adjacent the boiler, a check valve in said wet return on both sides of said connection, boiler steam pressure and vent connections with the air space of said return trap, steam and vent valves in said return trap controlling said steam and vent connections, a float device in said return trap to alternately operate said valves in accordance with the water level in said return trap, and a vent trap connected between the dry return of the heating system and said return trap connection with the wet return of the boiler, to vent said dry return and to receive condensation water during the discharge of said return trap and then supply such water thereto.

6. The return and vent trap apparatus for low pressure steam heating systems, comprising a return trap having a connection with the wet return adjacent the boiler, a check valve in said wet return adjacent said connection, boiler steam pressure and vent connections with the air space of said return trap, steam and vent valves in said return trap controlling said steam and vent connections, a float device in said return trap to alternately operate said valves in accordance with the water level in said return trap, and a receiving chamber having an automatically closed vent and connected between the dry return of the heating system and said return trap connection with the wet return of the boiler to vent said dry return and to receive condensation water during the discharge of said return trap and then supply such water thereto.

7. The return and vent trap apparatus for low pressure steam heating systems, comprising a return trap having a connection with the wet return adjacent the boiler, a boiler steam connection with the air space of said return trap, a vent connection between said trap and the dry return to the boiler, steam and vent valves in said return trap controlling said steam and vent connections, a float device in said return trap to be operated by the water level therein,

connections enabling said float device to alternately operate said valves during the movement of said float device, and a vent trap connected between said dry return and the return trap connection with the wet return of the boiler and located at a higher level than said return trap to vent said dry return and to receive water during the discharge of said return trap and then supply such water thereto.

8. The return and vent trap apparatus for low pressure steam heating systems, comprising a return trap having a connection with the wet return adjacent the boiler, a check valve provided in said wet return adjacent said connection, a boiler steam connection with the air space of said return trap, a vent connection between said trap and the dry return to the boiler, steam and vent valves in said return trap controlling said steam and vent connections, a float device in said return trap to be operated by the water level therein, connections enabling said float device to alternately operate said valves by movement of said float device, means to vent said dry return, and a receiver connected between said dry return and the return trap connection with the wet return of the boiler and located at a higher level than said return trap to receive water during the discharge of said return trap and then supply such water thereto.

9. The return and vent trap apparatus for low pressure steam heating systems, comprising a return trap having a connection with the wet return adjacent the boiler, a check valve provided in said wet return adjacent said connection, a boiler steam connection with the air space of said return trap, a vent connection between said trap and the dry return to the boiler, steam and vent valves in said return trap controlling said steam and vent connections, a float device in said return trap to be operated by the water level therein, connections enabling said float device to operate said valves by movement of said float device, and a receiver having an automatically closed vent and connected between said dry return and the return trap connection with the wet return of the boiler to receive water during the discharge of said return trap and then supply such water thereto.

10. The boiler return trap comprising a casing having pivotally mounted therein a rigidly connected float device comprising a vertically elongated float and connected float lever, a pair of symmetrical laterally arranged controlling arms extending upward from the pivotal portion of said float lever substantially at right angles to said lever, controlling weights rigidly arranged on said controlling arms to exert a restraining action on said float device in both its raised and lowered positions, the turning moment of said controlling weights gradually changing as the float device moves in either direction so as to effect the progressive acceleration of such movement, a valve device secured to said casing and comprising a supporting bracket extending between said controlling arms and supporting the pivot of said float lever, a steam pipe connection and connected valve seat, and a vent pipe connection and connected valve seat, steam and vent valves cooperating with said seats and having connected weighted lifting rods cooperating with said float lever on opposite sides of its pivot to alternately raise said valves from said seats by each movement of the float device.

11. The boiler return trap comprising a casing having pivotally mounted therein a float device comprising a float and connected float lever, a pair of laterally arranged controlling arms extending upward from the pivotal portion of said float lever, controlling weights on said controlling arms to exert a restraining action on said float device in both its raised and lowered position, the turning moment of said controlling weights gradually changing as the float device moves in either direction so as to effect the progressive acceleration of such movement, a valve device secured to said casing, a supporting bracket extending between said controlling arms and supporting the pivot of said float lever, a steam pipe connection and connected valve seat, and a vent pipe connection and connected valve seat, steam and vent valves cooperating with said seats and alternately raised from their seats by each movement of the float device.

12. The boiler return trap comprising a casing having pivotally mounted therein a float device comprising a float and connected float lever, a pair of symmetrical laterally arranged controlling arms extending upward from the pivotal portion of said float lever substantially at right angles to said lever, controlling weights on said controlling arms to exert a restraining action on said float device in both its raised and lowered position, the turning moment of said controlling weights gradually changing as the float device moves in either direction so as to effect acceleration of such movement, steam and vent valves cooperating with seats and having connected weighted lifting rods formed with reduced stems projecting through said float lever to alternately raise said valves from said seats by each movement of the float device, and a water resistance cushioning device connected to said float lever to cushion the movement thereof.

13. The boiler return trap comprising a casing having pivotally mounted therein a float device comprising a float and connected float lever, a pair of symmetrical laterally

arranged controlling arms extending upward from the pivotal portion of said float lever substantially at right angles to said lever, controlling weights secured to said controlling arms to exert a restraining action on said float device in both its raised and lowered position, the turning moment of said controlling weights gradually changing as the float device moves in either direction so as to effect the acceleration of such movement, steam and vent valves cooperating with seats and alternately raised from their seats by each movement of the float device.

14. The boiler return trap comprising a casing having pivotally mounted therein a rigidly connected float device comprising a vertically elongated float and connected float lever, a controlling arm extending upward from the pivotal portion of said float lever substantially at right angles to said lever, a heavy controlling weight rigidly secured to said controlling arm to exert a restraining action holding said float device stationary in both its raised and its lowered position until the water level in the return trap reaches the opposite extreme, the turning moment of said controlling weight gradually decreasing as the float device moves in either direction so as to effect the progressive acceleration of such movement, a cushioning device cooperating with said float device and stops to limit its movement, a valve device secured to said casing and comprising a support for the pivotal mounting of said float device, a steam passage and connected valve seat, and a vent passage and connected valve seat, steam and vent valves cooperating with said seats and having connected weighted lifting rods formed with reduced stems projecting through said float lever to be alternately raised from their seats by each movement of the float device, and a deflector on the lifting rod adjacent said steam valve.

15. The boiler return trap comprising a casing having pivotally mounted therein a rigidly connected float device comprising a float and connected float lever, a controlling arm extending upward from the pivotal portion of said float lever substantially at right angles to said lever, a heavy controlling weight rigidly secured to said controlling arm to exert a restraining action holding said float device stationary in both its raised and its lowered position until the water level in the return trap reaches the opposite extreme, the turning moment of said controlling weight gradually decreasing as the float device moves in either direction so as to effect the progressive acceleration of such movement, a cushioning device cooperating with said float device and stops to limit its movement, a valve device secured to said casing and comprising a steam passage and connected valve seat, and a vent passage and connected valve seat, and steam and vent valves cooperating with said seats and having connected weighted lifting rods formed with reduced stems projecting through said float lever to be alternately raised from their seats by each movement of the float device.

16. The boiler return trap comprising a casing having pivotally mounted therein a rigidly connected float device comprising a float and connected float lever, a controlling arm extending upward from the pivotal portion of said float lever substantially at right angles to said lever, a controlling weight on said controlling arm to exert a restraining action holding said float device stationary in both its raised and its lowered position until the water level in the return trap substantially reaches the opposite extreme, the turning moment of said controlling weight gradually changing as the float device moves in either direction so as to effect the progressive acceleration of such movement, a cushioning device cooperating with said float device, a valve device secured to said casing and comprising a steam passage and connected valve seat, and a vent passage and connected valve seat, unbalanced self-closing steam and vent valves cooperating with said seat and having loose operating connection with said float lever to be alternately raised from their seats by each movement of the float device.

17. The boiler return trap comprising a casing having mounted therein a rigidly connected float device comprising a float and connected float lever, a controlling arm extending upward from the pivotal portion of said float lever, a controlling weight secured to said controlling arm to exert a restraining action holding said float device stationary in both its raised and its lowered position until the water level in the return trap substantially reaches the opposite extreme, the turning moment of said controlling weight gradually changing as the float device moves in either direction so as to effect the progressive acceleration of such movement, a steam passage and connected valve seat, and a vent passage and connected valve seat, steam and vent valves cooperating with said seats and having loose operating connection with said lever to be alternately raised from their seats by each movement of the float device.

18. The boiler return trap comprising a casing having pivotally mounted therein a float device comprising a float and connected float lever, a controlling arm extending upward from the pivotal portion of said float lever substantially at right angles to said lever, a heavy controlling weight rigid on said controlling arm to exert a restraining action holding said float device stationary in its raised or lowered position until the water level in the return trap reaches the opposite extreme, the turning moment of said controlling weight gradually changing as the float device moves so as to effect the

progressive acceleration of such movement, a cushioning device cooperating with said float device, a valve device comprising a passage and connected valve seat, and an unbalanced valve cooperating with said seat and having a connected weighted lifting rod cooperating with said float lever to raise said valve from said seat by the movement of the float device.

19. The boiler return trap adapted for use with low pressure heating systems comprising a casing having pivotally mounted therein a float device comprising a float and connected float lever, a controlling arm extending upward from the pivotal portion of said float lever and carrying a heavy controlling weight to exert a restraining action holding said float device stationary in its raised or lowered position until the water level in the return trap reaches the opposite extreme, the turning moment of said controlling weight tending to cause movement of said float device, gradually changing as the float device moves so as to effect the progressive acceleration of such movement, a valve device comprising a passage and connected valve seat, and a valve cooperating with said seat and having an operating connection with said float lever to be raised from its seat by the movement of the float device.

20. The boiler return trap adapted for use with low pressure heating systems comprising a casing having pivotally mounted therein a float device comprising a float and connected float lever, a controlling arm extending upward from the pivotal portion of said float lever and carrying a controlling weight to exert a restraining action holding said float device stationary in its raised or lowered position until the water level in the return trap reaches the opposite extreme, the turning moment of said controlling weight ending to cause movement of said float device gradually changing as the float device moves so as to effect the progressive acceleration of such movement, a valve device comprising a passage and connected valve, and having connections to operate said valve by the movement of the float device.

21. The boiler return trap adapted for use with low pressure heating systems comprising a casing having pivotally mounted therein a float device comprising a float and connected controlling weight to exert a restraining action holding said float device stationary in both its raised and lowered position until the water level in the return trap reaches the opposite extreme, the turning moment of said controlling weight gradually changing as the float device moves in either direction so as to effect progressive acceleration of such movement, and pressure and vent passages and valves alternately operated by each movement of the float device.

22. The boiler return trap comprising a casing having pivotally mounted therein a float device comprising a float and connected controlling weight to exert a restraining action holding said float device stationary in an extreme position until the water level in the return trap reaches the opposite extreme, the turning moment of said controlling weight gradually changing as the float device moves so as to effect progressive acceleration of such movement, and pressure and vent passages and valves operated by movement of the float device.

23. The boiler return trap comprising a casing having pivotally mounted therein a float device comprising a float and connected float lever, a controlling weight cooperating with said float lever to exert a restraining action holding said float device stationary in both its raised and its lowered position until the water level in the return trap substantially reaches the opposite extreme, the turning moment of said controlling weight on said float lever gradually changing as the float device moves in either direction so as to effect progressive acceleration of such movement, and steam and vent passages and cooperating valves having loose operating connections with said float lever to be alternately opened and closed by each movement of the float device.

24. The trap comprising a casing having movably mounted therein a float device comprising a float and rigidly connected float lever and controlling weight to exert a restraining action holding said float device stationary in an extreme position until the water level in the trap substantially reaches the opposite extreme, the turning moment of said controlling device on said float lever then gradually changing as the float device moves so as to effect acceleration of said movement, and a valve seat and valve in said casing and having a loose operating connection comprising a lifting knife edge on said float lever.

25. The boiler return trap comprising a casing having pivotally mounted therein a float device comprising a float and a rigidly connected heavy controlling weight to exert a restraining action holding said float device substantially stationary in an extreme position until the water level in the trap reaches the opposite extreme, the turning moment of said controlling weight thereupon gradually changing as the float device moves so as to effect progressive acceleration of such movement, and pressure and vent passages and valves in said casing and operated by the float device during a mid portion of its movement.

26. The boiler return trap comprising a casing having movably mounted therein a float device comprising a float and a rigidly connected controlling weight to exert a re-

straining action holding said float device substantially stationary in an extreme position until the water level in the trap substantially reaches the opposite extreme, the turning moment of said controlling weight on said float lever thereupon changing as the float device moves so as to effect acceleration of such movement, and a valve seat and cooperating valve in said casing and having loose operating connections with said float device to be operated thereby.

27. The boiler return trap comprising a casing having mounted therein a float device comprising a float and a rigidly connected float lever and controlling device, a valve device comprising a steam pipe connection and connected valve seat, a steam valve cooperating with said seat and having a connected substantially vertical lifting rod formed with a reduced stem projecting through said float lever to raise said valve from its seat by movement of the float device.

28. The boiler return trap comprising a casing having mounted therein a float device comprising a float and connected float lever, a steam pipe connection and connected valve seat, a steam valve cooperating with said seat and having connected substantially vertical lifting rod to raise said steam valve from its seat by movement of the float device, and a deflector on the lifting rod adjacent said steam valve to minimize undesirable condensing contact between the entering steam and the water in said trap.

29. The boiler return trap comprising a casing having mounted therein a float device comprising a float and connected float lever, a valve device comprising a steam pipe connection and connected valve seat, a steam valve cooperating with said seat and having connected substantially vertical lifting rod cooperating with said float lever to raise said steam valve from its seat by movement of the float device, and a deflector on the lifting rod adjacent said steam valve to minimize undesirable condensing contact between the entering steam and the water in said trap.

30. The boiler return trap comprising a casing having mounted therein a float device, a steam pipe connection and connected valve seat, a steam valve cooperating with said seat and having connected substantially vertical lifting rod to be raised from its seat by movement of the float device, and a deflector adjacent said steam valve to minimize undesirable condensing contact between the entering steam and the water in said trap.

31. The boiler return trap comprising a casing having pivotally mounted therein a float device comprising a float and connected controlling device to exert a restraining action holding said float device stationary in an extreme position until the water level in the return trap reaches the opposite extreme, the turning moment of said controlling device gradually changing as the float device moves so as to effect progressive acceleration of such movement, steam and vent passages and valves operated by movement of the float device, and a water dash pot cushioning device connected to said float lever to cushion the movement thereof and having an opening above the water line of said trap to be supplied with steam condensed therein.

32. The boiler return trap comprising a casing having pivotally mounted therein a float device comprising a float and connected float lever, a controlling device cooperating with said float lever to exert a restraining action holding said float device stationary in both its raised and its lowered position until the water level in the return trap substantially reaches the opposite extreme, the turning moment of said controlling device on said float lever gradually changing as the float device moves in either direction so as to effect the progressive acceleration of such movement, steam and vent passages and cooperating valves having loose operating connections with said float lever to be alternately opened and closed by each movement of the float device, and a water dash pot cushioning device connected to said float lever to cushion the movement thereof and having an opening above the water line of said trap to be supplied with steam condensed therein.

33. The return and vent trap apparatus for low pressure steam heating systems, comprising a return trap having a connection with the wet return adjacent the boiler, check valves provided in said wet return adjacent said connection, a boiler steam connection with the air space of said return trap, a vent connection having an automatically closed vent and communicating with said return trap, float operated steam and vent valves controlling said steam and vent connections, and a receiver connected between the dry return and the return trap connection with the wet return of the boiler and located at a higher level than said return trap to receive water during the discharge of said return trap and then supply water thereto.

34. The return and vent trap apparatus for low pressure steam systems, comprising a return trap having a connection with the wet return adjacent the boiler, a steam connection with the air space of said return trap, a vent connection having an automatically closed vent and communicating with said return trap, automatically operated steam and vent valves controlling said steam and vent connections, and a receiver connected between the dry return and the re-

turn trap connection with the wet return of the boiler, to receive water during the discharge of said return trap and then supply said water thereto.

35. The return and vent trap apparatus for low pressure steam heating systems, comprising a return trap having a connection with the wet return adjacent the boiler, check valves provided in said wet return adjacent said connection, a boiler steam connection with the air space of said return trap, a vent connection between said trap and the dry return of the boiler, float operated steam and vent valves in said return trap controlling said steam and vent connections and a float controlled vent valve connected between said dry return and the return trap connection with the wet return of the boiler.

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