SKIDMORE CORPORATION

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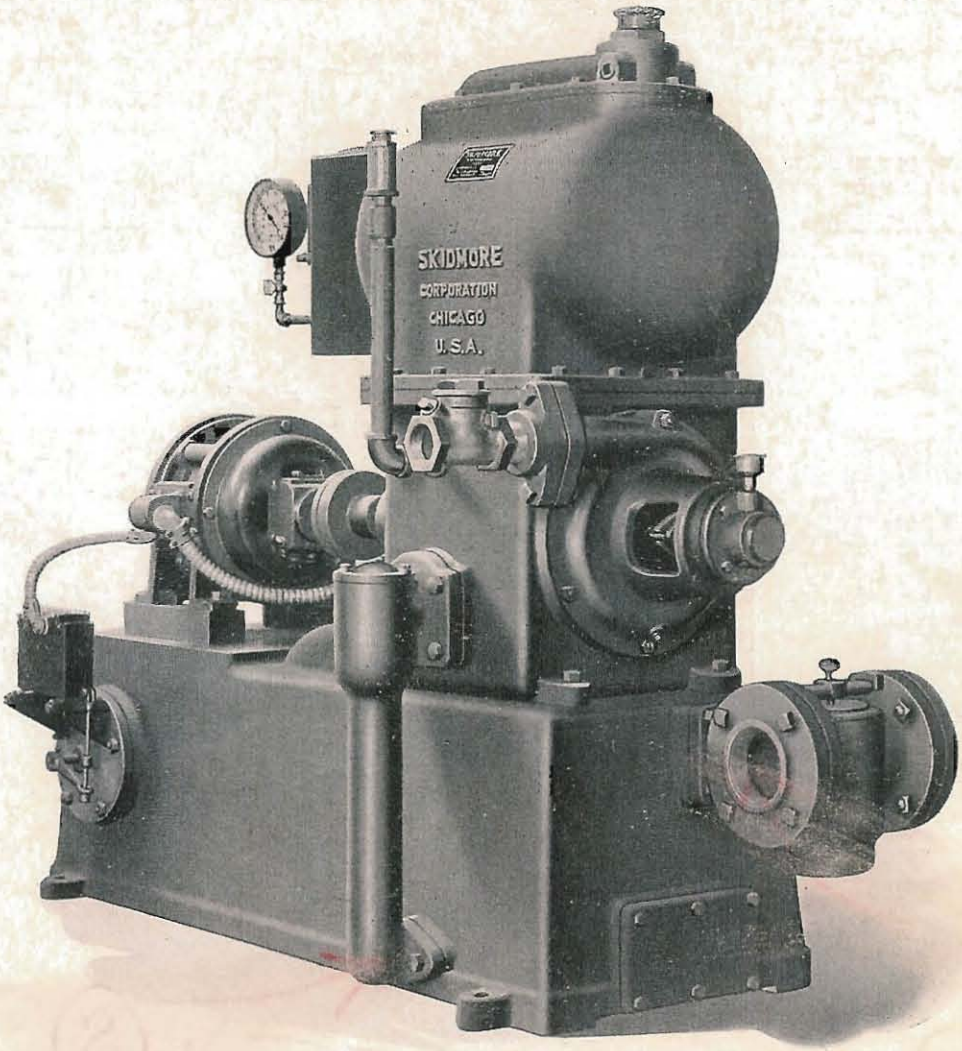
Local and Long Distance Phone Diversey 9330

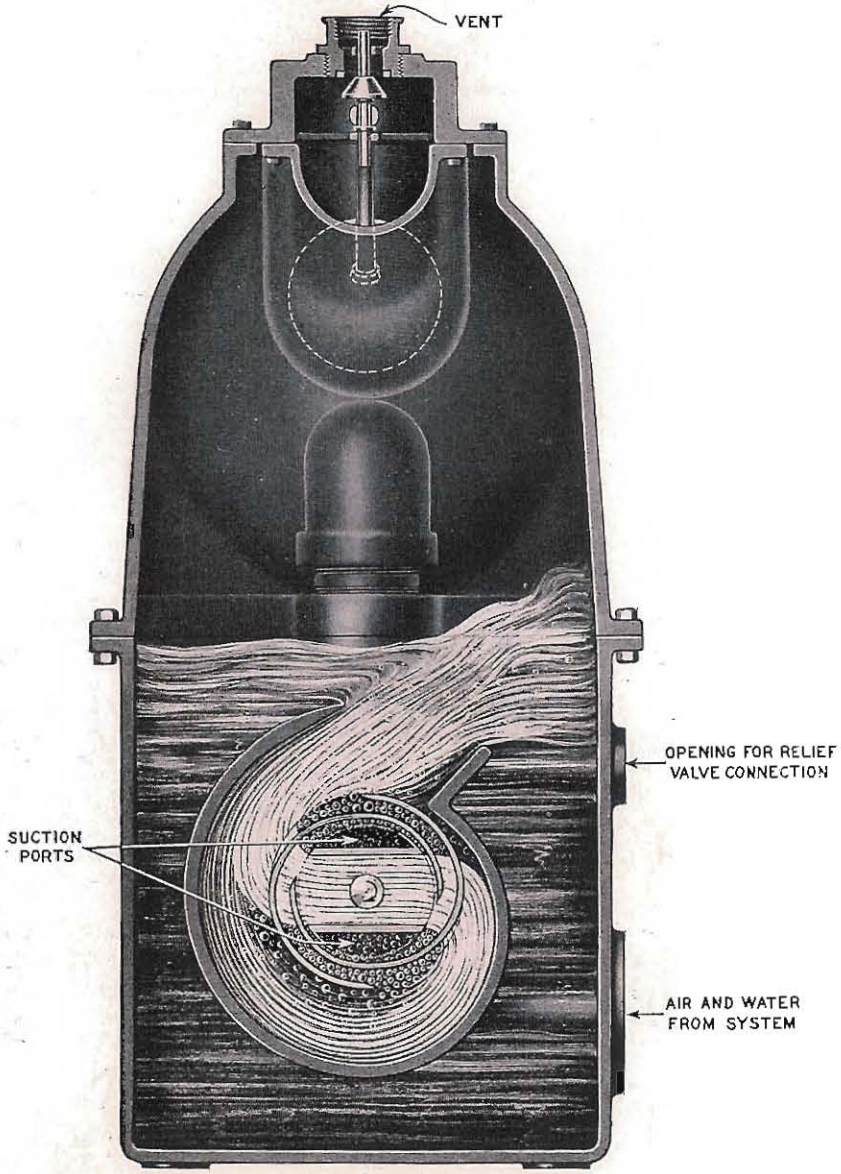
BULLETIN No. 6

Skidmore Hydro Turbine Vacuum and Boiler Feed Pump with Interceptor Tank in Base



Nos. 3 to 6 Inclusive

FOR RETURN LINE HEATING SYSTEMS WHERE RADIATION AND RETURNS ARE AT THE SAME LEVEL OR ABOVE THE PUMP



INTRODUCTION

THE object of the design is to have a unit compact in arrangement, combining the vacuum pump with an interseptor tank, thereby saving floor space, and securing a low water line in the system when operating on float control.

In the arrangement shown a hollow base has been used on which the pump, motor and electrical equipment are mounted. A float operated switch is installed in the base to control the pump from water level in same. All wiring between the starter, vacuum switch and float switch will be installed at the factory.

With this construction the unit arrives complete, ready to set in place, and by simply connecting the return and discharge pipes to flanged openings and wiring to starter the pump is ready to run.

The use of a cast iron tank as a base eliminates the necessity of a concrete base for mounting.

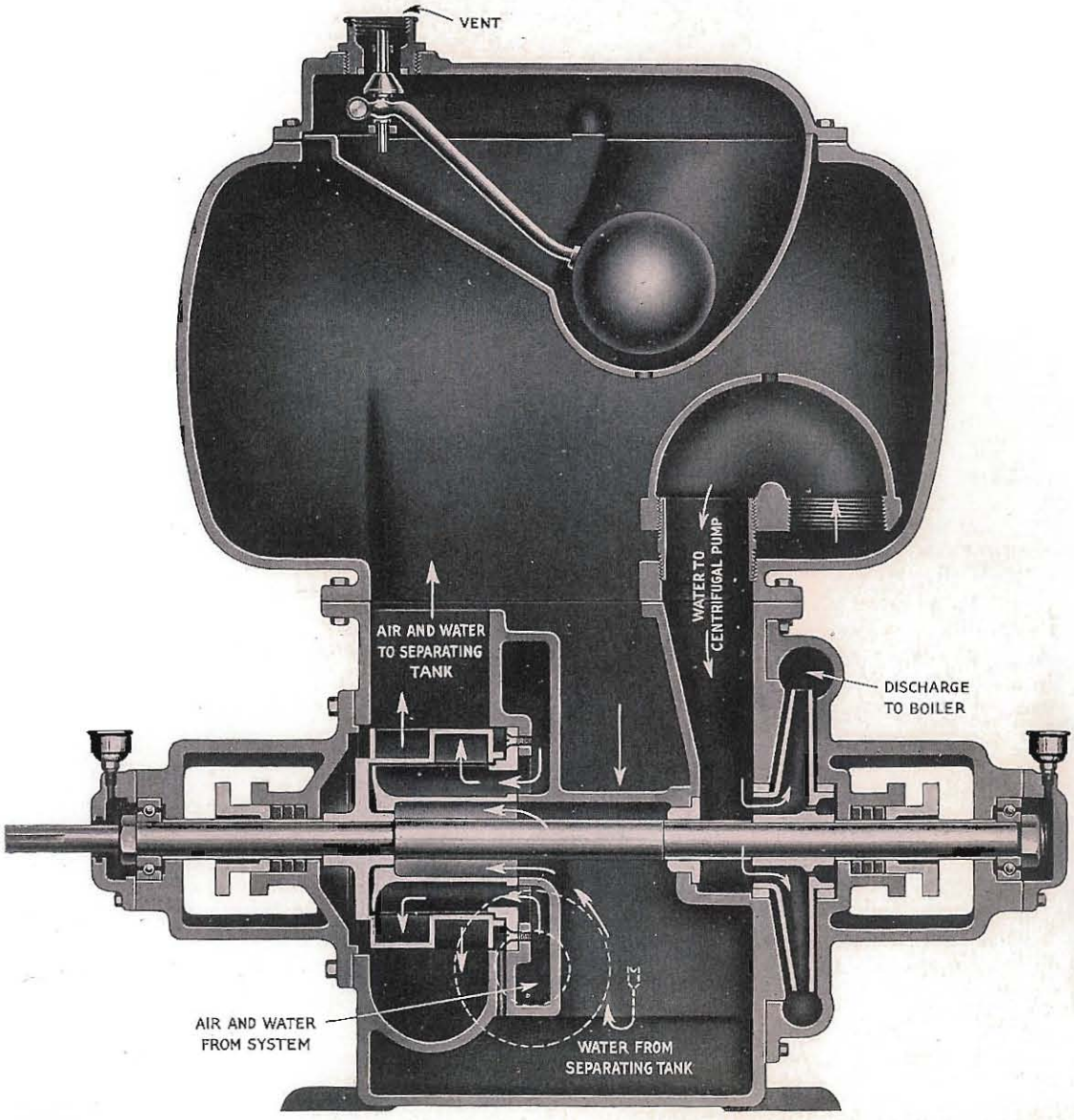
We feel sure that the low operating water line secured in this design will appeal to Architects and Engineers as it will in many installations eliminate the placing of the pump in a pit to secure drainage of low radiation and returns.

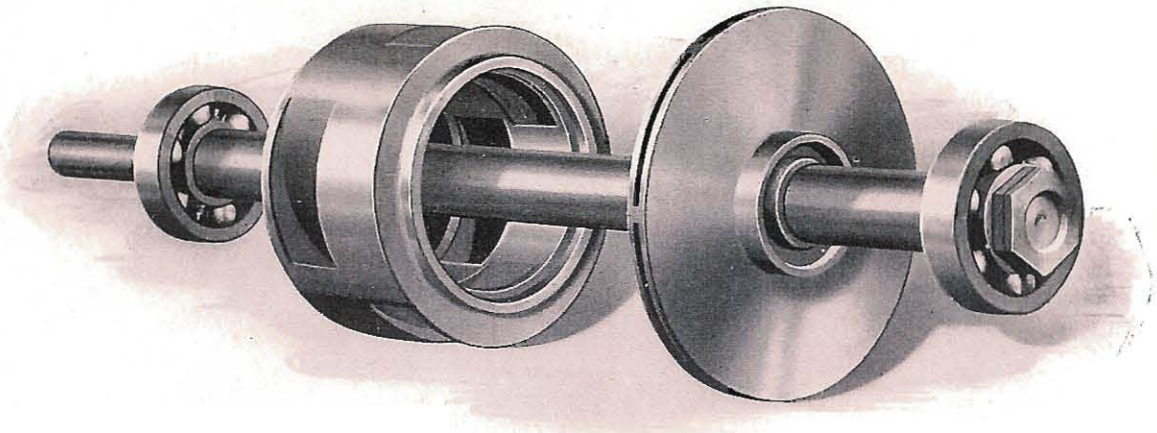
The operating point on these units will be from 10″ on the samller sizes to 12″ on the larger, from floor level.

The many advantages in use of vacuum for steam heating are recognized by all engineers and architects so that today installations of any considerable size without a vacuum system are a rartiy.

To all vacuum heating systems the Pump is all important, it should be reliable, efficient, economical in power used, noiseless and compact. These qualifications the Skidmore Pump has, together with other valuable improvements over other pumps now used for this purpose.

The simple design and sturdy construction together with high efficiency in every way appeal at once to the critical engineer or architect. There being no close clearances, valves or gears to wear, the efficiency remains constant.





THE ONLY MOVING PART

GENERAL DESCRIPTION

As appears in illustrations the pump is of pleasing design, very compact and direct coupled to motor. Separating Tank is bolted directly on pump casing. Our combined strainer and check valve is flanged direct to pump suction and flanged openings provided on both sides for convenience in connecting returns from heating system. The sediment basket is easily removed for cleaning without disturbing piping.

The returns from the heating system are bolted to a specially designed combined strainer and check valve located close to the floor, thereby minimizing the lift of water of condensation from low returns and reducing power consumption.

The arrangement of vacuum and boiler feed pumps in the receiver is such that the water supply to both is taken from the lower part of the case, in quiescent water, freed from entrained air. The boiler feed pump being proportioned for approximately three times the normal requirements, it can remove the condensate as fast as it is pumped through the vacuum pump and also rapidly dewater the system after a shut-down.

The Skidmore Pump operates on the "wet vacuum" principle (same as a steam pump), that is the air, vapor and water of condensation are delivered by suction rotor direct from return lines to the separating tank (open to atmosphere) from which water flows by gravity to centrifugal pump, the air and vapor passing off through the air discharge. The open separating tank has a distinct advantage over the tank under vacuum as it eliminates the suction head on centrifugal pump, thus saving power. Inlet to centrifugal pump is at a fixed height so that a sufficient water level for sealing is maintained in tank at all times.

To prevent any loss of water through air discharge pipe at times when pump is not in operation (as closed down for the night), a float valve is installed, so it will automatically close air discharge before water fills tank. This valve has another function; in case boiler pressure increases above a pressure centrifugal pump is designed to operate at, water will accumulate in tank, thereby closing air discharge; when this occurs, suction rotor automatically becomes a booster to centrifugal pump enabling it to deliver the water against greater boiler pressure. This feature has been the means of saving boilers from being cracked or burnt out due to low water level in boiler.

A vacuum is maintained on the system at all times and all water returned to boiler or feed water tank as case may be.

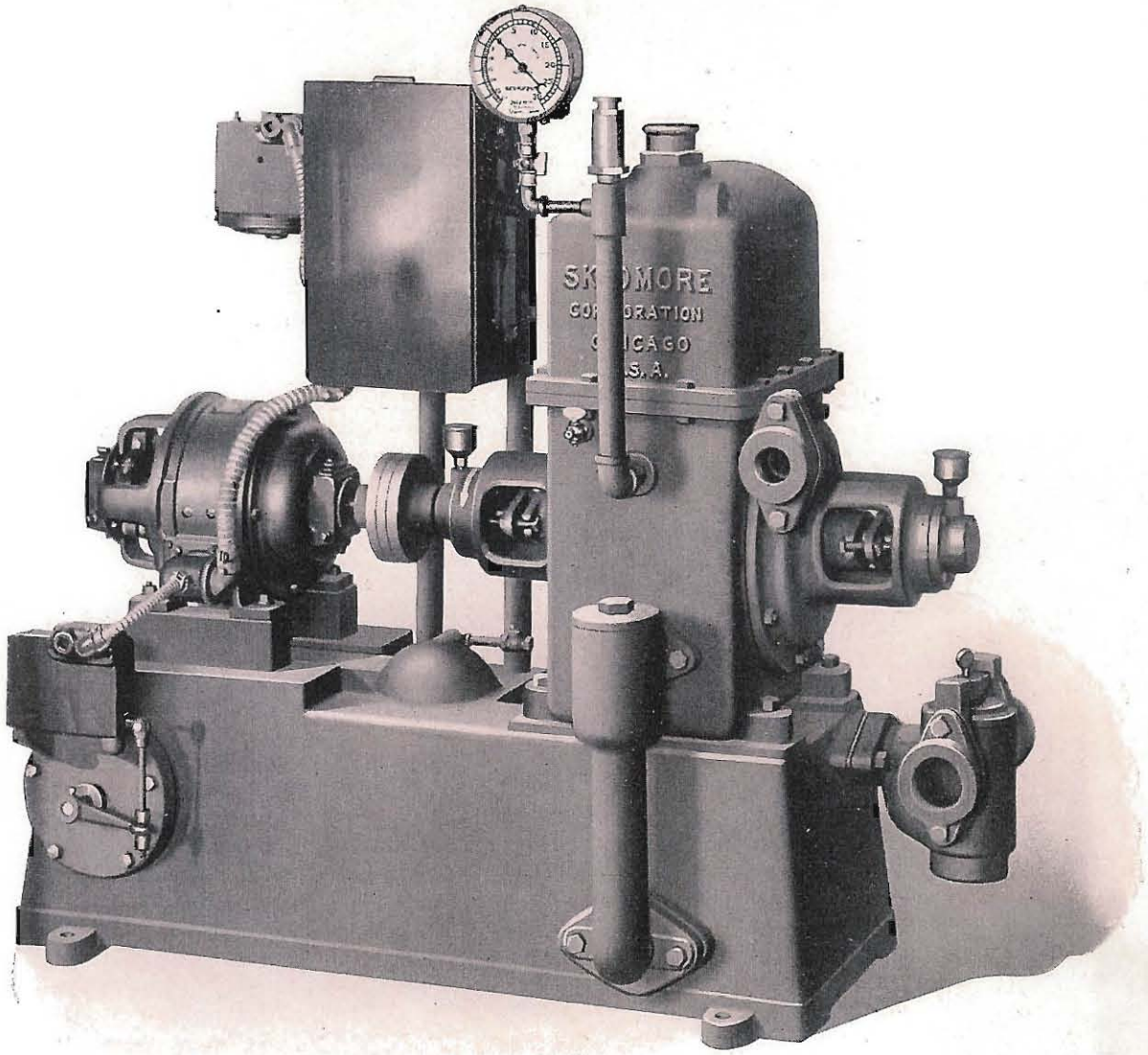
Mechanically and hydraulically the Skidmore Pump could not be more simple. A suction rotor and centrifugal pump impeller of symmetrical design, both mounted on a shaft carried on oversized ball bearings, comprise the only moving part. The air rotor and the centrifugal impeller are both of the enclosed type, permitting liberal clearances and eliminating the use of adjustments to compensate for wear. Because of this feature of liberal clearances, ***maintained*** vacuum and power efficiency is assured, a notable and exclusive feature of the Skidmore Pump.

MATERIALS

Materials used are the best that can be obtained. Casing, base and separating tank are of fine grained cast iron. Suction rotor, centrifugal pump and sealing rings are bronze. Shaft is high carbon steel protected by phosphor bronze sleeves now recognized by engineers as the highest grade of construction. Ball bearings are of best quality and ample size. Suction rotor and centrifugal pump are mechanically and hydraulically balanced. All parts are accurately machined and interchangeable. Motors are standard make.

STANDARD EQUIPMENT

Standard equipment consists of Pump and Motor bolted to heavy cast iron base, cast iron air separating tank bolted to top of pump, strainer with self contained check valve flanged to pump suction, vacuum gauge, adjustable vacuum relief valve, check valve for boiler feed line and float controlled air discharge valve in tank.



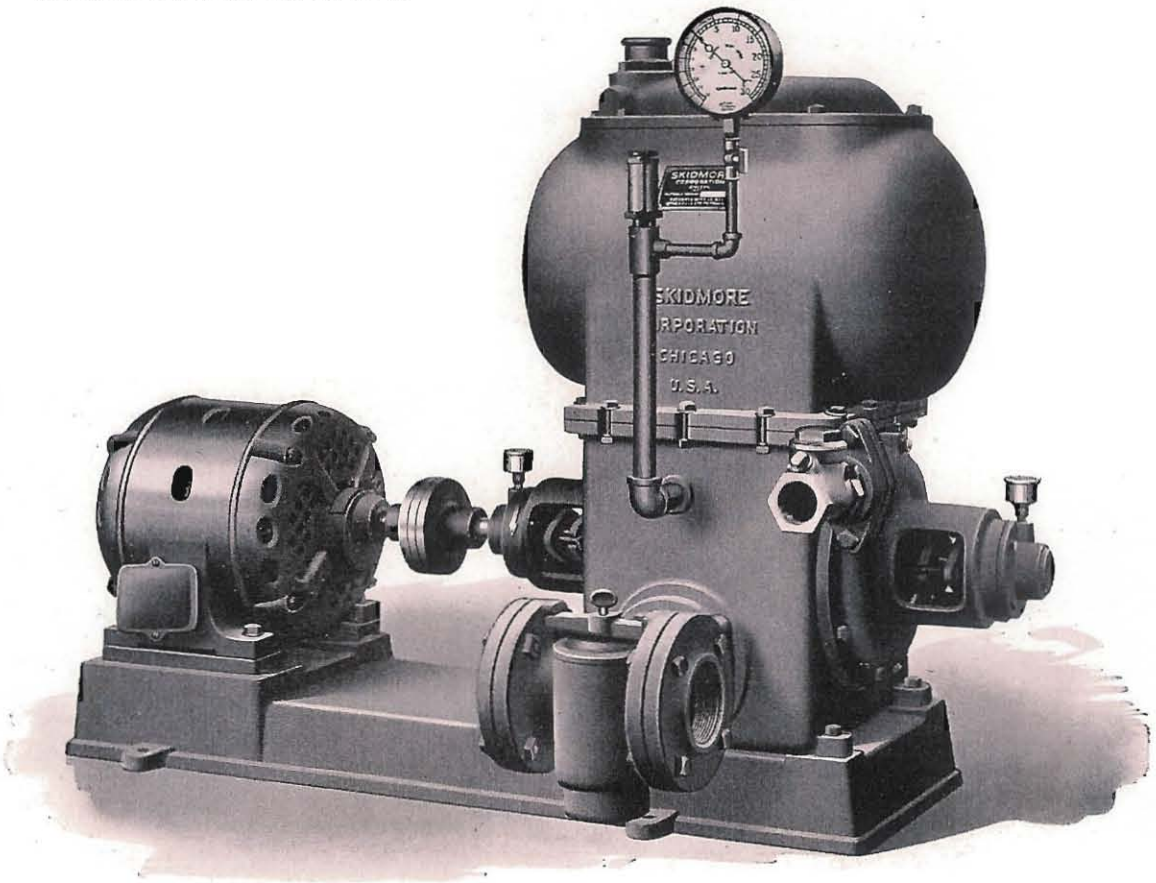
Sizes 0, 1 & 2 Automatic Control furnished in this design.
Sizes 3 to 6 inc., Automatic Control furnished in design on Page 1.

AUTOMATIC CONTROL

These pumps are furnished for continuous running or with automatic control.

Automatic control equipment consists of a float control switch with toggle contact switch so that unit will operate as a condensation pump by by-passing vacuum control, a diaphragm type vacuum controller and automatic starters for all currents with overload and no voltage protection. Standard devices furnished.

Continuous units are the same design as automatic units except that base will be as shown in cut below for all sizes.



Nos. 3 to 6 Inclusive in this Design

SPECIAL ADVANTAGES

Quiet in operation. Low power consumption. Cannot become air bound.
No close clearance on moving parts. No loss of feed water due to overflowing.
No air can leak back into system through pump.
Maintained efficiency, no adjustments for wear.
Minimum floor space occupied, everything on one base.
Ease in installing, no piping necessary, just connect to returns.
As none of the internal parts of pump are lubricated it is impossible for any oil to be delivered to boiler in water.
Positive removal of air and water from system and return of water to boiler without use of overhead tanks or water legs.

PRINCIPLE OF OPERATION

As the name "Hydro Turbine Vacuum Pump" indicates, the Skidmore Vacuum Pump is one of several using water as the actuating medium and shares the advantages of this type in the elimination of the losses of clearances, re-expansion and valve leakage. Owing to its unique principle, the Skidmore Pump has many additional and exclusive advantages.

A rotor, Fig. 1, having two or more concentric passages revolves about a central stationary post, Fig. 2, having four openings. Two of the post openings, "A-A", communicate with the separating tank and supply the pistons of actuating water to the rotor. The two other openings, "B-B", in the post are connected directly to the return line of the heating system, and from these openings the rotor draws the non-condensable vapors and condensed steam.

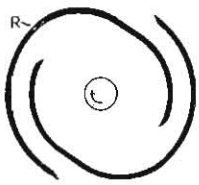


Fig. 1

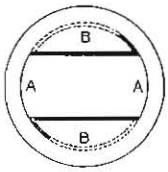


Fig. 2

The rotor "R" revolves about the stationary post, Fig. 2, as indicated by the arrow: the inner lip of the rotor cuts off pistons of water as shown in Fig. 3 and 4. The passages of the rotor being of uniform cross section and the walls ***concentric,*** no motion is imparted to the water pistons other than that caused by skin friction, and the water pistons remain relatively stationary with respect to the moving rotor.

Consider the rotor passage as a moving cylinder with a stationary (water) piston therein. As the cylinder (rotor) moves, the area ahead of the piston increases, creating a vacuum and drawing in air, water or both, from the openings "B". If the returns consist of water, as would be the case on starting up in the morning, then the rotor cuts off alternate pistons of water from both the post openings and the return openings.

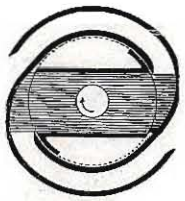


Fig. 3

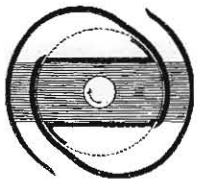


Fig. 4

As the rotor revolves to position Fig. 5, the water piston reaches the end of the passage and the opening "B" is cut off, trapping a charge of air and condensate in the passage ready to be pushed out as a new water piston is cut off from the opposite outlet of the water post. In other words, alternate stationary masses of water, and a mixture of air and water, are cut off by the revolving ***concentric*** passages. Note that no centrifugal action is imparted to the water thereby keeping the power at a minimum; that the movement is ***continuous*** and in ***one direction,*** giving smooth action, and ***most important,*** there are no close clearances or adjustments necessary. This means ***maintained capacity and efficiency,*** an exclusive feature.

The characteristics are those of a positive displacement pump but without the disadvantage of clearances because the outlet, or discharge, is the full piston area. This unique feature permits the use of the Skidmore Pump as a "Wet" vacuum pump handling both air and condensate through the pump and the great advantage of a separating tank under atmospheric pressure. One of the incidental advantages of the latter is that the suction of the centrifugal boiler feed pump is under pressure, an advantage too well understood to be more than mentioned.

Due to the simple innovation of concentric passages moving in relation to stationary water pistons, perfect balance, structural simplicity, a great increase in efficiency is attained over other pumps of the hydraulic type.

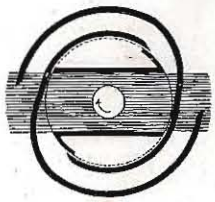


Fig. 5

These Pumps are protected by U. S. and foreign patents.

GENERAL DATA

Pumps are built to handle from 5,000 to 100,000 sq. ft. of radiation.

The ratings are based on direct radiation or its equivalent in indirect or direct indirect radiation and the pumps are guaranteed to handle up to their rated capacity of radiation and return the water to the boiler against 10 pounds pressure at the pump. In figuring the pressure at the pump 1 pound must be added for each two feet that the water level in boiler is above the pump discharge.

Pumps to operate against 20 pounds to 60 pounds pressure are also furnished for the same capacities.

The design and tightness of the system, temperature of the returns, and type of vacuum valves materially affect the maximum vacuum maintained.

The size of the installation and the type of construction materially affect the operation of any vacuum pump. It is often found that while the amount of radiation in a given case may be within the limit of a certain size pump, it will be found advisable to use a larger size due to old work, trapped pipings, low returns or where lifts are necessary. For this reason we advise that problems of this kind be submitted to us so that the proper size equipment can be selected.

Every pump is carefully tested. Quantity of air and water are measured and vacuum and pressure determined by mercury columns and calibrated gauges.

TABLE OF CAPACITIES

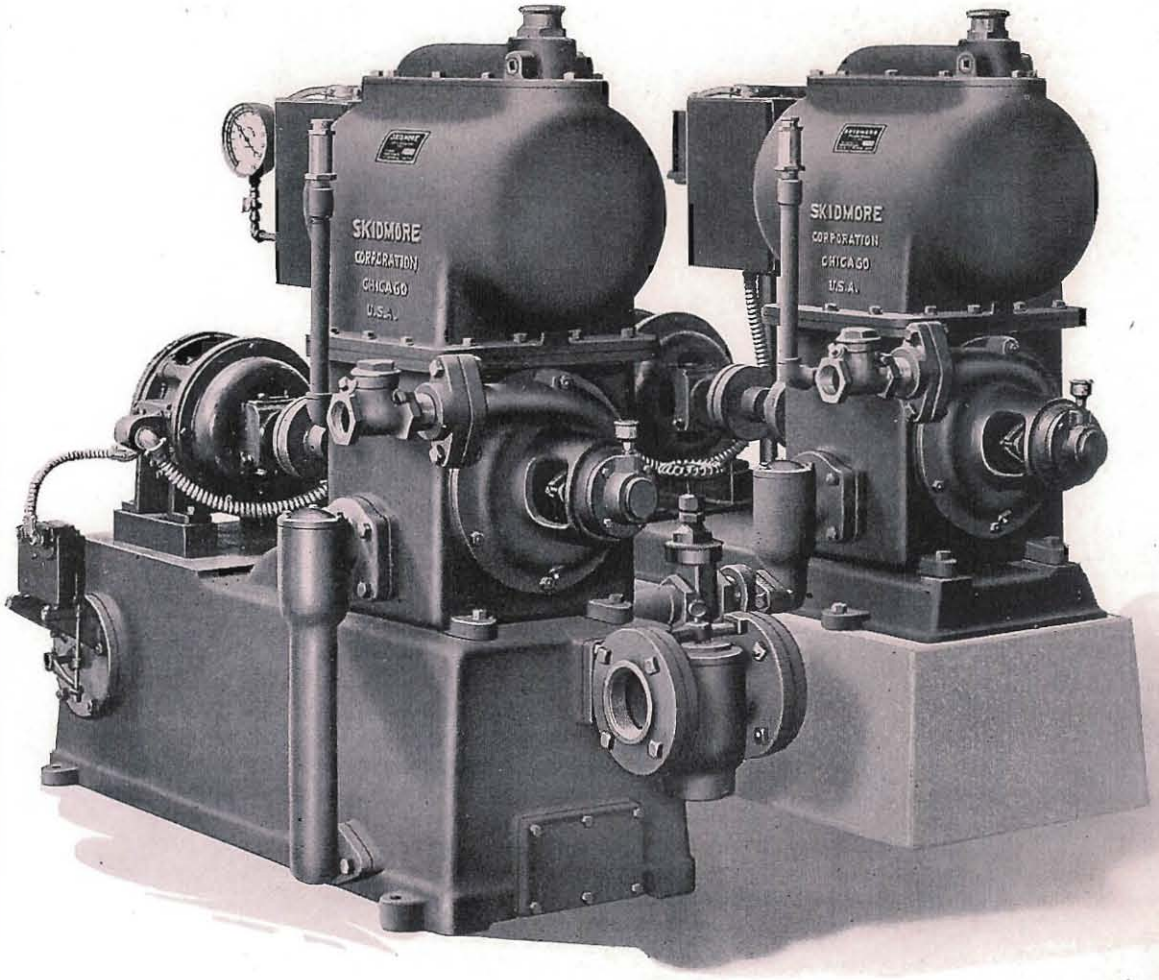
10-in. Vacuum, 10 and 20 Lbs. Pressure

Size of Pump	Capacity sq. ft. of radiation	Gals. of water per min.	Motor H.P. 10 lbs.	Motor H.P. 20 lbs.	Size of Companion Flanges for returns	Size of discharge to boiler	Approx. floor space	Shipping weight lbs.
0	5,000	8	¾	1	1½″	1″	18″x34″	500
1	8,000	11	1	1½	2″	1¼″	18″x46″	600
2	16,000	22	1½	2	2″	1¼″	18″x48″	700
3	26,000	35	2	3	3″	1½″	18″x50″	775
4	40,000	60	3	5	3″	2″	18″x52″	800
5	65,000	90	5	7½	5″	2″	20″x60″	1350
6	100,000	150	7½	10	5″	2½″	20″x66″	1650

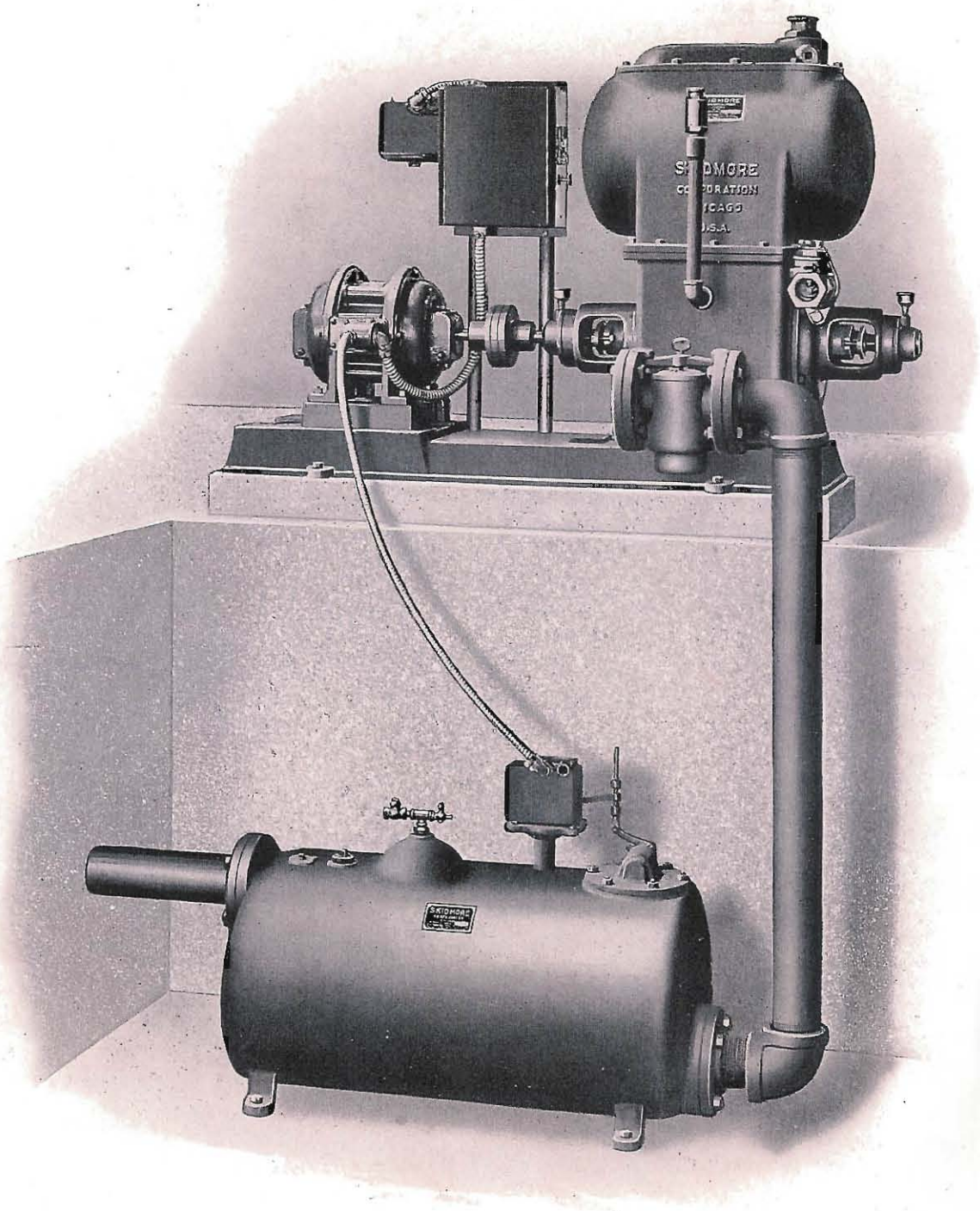
R. P. M. 1800 for all sizes.
Above weights are for continuous service.
Data on pumps for higher discharge pressures furnished on request.

PROPERTIES OF SATURATED STEAM 0 to 14″ VACUUM

Vacuum in in.	Temp. Deg. F.	Spec. Vol.	Vacuum in in.	Temp. Deg. F.	Spec. Vol.	Vacuum in in.	Temp. Deg. F.	Specific Vol
0	212.0	26.79	5	203.1	31.67	10	192.4	39.01
1	210.4	27.59	6	201.1	32.90	11	190.0	40.94
2	208.7	28.50	7	199.0	34.25	12	187.4	43.10
3	206.8	29.47	8	196.9	35.70	13	184.8	45.40
4	205.0	30.53	9	194.7	37.29	14	182.0	48.10

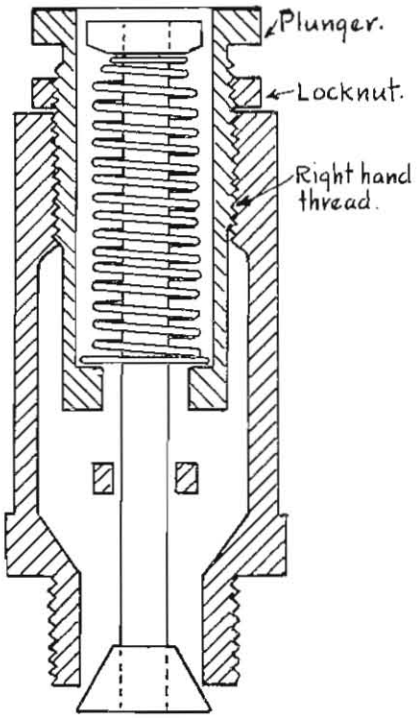


The illustration above shows how the Skidmore unit is furnished as a duplex unit.

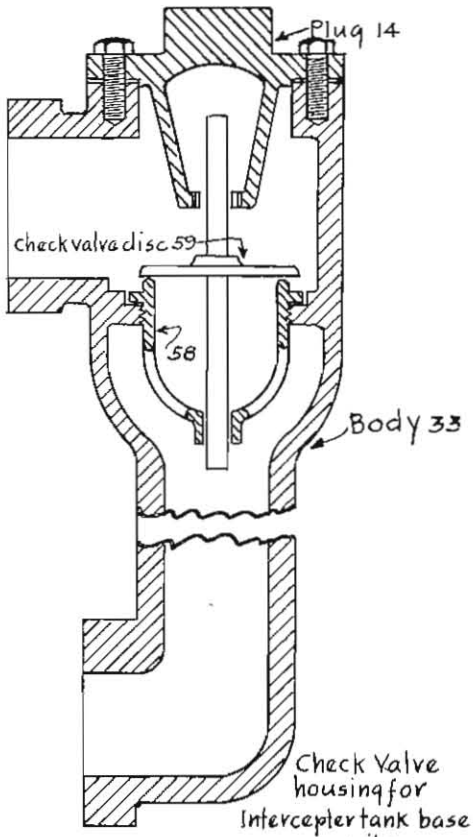


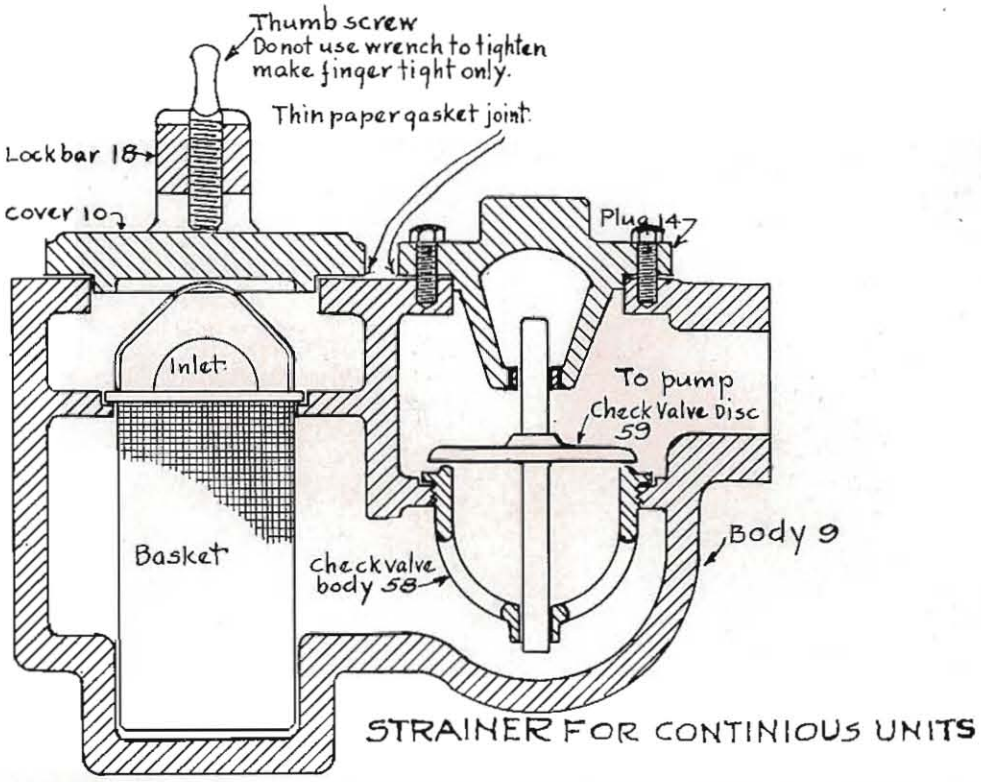
The above illustration shows how the Skidmore pump can be furnished when returns are below the floor and low water line is desired in the system.

This arrangement eliminates the necessity of pitting the pump thereby assuring better care of the pump and motor.



RELIEF VALVE

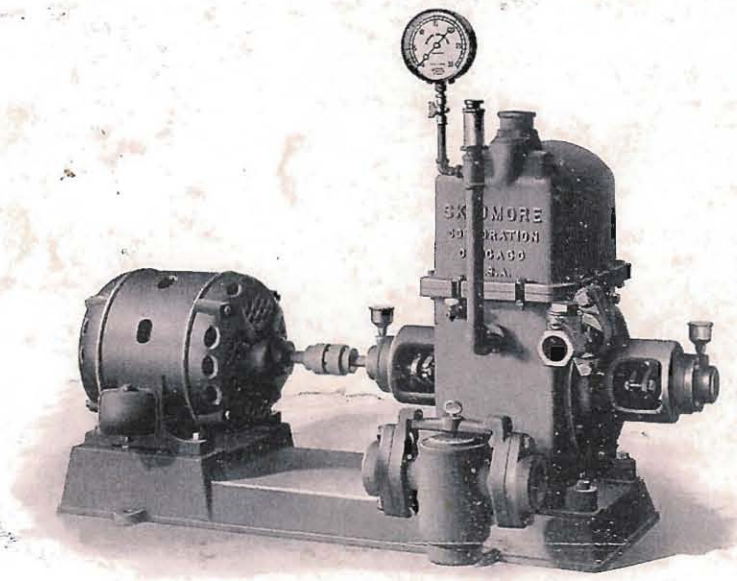




STRAINER FOR CONTINIOUS UNITS

REPRESENTATIVES

Baltimore, Md	The Whitaker Bldg.
Boston, Mass	35 Hartford St.
Buffalo, N. Y	610 Erie County Bank Bldg.
Charlotte, N. C	1016 Independence Bldg.
Chicago, Ill	215 W. Superior St.
Cleveland, Ohio	1392 W. 3rd St.
Cincinnati, Ohio	1021 Chamber of Commerce Bldg.
Dallas, Texas	612 Construction Industries Bldg.
Des Moines, Iowa	Hubbell Bldg.
Detroit, Mich	4484 Cass Ave.
Erie, Pa	507 Ariel Bldg.
Garnet, N. Y	Hill Top Lodge
Houston, Texas	941 Electric Bldg.
Kansas City	2710 McGee Trafficway
Nashville, Tenn	155 Eighth Ave.
Memphis, Tenn	704 Dermon Bldg.
Milwaukee, Wis	480 Market St.
Minneapolis, Minn	Metropolitan Life Building
New York, N. Y	369 Lexington Ave.
Oklahoma City, Okla	120 E. Main St.
Omaha, Nebr	1712 Dodge St.
Philadelphia, Pa	1612 Vine St.
Pittsburgh, Pa	700 Century Bldg.
San Francisco, Calif	635 Mission St.
Seattle, Wash	Alaska, Bldg.
Spokane, Wash	Empire State Bldg.
St Louis, Mo	606 Tower Bldg.
New Orleans, La	833 Howard Ave.
Toledo, Ohio	1 St. Clair St.
Canadian Representatives and Manufacturers:	Darling Bros., Ltd., Montreal, Que.



Nos. 0 to 2 Inclusive in this Design

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