

Feb. 14, 1939.

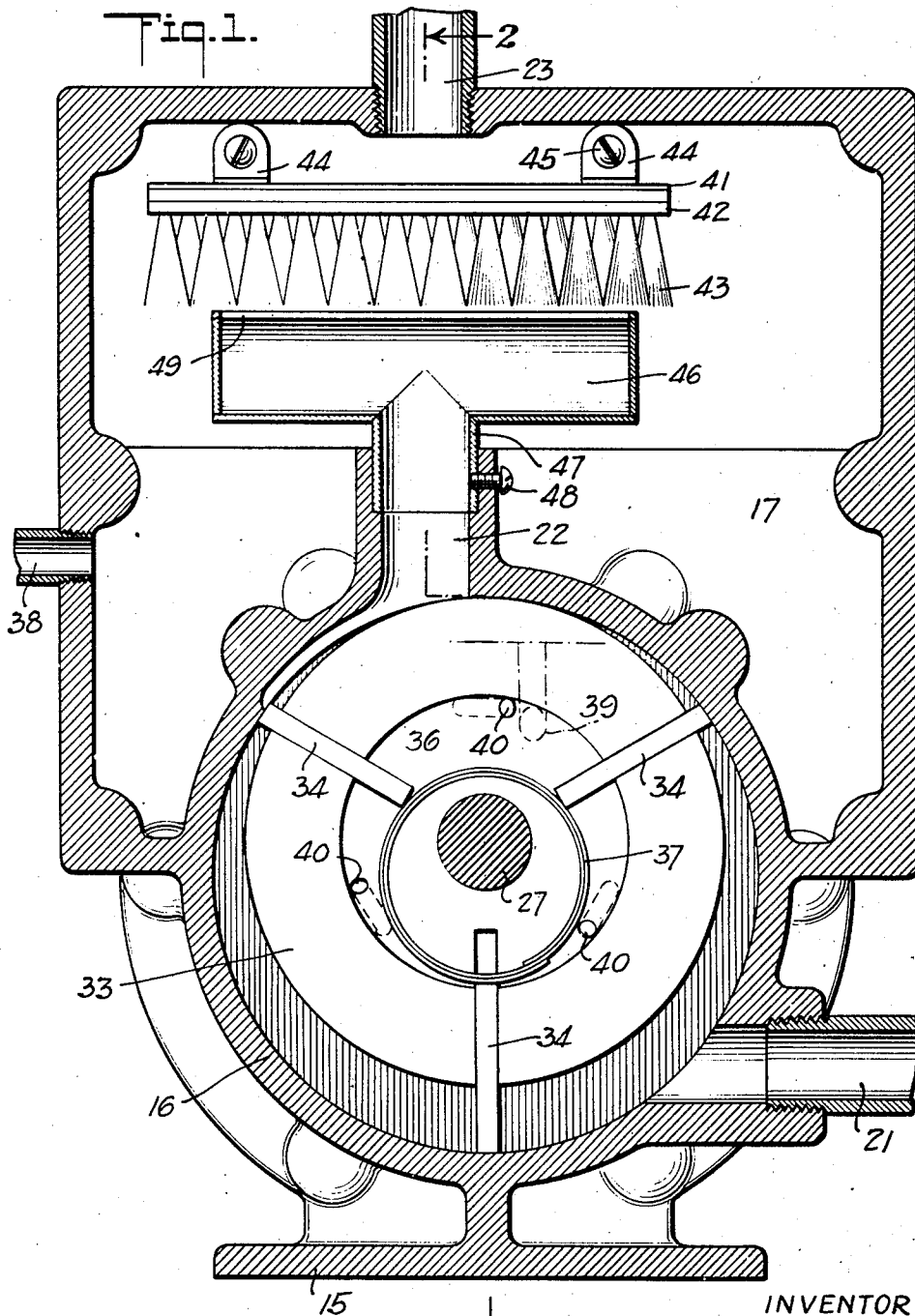
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ROTARY VACUUM PUMP

Filed Dec. 2, 1935

2 Sheets-Sheet 1



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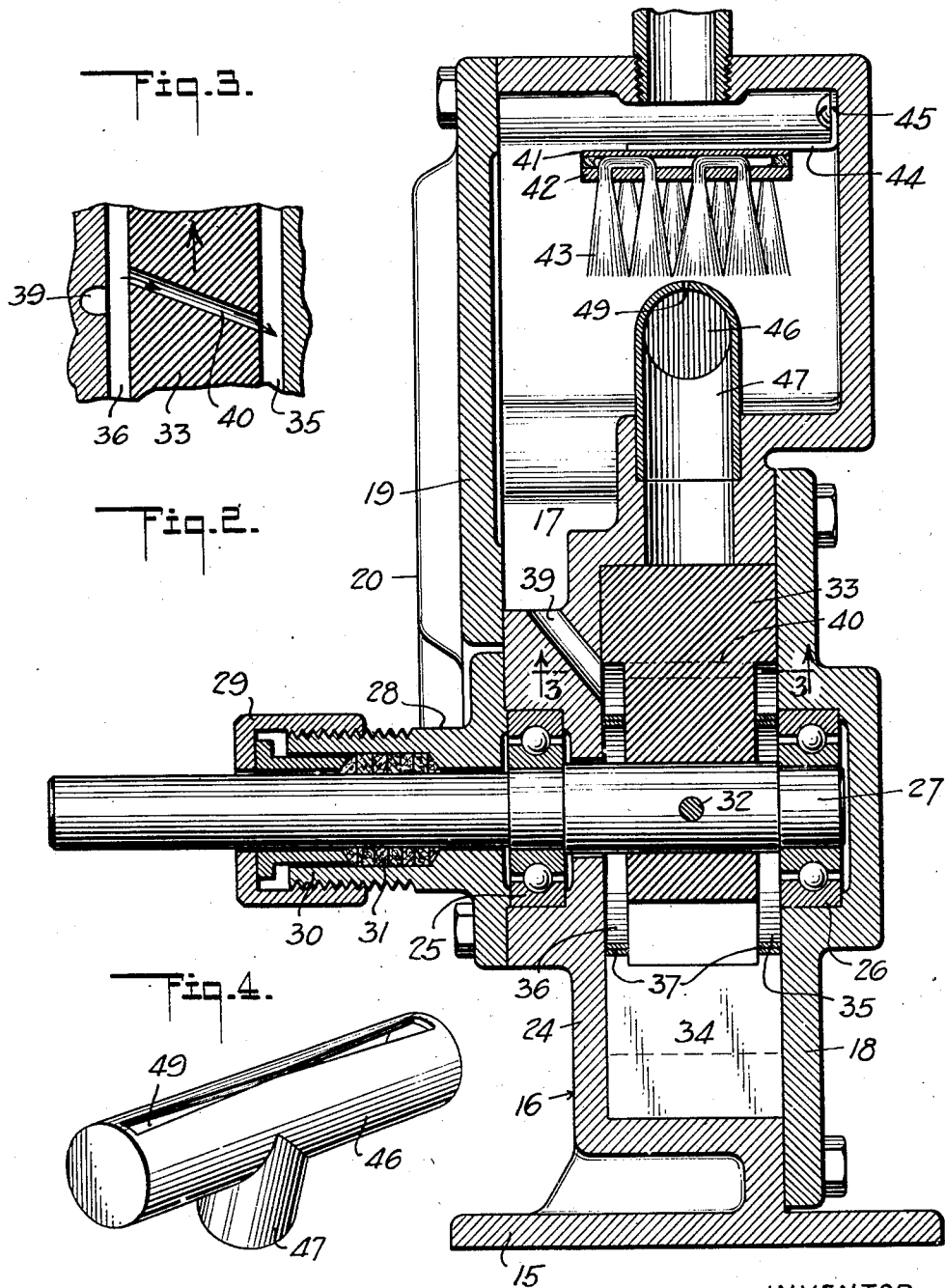
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ROTARY VACUUM PUMP

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Harry F. Langlois and Herbert N. Langlois, co-
partners doing business as Langlois Bros.

Application December 2, 1935, Serial No. 52,499

1 Claim. (Cl. 230—207)

My invention has reference generally to rotary pumps, and particularly, although not necessarily, to rotary vacuum pumps of the type in which oil from a reservoir is supplied to the pump cylinder for the purpose of lubricating and sealing the piston and its vanes against passage of air thereby in order that the pump may be efficient in its formation of a vacuum.

In pumps of this character as heretofore proposed, the quantity of oil supplied to the cylinder is fixed, and where the pump is designed, for example, to supply oil to the cylinder in quantity sufficient to produce an adequate seal of the piston and its vanes when the piston is rotating at a mean speed, the oil is insufficient for higher piston speeds, and in excess for lower piston speeds. An insufficient oil supply results in leakage past the piston and vanes of air or any other gas upon which the pump is operating, while an excessive oil supply results in such an accumulation in the cylinder as to compel the oil to be compressed before it is ejected from the cylinder. In compressing the oil added resistance is offered to rotation of the piston; the oil becomes heated causing dilution thereof; and there is effected such an intimate intermixing of oil and air as to form a froth which as exhausted from the pump results in a great waste of oil. Furthermore, in previous vacuum pumps the mode of oil circulation lacks uniformity in distribution through the cylinder and around the piston and its vanes. This results in inadequate sealing of the piston and vanes so that the vacuum producing efficiency of the pump is greatly lowered.

It is a purpose of my invention to provide, in a rotary pump, means by which oil is supplied automatically to the cylinder thereof in a predetermined quantity which is directly variable in accordance with the rotational speed of the piston so that irrespective of the speed at which the pump is operating, oil in quantity sufficient only to effect adequate sealing of the piston and its vanes, is supplied to the cylinder.

It is also a purpose of my invention to provide, in a rotary pump, means by which the oil supplied to the cylinder is distributed uniformly to opposite sides of the piston so as to effect and maintain at all times, proper sealing of all parts of the piston and its vanes.

A further purpose of my invention is to provide an oil filter particularly adaptable to vacuum pumps, although not necessarily, which is characterized by its ability to separate the oil from the air in a manner to retain the oil against being

exhausted from the pump, and yet not impede the exhaust of air therefrom.

A further purpose of my invention is a provision of a device adapted for use in conjunction with the oil filter above referred to, to distribute the oil-laden air as exhausted from the cylinder of the pump, uniformly over the surface of the filter in order that the latter may function effectively to separate the oil from the air.

I will describe only one form of rotary vacuum pump embodying my invention, including one form of filter and one form of spreader, and will then point out the novel features in the claim.

In the accompanying drawings:

Fig. 1 is a view showing in vertical longitudinal section one form of rotary vacuum pump embodying my invention and including one form of filter and one form of spreader.

Fig. 2 is a sectional view taken on the line 2—2 of Fig. 1.

Fig. 3 is a fragmentary sectional view taken on the line 3—3 of Fig. 2.

Fig. 4 is a detail perspective view of the spreader shown in Figs. 1 and 2.

With specific reference to the drawings, my pump comprises an integral casing constructed to form a base 15, a cylinder 16, and an oil reservoir 17 above and surrounding the upper part of the cylinder. A plate 18 is bolted to the casing to form a head for the cylinder, while a second plate 19 preferably formed with aluminum and provided of heat distributing fins 20, is bolted to the casing to close the reservoir. A tangential inlet 21 is provided for the cylinder through which air or other gas is admitted to the cylinder, and this air after being compressed in the cylinder is adapted to be exhausted into the reservoir 17 through an outlet 22 and finally to atmosphere through an exhaust port 23.

That part 24 of the casing which forms the fixed head of the cylinder, and the removable plate 18 are constructed to receive bearings 25 and 26, respectively, in which a shaft 27 is journaled. A stuffing box 28 is bolted to the casing to confine the bearing 25 in proper position, and this box is formed with the usual packing nut 29, gland 30 and packing 31.

As shown in Fig. 1, the shaft 27 is eccentric of the cylinder 16, and fixed to the shaft by a pin 32 is a piston 33. This piston is concentric of the shaft but eccentric of the cylinder, and it is provided with a plurality of vanes 34 which are mounted to move radially in the piston when the latter is rotated, as will be understood.

The piston 33 is constructed to provide pockets

35 and 36 in the opposite sides thereof, and each pocket extends from the axis of the piston to a point spaced from the periphery thereof, so that the vanes extend into the pockets, as shown in Fig. 1. Spiral springs 37 are contained within the pockets to yieldably urge the vanes outwardly so that their outer ends at all times contact with the annular wall of the cylinder.

Oil from a suitable source (not shown) is supplied to the reservoir 17 through a pipe 38 to maintain an oil level in the reservoir corresponding to that of the pipe. From the reservoir, the oil can gravitate into the pocket 36 through a feed port 39 (Fig. 2) formed in the cylinder head 24 and having its exit or lower end entering the cylinder at a point in the side thereof which is traversed by those side edges of the vanes 34 within the area defined by the pocket.

As best shown in Fig. 1, the lower end of the port 39 is to the right of the outlet 22 in order that the negative pressures produced by and at the rear of the revolving vanes 34 may be utilized to accelerate the flow of oil through the feed port, as will be more fully described hereinafter.

Part of the oil supplied to the pocket 36 from the feed port is distributed to the other pocket 35 by the provision of ducts 40 in the piston which are located at points spaced equidistantly about the circumference of the pockets. Each duct extends obliquely of the piston with its entrance end in advance of its exit end in respect to the direction of rotation of the piston. In the present instance, I have shown three such ducts, although any number may be used depending upon conditions and requirements. It is important, however, that the respective diameters of the feed port 39 and the ducts 40 be such that the combined oil receiving capacity of the ducts be equal to substantially one-half the capacity of the feed port with a given head of oil in the reservoir.

In the operation of the pump, the piston is driven through the shaft 27, in a clockwise direction as when viewed in Fig. 1, to successively induce charges of air or other gas into the cylinder through the inlet 21. These charges are then compressed in the cylinder by the piston and vanes, and finally exhausted through the outlet 22. In this manner the pump functions to produce a vacuum in respect to any air or gas receptacle to which the inlet 21 is connected.

Prior to and during operation of the piston, oil from the reservoir gravitates through the feed port 39 to fill the pocket 36. By rotation of the piston oil from the pocket 36 is impelled through the several ducts 40 to be uniformly distributed in the pocket 35. This impelling effect is produced by obliquely positioning the ducts in the piston as previously described herein.

As the piston speed is variable in accordance with the degree of vacuum it is desired to produce, while the gravitation flow of oil is fixed, other means than gravity must be provided to increase the oil supply to the cylinder in order to adequately lubricate and effectively seal the piston and vanes, if the pump is to be efficient at high piston speeds. In my pump this other means is provided through coaction of the vanes with the feed port.

As each vane passes across the feed port it forms in its wake a negative pressure. Although this pressure is slight as produced by any one vane, through the combined action of the several vanes when rapidly revolved, a negative pressure of sufficient degree is formed to accelerate the oil flow through the feed port. As the

vane speed increases with the piston speed, the negative pressure at the feed port is increased proportionately to accelerate the oil flow accordingly. Thus, the oil supply to the pocket 36 is caused to vary with the piston speed, and in this manner the cylinder is supplied with oil variable in quantity from a minimum at low piston speed to a maximum at high piston speed.

By proper design of the feed port and vanes, and maintaining a proper head of oil in the reservoir, at no time will the quantity of oil supplied to the cylinder be excessive, but just sufficient to adequately lubricate and seal the piston and vanes, so as to maintain the pump at its highest degree of efficiency.

Not only do the ducts 40 serve to conduct and impel oil from one pocket to the other, but they function to vary the oil flow therethrough in direct accordance with variation in speed of the piston. Where the relative oil capacity of the feed port and ducts is as previously described herein, the amount of oil distributed to the pocket 35 will be substantially half of that supplied to the pocket 36, at any and all piston speeds. Thus there is automatically effected at all times, a uniformity in distribution of oil to opposite sides of the piston to establish and maintain equal and adequate lubrication and sealing of the piston and vanes at any and all piston speeds.

In Figs. 1 and 2 I have shown one form of oil filter embodying my invention which comprises a solid support or back made of two metal plates 41 and 42 welded to each other. The lower plate is perforated to receive tufts 43 of wire or any other suitable material, and the wires of each tuft diverge to their free ends so that the latter are spaced one from the other. Brackets 44, 44, are welded to the upper plate 41, and by screws 45, 45, they are secured to the inner side of the pump casing to support the filter horizontally within the oil reservoir and directly over the outlet 22.

In practice, the filter functions as follows: As the stream of oil bearing air exhausts from the pump outlet it impinges against the tufts, and is thus minutely subdivided by the wires to cause the oil to be retained between the wires and thus separated from the air. The filter support or back functions as a baffle to retard the flow of oil and air and spread the stream laterally so that that oil not separated by the wires as the stream moves upwardly, is retained between the wires as the stream moves horizontally beneath the filter back. As the oil collects on the wires it falls back into the reservoir to be recirculated through the pump.

For the purpose of distributing the oil-bearing air uniformly over the under surface of the filter so that a more complete filtering of oil from air is effected, I provide a fluid spreader which comprises a tubular body 46 supported horizontally beneath the filter by a short length of pipe 47 which extends into the outlet 22 and is secured therein by a screw 48. The body 46 is provided in its top with a longitudinal slot 49 which, as shown in Fig. 4, decreases in width from its ends to its center or medial portion.

It is at this medial portion of the filter body that the fluid stream from the pump enters the body through the pipe 47, and as the slot is restricted at this point the body serves to spread the stream in opposite directions along the length of the body to be emitted uniformly along

the length of the slot, and in this manner to be evenly distributed over the surface of the filter.

Although I have herein shown and described only one form of rotary pump, one form of oil filter, and one form of spreader, each embodying my invention, it is to be understood that various changes and modifications may be made herein without departing from the spirit of my invention and the spirit and scope of the appended claim.

I claim:

A rotary pump having a vertically disposed cylinder, a horizontal shaft rotatable in the cylinder; a vertically disposed piston in the cylinder and fixed to said shaft; pockets one in each side of the piston; an oil reservoir above the cyl-

inder; a port leading from the bottom of the reservoir downwardly to said cylinder at one side of the piston so as to deliver oil to one of said pockets; vanes movable radially in the piston so as to have sweeping contact with the lower end of said port to produce suction in the port and to thereby accelerate the flow of oil to said pocket from the reservoir in direct proportion to the revolving movement of the vanes; and auxiliary pumping means comprising ducts extending obliquely in the direction of rotation through the piston from one pocket to the other adjacent the outer edges thereof for impelling oil from that pocket to which oil is supplied to the other pocket.

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