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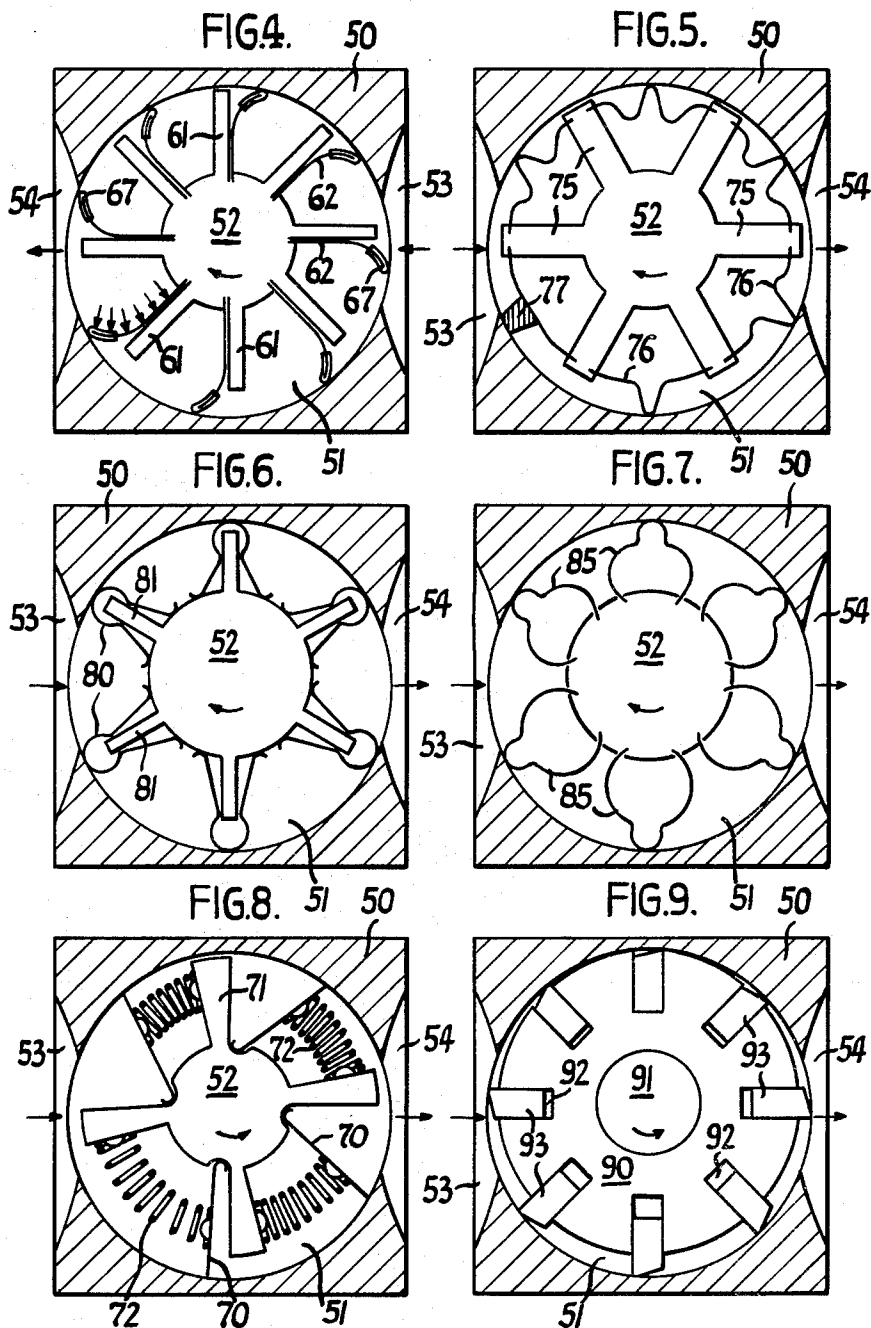
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INKING MECHANISM FOR ROTARY PRINTING PRESSES

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INKING MECHANISM FOR ROTARY
PRINTING PRESSES

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This invention relates to inking devices for conveying printing ink from an ink reservoir to the inking rolls of rotary printing presses and, more particularly, to arrangements for individual adjustment and positive metering of the dosages of ink conveyed from a single main ink reservoir and applied at a plurality of sets of inking rolls in a rotary printing press.

As will be understood, with printing presses and particularly offset presses having a plurality of individual sets of ink distributing rolls for rolling ink out into a film for application to the printing plates, it may be desired to convey ink automatically from a common reservoir individually to each of the sets of inking rolls and under conditions whereby the dosage or quantity of ink conveyed to each set of inking rolls is metered or controlled as may be necessary or desired to obtain the desired distribution of ink film on the printing plates for satisfactory printing results.

If it is attempted to accomplish such conveying of ink from a common reservoir to individual sets of inking rolls by providing individual rotary or positive displacement pumps for conveying and metering ink from the reservoir to each of the sets of inking rolls, difficulty may be experienced in obtaining accurate metering and/or uniform conveying and distribution because, for example, the quantity of ink needed for each revolution of either the pumps or the inking rolls is usually quite small, particularly with offset inks to be rolled out into a thin film along a train of distributing rolls, and accurately withdrawing such small quantities of ink uniformly from a cold or viscous supply of ink simultaneously with a plurality of different pumps and under the quantitative control which may be desired presents difficulties. Furthermore, providing a plurality of such pumps for metering as well as pumping and conveying ink from the single reservoir to individual ones of a plurality of inking rolls presents a substantial additional expense in the manufacture, maintenance, and operation of the printing press.

On the other hand, if it is attempted to convey and meter the ink by providing a pump arrangement for conveying the ink under pressure from the reservoir to adjacent each of the various inking rolls, with valves or the like for metering the ink from the pressure line to each set of inking rolls, other difficulties may be experienced in achieving the desired uniform distribution and controlled dosaging or metering at each of the distribution points, which may be at different distances from the pump and the reservoir and susceptible to different pressure or flow conditions, etc., as indicated by the rheological and other characteristics of the various inks used.

According to this invention, however, arrangements are provided and adapted for the pressure conveying and accurate and adjustable metering or dosaging application of printing ink from a common ink reservoir to the individual ones of a plurality of sets of ink distributing rolls in a printing press, with individual control and adjustment of metering and dosage at each set of inking rolls substantially independently of variations in viscosity in the printing ink and other flow or design characteristics of the entire inking system, yet with accurate and posi-

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tive metering of the rate and quantity of ink delivered to each set of inking rolls despite the extremely small quantities which may be desired per revolution and in a manner to accommodate the adjustment to different speeds of the printing press and different types and characteristics of inks being used at different times. Such simplified and economical arrangements in accordance herewith include the provision of a substantially continuous pressurized distribution and return manifold circuit for the pressure conveying of ink from the common reservoir to adjacent each of the sets of inking rolls, and an infinitely variable rotary dosaging or feeding device for each of the individual sets of inking rolls to withdraw ink from the continuous circuit and meter it in predetermined and adjustable quantities and rates to each of the individual sets of inking rolls. As a further feature of this invention, there are also provided simplified and economical constructions for the rotary dosaging device itself for assuring the uniform feed of ink and positive metering of both rate and quantity over a wide range of adjustability, and requiring less space or mechanical complexity for manufacture and maintenance than conventional rotary gear or piston or sliding vane pump constructions.

With the foregoing and additional objects in view, this invention will now be more particularly described, and other objects and advantages thereof will be apparent from the following description, the accompanying drawings and the appended claims.

In the drawings:

FIG. 1 illustrates in somewhat diagrammatic or schematic form an ink distributing arrangement embodying and for practicing this invention as applied to a rotary printing press including three sets of inking rolls;

FIGS. 2-4 and 8 indicate somewhat diagrammatically on vertical transverse sections rotary dosaging or feeding devices for the arrangement of FIG. 1 and utilizing spring leaves coacting with the vanes of an eccentric rotor to provide positive displacement metering and feeding of ink;

FIGS. 5-7 indicate, similarly to the aforementioned figures, another embodiment for the metering and dosaging devices of FIG. 1 in which feeding and metering of the ink is accomplished with bent or generally U-shaped spring elements instead of spring leaves; and,

FIG. 9 indicates, similarly to FIGS. 2-8, a further embodiment for the dosaging and metering devices of FIG. 1 with radially sliding and magnetically controlled vanes in the eccentric rotor.

Referring to the drawings, in which like reference characters refer to like parts throughout the several views thereof, a somewhat diagrammatic or flow sheet layout of an ink distributing system in accordance herewith is shown in FIG. 1 as applied to a rotary printing press, and for delivering printing ink from a main reservoir 10 individually to each of a plurality of sets of inking rolls indicated at 11, 12, and 13, in a conventional rotary offset printing press, the remainder of which is omitted from the drawings for simplicity and as being both conventional and well understood. That is, each of the sets of inking rolls 11-13 comprises, as conventional, an ink supply roll 15 to receive the ink initially and a train of distributing and ink-applying rolls 16-18, etc., for receiving ink from ink supply roll 15 and rolling it out into a thin film for application to the printing plate in known manner.

Adjacent each of the sets of inking rolls 11-13 is provided a metering and feeding or dosaging device, indicated generally at 20 and described in more detail below, for receiving ink under pressure from reservoir 10 and feeding and metering the ink individually to the ink supply rolls 15 of the sets of rolls 11-13 through ink supply nozzles indicated at 21.

Substantially continuous circulation and conveying of ink under some pressure is provided by main ink supply pump 25, which may satisfactorily be a conventional gear pump, for pumping ink from reservoir 10 through a distribution manifold conduit 30, from which the ink is supplied into feed lines 31-33, each of which leads to one of the dosaging devices 20. Intermediate return lines 34-36 lead from each of the dosaging devices 20 into a return manifold conduit 40 back to ink reservoir 10. Flow communication is maintained between the respective pairs of feed and return lines 31, 34 and 32, 35 and 33, 36, as by communicating inlet passages 41 within each of the dosaging devices 20, for uninterrupted flow of ink from distributing manifold 30 to return manifold 40 through the intermediate feed and return lines 31-36 and past each of the dosaging devices 20, regardless of whether or not the dosaging devices 20 may be withdrawing ink from the main flow for feeding through nozzles 21 to inking rolls 15. As will be understood from the foregoing, the volumetric capacities and feed rate of ink supply pump 25 and the various conduits 30-40 are selected and coordinated to maintain and provide a substantially continuous flow and circulation of ink from reservoir 10 and through the various conduits 30-40 regardless of how much ink may be withdrawn from the flowing ink supply circuit by the various dosaging devices 20 so as to maintain continuously an excess supply of ink flowing through the inlet passages 41 of each dosaging device 20 from which excess supply each dosaging device can withdraw the required quantity of ink for delivery at the required rate through nozzles 21 to various ink supply rolls 15 of the several sets of inking rolls 11-13.

A variety of positive displacement and adjustable or variable feeding and metering devices may be included in the foregoing system for withdrawing from the flowing ink circuit the particular quantities desired for application through nozzles 21 to the various inking roll mechanisms. As will be understood, however, a positive feeding arrangement is desired rather than merely a valve or cock through which the flow of ink delivered might be variously susceptible to variations in viscosity, pressure, flow velocity, and similar conditions in the circulating ink supply as well as the effect of withdrawing of ink therefrom at other points. Although satisfactory results are achieved in accordance herewith utilizing, for the various dosaging devices 20, various forms or adaptations of conventional sliding vane rotary pumps, etc., adjustable rotary feeding and metering devices of somewhat simpler construction and less expensive manufacture are generally preferred, particularly for large rotary newspaper presses and the like which require a substantial number of feeding devices 20.

For example, satisfactory results are achieved herewith with the dosaging devices 20 comprising generally, within an outer housing 45 thereof, a casing or body 50 of generally square cross section and including a cylindrical transverse chamber 51 with an eccentrically rotating rotor 52 therein and having diametrically opposed inlet and outlet ports 53 and 54, communicating with, respectively, inlet passage 41 and outlet passage 55 in housing 45, the latter leading to nozzle 21. With such feeding and metering arrangements, as noted in more detail below, a positive feeding of ink from inlet port 53 to outlet port 54 around chamber 51 is achieved, upon rotation of eccentric rotor 52, by a variety of resilient or deformable blade structures extending outwardly therefrom and forming successive cells or pockets for receiving a quantity of ink at inlet 53 and feeding it out outlet 54 to nozzle 21.

Similarly, and with complete simplicity, virtually infinite adjustment of the quantity of ink fed or delivered per revolution of rotor 52 (within, of course, the maximum capacity of the feeding device) is achieved, by displacing the casing 50 vertically within housing 45 (as by an adjustable screw arrangement indicated at 60) for adjusting and altering the degree of eccentricity of rotor

52 in cylindrical chamber 51. Such adjustment is readily accomplished individually for each of the dosaging devices 20 and substantially independently of the speeds of rotation at which the various rotors 52 may be driven in the various dosaging devices 20. Thus, extremely fine and precise individual adjustments of the actual quantity of ink delivered through each nozzle 21 from each dosaging device 20 is achieved and maintained during operation of the printing press and independently of such otherwise varying factors as different flow conditions in the ink distributing conduit at different points therealong, variation in viscosities, and different speeds of operations of the entire printing press or the dosaging devices.

As illustrative of various spring-urged or resilient blade structures for the eccentric rotors 52 of feeding and metering devices 20 in accordance herewith may be noted those indicated in FIGS. 2-9. That is, considering FIG. 2, a plurality of radially extending vanes 61 are provided around the periphery of rotor 52, with the outer circumference defined by the outer tips of vanes 61 being substantially less than the circumference of cylindrical chamber 51. Extending along and beside each of vanes 61, and on the leading side thereof in direction of rotation, is a resiliently curved spring leaf or plate 62. The inner edge of leaf 62 is anchored in rotor 52 and the outer curved edge bears against the inner circumferential surface of chamber 51 effecting a continued spring pressure seal against the surface of chamber 51 during rotation of rotor 52, with such seal being maintained by the resiliency of spring blades 62 notwithstanding the eccentricity of rotor 52.

Thus, a plurality of cells or ink-receiving pockets is provided around rotor 52, by the several spring blades 62, each supported against or back by one of the vanes 61. Each of the successive cells or pockets receives a quantity of ink as the pocket passes inlet 53, such ink being forced into each passing pocket by the slight pressure which is maintained in feed line 32 by the action of pump 25, and each such quantity of ink in each successive cell or pocket around rotor 52 is positively conveyed to and forced out outlet 54. Although the volume of material fed per unit time by such feeding device is, of course, a function of the speed of rotation of rotor 52, precise additional adjustment for each individual such device is provided in accordance herewith merely by altering the degree of eccentricity of the rotor 52 within cylindrical chamber 51 and, hence, the volumetric capacity of each successive pocket or cell between blades 62 during passage thereof from inlet 53 to outlet 54. Also, as will be understood, the utilization of spring leaves or plates 62, instead of more complex designs typical of sliding vane rotary pumps, achieves a considerably simplified construction which nevertheless assures substantially uniform feed for a wide variety of speed ranges and ink viscosities, and the spring leaves or plates 62 occupy so little space that a larger number of cells or pockets may be satisfactorily provided around rotor 52 to enhance the uniformity of feed and dosaging attributable to the device.

It is not necessary that the vanes 61 be radially extending from rotor 52, but, as indicated in FIG. 3, the device may be provided with tangentially extending vanes 65 with associated spring plates 66 extending along the leading surfaces thereof and being flexible or resilient to assume the bowed configuration shown at various positions around chamber 51 as eccentric rotor 52 revolves therein. Similarly, as indicated at FIG. 4, the outer sealing edges of spring plates 62 (and, of course, the outer sealing edges of spring plates 66 in FIG. 3) may be provided with covering or wear strip 67 of plastic material or the like for direct bearing against the inner surface of chamber 51. Similarly, as indicated by the various small arrows adjacent springs 62 and 66 in FIGS. 2-4, the pressure or resistance on the resilient and curved spring leaves or plates provided by the ink being conveyed urges the spring leaves more tightly against the inner surface of

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chamber 51 with even greater pressure than provided inherently by the springs for enhancing the sealing effect achieved between the radially outer edges of leaves 62 or 66 and the inner circumferential surface of chamber 51.

In the structure illustrated in FIG. 8, the inherently resilient and deformable spring leaves have been replaced with radial conveying and sealing plates 70 pivoted on rotor 52 and arranged between successive radial vanes 71, with coil springs 72, between pivoted plates 70 and vanes 71 for urging plates 70 in the direction of rotation into the most nearly radial position permitted within chamber 51 for sealing engagement with the inner surface of chamber 51. As will be apparent, the radially outer sealing edges of plates 70 may also be provided with the plastic wear strips 67 as indicated in FIG. 4.

Instead of blades formed of generally radially extending spring leaves or plates 62, 66, or 70 positioned with an inner edge at rotor 52 and an outer sealing edge bearing against the surface of chamber 51, another satisfactorily resilient arrangement for defining the separate successive ink-receiving and conveying pockets around rotor 50 is indicated in FIGS. 5-7. Thus, resilient spring leaves or blades are provided and formed as generally U-shaped elements which are radially deformable depending upon the clearance between eccentric rotor 52 and the walls of chamber 51 in the various eccentric positions of rotor 52. In FIG. 5, radially extending vanes 75 are provided adjacent the outer ends thereof with slots for engaging and carrying bent spring elements 76 configured generally as shown, whereby, in the various angular positions of eccentric rotor 52, the outermost portion of the resiliently deformable spring member 76 is urged into sealing engagement with the inner surface of chamber 51. If desired, a sealing strip 77 of wear-resistant plastic (such as "nylon" and the like) may be provided on spring elements 76 instead of the radially extending protrusion shown thereon for sealing engagement with the inner surface of chamber 51.

In FIG. 6, radially deformable U-shaped spring members 80 are provided straddling vanes 81 around rotor 52, whereby the radially outer portions of spring elements 80 will be resiliently and deformably urged in sealing engagement with the inner surface of chamber 51 at the various angular positions of eccentric rotor 52 therein. In the arrangement of FIG. 7, U-shaped and radially deformable spring members 85 are provided with the radially inner ends thereof anchored in rotor 52 (so that the additional provisions of radial vanes such as 81 in FIG. 6 are not necessary). The configuration and formation of the resilient spring members 85 as indicated provide the desired deformability and sealing engagement with the inner walls of chamber 51 at the various angular positions of eccentric rotor 52 and throughout the varying degrees of eccentricity thereof as described.

A further modification is indicated in FIG. 9 in which the functioning is more in the manner of a sliding vane rotary pump, although the illustrated construction is considerably simpler to manufacture and maintain and is constructed in the manner to provide constant sealing of the device, regardless of the speed of rotation thereof and even immediately upon starting. In this construction, an eccentric rotor 90 is provided of a diameter more nearly approximating that of chamber 51 and mounted on a drive shaft 91. Around the periphery of rotor 90 is a plurality of radial slots 92 in each of which is a radially sliding blade or vane 93. Rotor 90 and shaft 91 are made of non-magnetic material, while the inner surface of chamber 51 is formed of a magnetic material, and the individual blades 93 are magnetized so that they are magnetically attracted radially outwardly and in sealing contact with the walls of chamber 51 in all of the various angular positions of rotor 90. As will be understood, the utilization of magnetic attraction to maintain the blades 93 desirably outwardly engaged with chamber 51 not only simplifies the entire construction but also per-

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mits the utilization of lighter and less complicated structure in rotor 90 and similarly permits the provision of a greater number of individual blades 93 and ink-receiving pockets therebetween for enhancement of the uniformity of feed to be achieved by the device.

As will be apparent from the foregoing, there is provided in accordance with this invention effective and simplified arrangements of enhanced uniformity and efficiency for individually and separately metering and dosing ink from a common reservoir to a plurality of remotely spaced sets of ink distributing rolls in a rotary printing press. A substantially continuous circulation of ink in a manifold distributing and return conduit circuit is maintained by a primary ink supply pump from the main ink reservoir, and positively driven (in known manner and not shown specifically) feeding and metering devices are provided at each point of application for withdrawing from said continuously circulating ink supply the desired and metered quantity of ink at each distribution location. Thus, there is avoided the duplication of individual supply lines and pumps separately for conveying ink to each distribution point, while both the uniform feeding and the fine adjustment thereof is provided at each distribution point substantially independent of pressure or viscosity variations or flow characteristics at different parts of the system and under circumstances which accommodate a wide variety of initial ink viscosities and printing press operating speeds. Within the range or capacity of each individual ink dosing device, an independent and individual adjustment of almost infinite latitude is provided, even with all the dosing devices rotating at the same speed, for controlling the volumetric delivery of ink by each device in a substantially uniform manner, substantially independent of differences in viscosity and speed and pressure and also despite variations on the system resulting from the operation of other independent dosing devices.

While the arrangements and apparatus herein described constitute preferred embodiments of the invention, it is to be understood that the invention is not limited to these precise arrangements and apparatus, and that changes may be made therein without departing from the scope of the invention which is defined in the appended claims.

What is claimed is:

1. In an arrangement for supplying printing ink simultaneously to a plurality of sets of inking rolls in a rotary printing press in individually controlled and metered quantities, the combination which comprises a reservoir for said ink, conduit means forming a continuous circuit for conducting ink from said reservoir to adjacent each of said sets of inking rolls and back to said reservoir, pump means for pumping ink from said reservoir through said conduit means for maintaining a continuous ink flow substantially and continuously in excess of the quantity of ink to be supplied to all said sets of inking rolls, and a positively driven and individually adjustable positive displacement feeding and metering dosing device adjacent each of said sets of inking rolls for withdrawing ink from said conduit means and feeding said withdrawn ink continuously to said rolls, each said dosing device including a generally cylindrical chamber having an inlet and an outlet in the circumferential walls thereof, a rotor disposed within said chamber for rotation about an axis eccentric to the axis of said chamber, means on said rotor forming a plurality of outwardly extending blades defining therearound a plurality of pockets successively communicating with said outlet and said inlet during rotation of said rotor, means for varying the degree of eccentricity of said rotor within said cylindrical chamber, and means for maintaining said blade means in sealing contact with the circumferential wall of said cylindrical chamber in all angular positions of said rotor and said blade means between said inlet and said outlet and notwithstanding the eccentricity of said rotor.

2. Apparatus as recited in claim 1 in which said ink

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reservoir is disposed remotely from said sets of inking rolls.

3. Apparatus as recited in claim 1 in which said conduit means forming said continuous circuit includes a manifold conduit means forming said circuit in parallel arrangement to each of said sets of inking rolls.

4. Apparatus as recited in claim 1 in which said means forming said plurality of blades on said rotor includes outwardly extending spring members resiliently urged outwardly in sealing engagement against the inner circumferential wall of said chamber in all angular positions of said eccentric rotor therein.

5. Apparatus as recited in claim 1 in which said means forming said plurality of blades on said rotor include radially deformable spring members extending from said rotor outwardly into resilient sealing engagement with the inner circumferential wall of said chamber in all angular positions of said rotor therein.

6. Apparatus as recited in claim 1 in which said means forming said blade on said rotor include a plurality of outwardly extending rigid vanes defining a circumference substantially less than the circumference of said chamber and a spring member associated with each said vane for resiliently and deformably defining one of said pockets and extending from said rotor outwardly into sealing engagement with said circumferential wall of said chamber.

7. Apparatus as recited in claim 6 in which said spring members associated with each of said vanes comprise a resilient spring blade extending axially along said vanes, with inner axial edge portions of said blades engaged with said rotor and outer axial edge portions resiliently urged into said sealing engagement with said circumferential wall of said chamber.

8. Apparatus as recited in claim 1 in which said means

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forming said plurality of blades on said rotor include axially extending generally U-shaped spring members having opposite axially extending edge portions thereof engaging said rotor and radially outwardly curved portions in resilient sealing engagement against the inner circumferential wall of said chamber in all angular positions of said rotor therein.

9. Apparatus as recited in claim 1 in which said means forming said plurality of blades on said rotor include a plurality of vanes extending axially of said rotor and mounted thereon for radial movement with respect to the axis of said rotor and the inner circumferential wall of said chamber, and in which said inner chamber wall and said vanes are magnetically attracted toward each other for maintaining radially outer axial edges of said vanes in continuous sealing contact with said walls of said chamber in all angular positions of said rotor therein.

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