

## **CLASS 418, ROTARY EXPANSIBLE CHAMBER DEVICES**

### **SECTION I - CLASS DEFINITION**

This class relates to devices which include a working chamber the volume of which is progressively variable into which fluid alternately enters and exhausts and which is formed by a surface (or surfaces) of a moving solid member having relative movement with another solid surface (or surfaces), a portion of the working chamber boundary being substantially fixed, and in which:

(1) The working member has rotary motion in a single direction about a fixed or movable axis thereby to expand and contract the volume of the working chamber, there being relative rotation between the said working member and surface at some time during the expansion and contraction of the working chamber.

(2) The working member is circular and causes a change in the volume of the working chamber as it is progressively tilted in a single direction about a point on its axis to progressively contact said other surface, the central axis of the working member describing a cone whose apex is the point about which the working member oscillates or wobbles.

(3) The working member causes a change in the volume of the working chamber but does not have absolute rotation, the working member being provided with means having an axis offset from and parallel to the central axis of the working member about which the central axis moves in an orbit whereby the working member has planetary movement within the working chamber.

### **SECTION II - LINES WITH OTHER CLASSES AND WITHIN THIS CLASS**

#### **COMBINATIONS WITH LOAD DEVICES**

Inasmuch as a mechanical force output of a rotary expansible chamber device within the definition of this class is to operate or move a load the inclusion of the load in the claim by name only or in general terms will not exclude a patent from this class. An exception to this general rule exists where the load on the expansible chamber device is a valve. The combination of a rotary expansible chamber device and a valve as the load moved thereby even if claimed by name only, is excluded from this class. (See References to Other Classes, below.)

This line also applies where the load is a tool: that is, a named tool moved by a rotary expansible chamber device will not exclude a patent from this class if no tool details are recited. However, if a support for the work being acted upon by the tool is claimed, classification in the appropriate tool class results even though both the tool and the support are claimed by name only. Also see the Search Class notes, below for the line with regard to a nominally claimed tool driven by a rotary expansible chamber device combined with other features such as work cleansing or tool feeding.

No attempt has been made to review the classification of all patents found in classes relating to loads adapted to be moved by a rotary expansible chamber device. Thus, it is to be noted that the original classification of all patents is not consistent with the above statement as to nominally claimed loads and this particularly applies as to classes not recently reclassified. In those instances in which a body of art is known to exist in a given class in which the load adapted to be moved by the rotary expansible chamber device is claimed only nominally, and especially where the classification of that class provides for a fluid pressure actuator for the device, currently issuing patents will not be classified as original in this class (418) even though the load is only nominally claimed.

The means which transmits power from the working member of the rotary expansible chamber device to the load to be moved (e.g., linkage, gearing, etc.), is not considered to be the load to be moved by the expansible chamber device. Also see the Search Class notes below for a further discussion of this subject.

### **SECTION III - REFERENCES TO OTHER CLASSES**

#### **SEE OR SEARCH CLASS:**

- 15, Brushing, Scrubbing, and General Cleaning, for pumps claimed in combination with a work-contacting suction or blast nozzle.
- 73, Measuring and Testing, subclasses 253+ for rotary cylinder or piston type expansible chamber devices used in volume or rate of flow meters. Class 73 includes rotary expansible chamber meters combined with registering mechanism and meters incapable of general use as an expansible chamber device. A meter is considered to be incapable of such general use if there is no disclosed means to take power therefrom for external use such as to a register-

- ing mechanism. Therefore Class 418 takes a rotary expansible chamber device having means to take power therefrom such as for an unclaimed registering mechanism.
- 74, Machine Element or Mechanism, appropriate subclasses for machine elements and mechanisms, per se, and in combination with a nominally claimed rotary expansible chamber device. In general, gearing or linkage included as part of the power means either to drive or be driven by a rotary expansible chamber device is considered to be basic subject matter of the rotary expansible chamber device and would not preclude classification in Class 418.
- 96, Gas Separation: Apparatus, for the combination of a rotary expansible chamber device and a specifically claimed separator or filter not specifically disclosed for protecting the rotary expansible chamber device. For a further statement of the line between Classes 96 and 418, see Lines With Other Classes and Within This Class, in the class definition to Class 96 for the line between Classes 96 and 417, the line between Classes 96 and 418 being the same.
- 123, Internal-Combustion Engines, appropriate subclasses for a rotary piston and cylinder combination claimed with significant internal-combustion structure such as fuel injection means, ignition means, fuel charge treatment means, or compression means with transfer means to an expansion means.
- 137, Fluid Handling, for the combination of a rotary expansible chamber device and a valve as the load moved thereby even if claimed by name only. (Lines With Other Classes and Within This Class, Combinations With Load Devices.)
- 173, Tool Driving or Impacting, appropriate subclasses for a rotary expansible chamber device for operating an impact delivering means or for operating a tool combined with work cleaning or feed means.
- 210, Liquid Purification or Separation, appropriate subclasses and especially subclasses 416.1+, for the combination of a rotary expansible chamber device and a specifically claimed filter not specifically disclosed for protecting the rotary expansible chamber device whether or not the filter is upstream or downstream of the device. For a further statement of the line, see the search class note in the definition to subclass 416.1 of Class 210 for the line between Classes 210 and 417, the line between Classes 210 and 418 being the same.
- 222, Dispensing, appropriate subclasses, for the combination of a pump and a significantly claimed supply container and see section 9 of the class definition to Class 222 for an elaboration of the line between Classes 222 and 418.
- 251, Valves and Valve Actuation, for the combination of a rotary expansible chamber device and a valve as the load moved thereby even if claimed by name only. (Lines With Other Classes and Within This Class, Combinations With Load Devices.)
- 277, Seal for a Joint or Juncture, for a generic sealing means or process that may include a nominally claimed rotary expansible chamber device. Class 277 takes a nominally claimed rotary piston and cylinder combination, or a nominally claimed rotary piston or cylinder, per se, where the claim is otherwise directed to a packing or sealing means between relatively movable surfaces of said cylinder and rotary piston or on said cylinder or rotary piston. Class 418 takes such devices, where some details of the cylinder or rotary piston is set forth in the claim. However, structure of such device which is solely intended to cooperate with the packing or sealing means is not considered a detail of the device for Class 418, and is classified in Class 277. A device including either a flexible cup or flange type sealing member combined with a supporting body structure is classified in Class 418 where such device is disclosed as a rotary piston for either a pump or a motor.
- 417, Pumps, appropriate subclasses for a rotary expansible chamber pump that is; (1) driven by a significantly claimed motor, (2) operated by an art device, (3) claimed in combination with another type of pump and (4) provided with valving other than in-line valving or valving operating merely to perfect the operation of some part of the pump and see the Search Class note to Class 418 in the class definition of Class 417 for an elaboration of the line between these classes.
- 475, Planetary Gear Transmission Systems or Components, for planetary gearing per se, and in combination with a nominally claimed rotary expansible chamber device. The line between Class 418 and Class 475 is the same as the line between Class 418 and Class 74.

#### SECTION IV - GLOSSARY

**ABUTMENT**

A partition member having relative movement with a cylinder or reaction member of which it is a part and moving incident to the expansion and contraction of the working chamber, the cylinder or reaction member not constituting the working member in this case.

**CYLINDER**

An external member having wall or surface portions forming part of the working chamber of the rotary expansible chamber device, the member being either fixed or movable and may surround a fixed reaction member to move or be moved by the working fluid and may also include an abutment or reaction surface against which working fluid acts. However, the abutment or reaction surface for the rotary expansible chamber device need not necessarily be formed by the cylinder but may be formed by relatively movable opposed rotating members within the cylinder at least one of which is a working member.

**PARTITION MEMBER**

A member either fixed or movable on either the cylinder working member or other reaction member having a surface portion forming part of the working chamber to either (1) separate the working chamber into a plurality of working fluid compartments or (2) separate the inlet from the outlet of the rotary expansible chamber device.

**VANE**

A partition member which generally moves with the working member but also has movement relative to the working member incident to the expansion and contraction of the chamber. The vane may be on the cylinder if the cylinder is the working member.

**WORKING CHAMBER**

The space in an expansible chamber device which includes the working member and which is adapted to receive working fluid for acting upon the working member or for being acted upon by the working member, the chamber expanding and contracting incident to movement of the working member.

**WORKING FLUID**

The fluid (expansible or inexpandible) which is introduced into and withdrawn from the working chamber of

the rotary expansible chamber device either to act upon or be acted upon by the working member. Fluid which is withdrawn from the working fluid supply for perfecting the operation of the device is considered to be working fluid even though it never enters the working chamber of the device. A fluid combined with working fluid introduced into and exhausted with the working fluid from the working chamber of the device used merely to perfect the operation of the device (i.e., cooling, sealing, lubricating, etc.), is considered to be a non-working fluid.

**WORKING MEMBER**

A movable member in a rotary expansible chamber device having a surface portion disposed to either receive the energy of a working fluid directed thereagainst for moving the member to thereby produce a mechanical force output, or which, may move a working fluid by the application of a mechanical force to the movable member whereby fluid is admitted into and exhausted from the expansible chamber. The working member may include a movable vane thereon having a surface portion for either receiving energy from or energizing a working fluid passing through the expansible chamber.

**SUBCLASSES**

- 1 This subclass is indented under the class definition. Methods .
- 2 This subclass is indented under the class definition. Apparatus having (1) signals, indicators, registers, recorders or gauges for indicating either a condition of operation of the device or the condition or position of a part thereof or (2) window means whereby the operation of the device or the condition or position of a part thereof may be readily observed.
  - (1) Note. For classification under part (1) of this definition there must be either an indicia or an audible or visible signal. Relative to indicia, there must be graduation or markings in the disclosure as claimed. Where it is indicated that the mere position of a part is indicative of a condition of the device (e.g., valve handle position corresponds to direction of working member rotation or position of a part of the device) classification under this definition does not result unless some cooperating indicia are included.

## SEE OR SEARCH CLASS:

- 73, Measuring and Testing, subclasses 232+ for expansible chamber type volume or rate of flow meters and see References to Other Classes in the class definition of this class for a general statement of the line between this class and Class 73.
- 91, Motors: Expansible Chamber Type, subclass 1 for signals, indicators or inspection means for expansible chamber type motors.
- 92, Expansible Chamber Devices, subclass 5 for signals, indicators or inspection windows for expansible chamber devices.

**3** This subclass is indented under the class definition. Apparatus provided with two or more dissimilar rotary expansible chamber devices.

- (1) Note. Plural rotary expansible chamber devices of like types differing only in size and shape are excluded from classification here.
- (2) Note. A rotary expansible chamber device differing from another but which merely supplies a coolant, lubricant, etc., to the other is excluded from classification here, and is classified in subclasses 83+.
- (3) Note. Ordinarily, a rotary expansible chamber device of the stationary cylinder type and a rotary expansible chamber device of the moving cylinder type are considered to be diverse and classifiable here. However, a rotary expansible chamber device in which there is provided a rotating member common to both types having surface portions forming part of the working chamber surface of each type is not considered proper for classification here. See subclass 160 for such devices.
- (4) Note. The following are considered to be dissimilar rotary expansible chamber devices: (1) Sliding vane or abutment type; (2) Swinging vane or abutment type; (3) Interengaging rotary members; (4) Nested or internal-external gear

type; (5) Planetary; (6) Moving cylinder; (7) Mutating; and (8) Other miscellaneous rotary expansible chamber devices.

## SEE OR SEARCH CLASS:

- 417, Pumps, appropriate subclasses, for diverse pumps and motors wherein at least one pump or motor is not a rotary expansible chamber device.

**4** This subclass is indented under the class definition. Apparatus in which the working chamber comprises spaced partition members moving sequentially in curved and substantially straight line paths of travel, the distance between the partition members varying when moving in the curved path of travel to thereby expand and contract the working chamber.

**5** This subclass is indented under the class definition. Apparatus in which there is provided a plurality of working chambers, at least one of the working chambers serially receiving its working fluid at least in part from one other working chamber, the working fluid either acting on or being acted upon by the working member in each working chamber.

**6** This subclass is indented under subclass 5. Apparatus wherein a working chamber surrounds another working chamber with which it is in working fluid series flow relationship.

**7** This subclass is indented under subclass 5. Apparatus in which a rotating working member in each working chamber includes means for permitting working fluid to flow substantially unimpeded therepast during a portion of a revolution thereof and for producing work during another portion of the revolution, a working member in one working chamber permitting unimpeded working fluid flow therepast while a working member in a prior or subsequent working chamber is in work producing relationship with the working fluid.

**8** This subclass is indented under subclass 5. Apparatus in which there is provided a plurality of working chambers spaced about the periphery of the working member, at least two of the working chambers being serially connected so that a working member may sequen-

- tially act upon or be acted upon by the same working fluid.
- (1) Note. The space between adjacent vanes is not considered to be a working chamber.
- 9** This subclass is indented under subclass 5. Apparatus in which at least one of the working chambers is provided with a plurality of members rotating about fixed or substantially fixed axes having peripheral surface portions disposed to maintain or substantially maintain line contact therebetween; at least one of the rotating members being a working member.
- 10** This subclass is indented under subclass 9. Apparatus having three or more rotating members at least one of which has a peripheral surface engaging the peripheral surfaces of two or more other rotating members.
- 11** This subclass is indented under subclass 5. Apparatus in which at least one of the working chambers includes an abutment member having an end surface normally maintained in sealing engagement with the working member peripheral surface and having side portions slidably received in the cylinder to have sliding movement therein incident to the expansion and contraction of the working member.
- 12** This subclass is indented under subclass 5. Apparatus in which at least one of the working chambers includes an abutment member having an end surface normally maintained in sealing engagement with the working member peripheral surface and is swingably mounted to the cylinder to have swinging movement therewith incident to the expansion and contraction of the working member.
- 13** This subclass is indented under subclass 5. Apparatus in which at least one of the working chambers is provided with a rotating working member having a vane member slidably mounted thereon and having an end surface normally maintained in sealing engagement with a peripheral cylinder surface forming a part of the working chamber; the vane member having sliding movement relative to the working member incident to the expansion and contraction of the working chamber.
- 14** This subclass is indented under the class definition. Apparatus in which upon start of the device an interval of time elapses after which the working member of the device produces work, the interval of time being the time required for working chamber parts responding to a condition of operation of the device to assume or acquire a normal working or sealing relationship to overcome a working fluid bypass condition present upon starting the device.
- SEE OR SEARCH CLASS:  
417, Pumps, subclasses 279+ for expansible chamber devices having condition responsive pumped fluid control means.
- 15** This subclass is indented under the class definition. Apparatus in which working fluid en route to or from the working chamber of the device is either supplied thereto or discharged therefrom by a plurality of passages separately communicating therewith, each passage being at least adapted to communicate with a separate fluid source or point of use.
- (1) Note. Included herein are such devices in which working fluid is either introduced into or exhausted from the working chamber by a plurality of separate and distinct passages, each passage ordinarily being connectible to a separate working fluid source or place of use (or disposition) spaced from the rotary expansible chamber device.
- SEE OR SEARCH CLASS:  
91, Motors: Expansible Chamber Type, subclass 21 for rotary expansible chamber type motors having plural working fluid passages for conducting working fluid to the working chamber thereof, at least one of the passages having either a separate, selectively adjustable fluid flow control member or a separate fluid flow control portion of a unitary flow control means for sequentially and selectively controlling fluid flow through at least one other passage. However, a plurality of such passages sequentially controlled by the same portion of an adjustable

- fluid flow control member to merely control thereby the rate of fluid flow to the working chamber is not considered fluid flow through diverse paths for classification in Class 91.
- 137, Fluid Handling, subclasses 565.01+ for a fluid system including a pump having plural exhausts, each of which is separately controlled and directed to a separate point of use.
- 417, Pumps, subclasses 440+ for a significant pump having plural exhausts one of which being controlled and exhausting to waste.
- 16** This subclass is indented under the class definition. Apparatus in which in addition to the relative movement normally occurring between the working member and the other working chamber surfaces in the operation of a rotary expansible chamber device, the expansible chamber device has a portion thereof mounted for relative movement, and movement of which effects a change in a dimension of and therefore the voluminal space comprising the working chamber to thereby vary the amount of working fluid passing therethrough, no change occurring in the working member rotational speed.
- (1) Note. Those devices in which an adjustment is made to provide a better sealing arrangement or compensate for wear between cooperating parts and which may incidentally vary the volumetric capacity are not classifiable here under this definition and are classified either in subclasses 104+ or on other features.
- 17** This subclass is indented under subclass 16. Apparatus in which a dimension of the working chamber is variably controlled in response to the speed of rotation of the working member.
- SEE OR SEARCH CLASS:
- 74, Machine Element or Mechanism, subclass 731.1 for gearing with fluid drive having speed and/or torque responsive change and see the search notes thereunder.
- 91, Motors: Expansible Chamber Type, subclass 458 for expansible chamber motors having speed governor operated valves and see the search notes thereunder.
- 192, Clutches and Power-Stop Control, subclass .032 and .033 for interrelated power delivery controls automatically controlled by speed and see the search notes thereunder.
- 475, Planetary Gear Transmission Systems or Components, subclasses 31+, for planetary gear transmission systems having fluid drive or control.
- 18** This subclass is indented under subclass 16. Apparatus including a plurality of members each of which is rotatable about a common axis substantially in a common plane and having working chamber surfaces rotating in the same path, movement in one direction of at least one of the members being alternately and relatively increased and retarded whereby to expand and contact the working chamber and at least one of the members producing work.
- 19** This subclass is indented under subclass 16. Apparatus comprising a plurality of rotating members having undulating or tooth-like surface projections disposed to maintain a substantially fixed straight line of contact therebetween against which working fluid reacts; at least one of the rotatable members being a working member.
- 20** This subclass is indented under subclass 19. Apparatus having three or more rotating members at least one of which has a peripheral surface engaging the peripheral surfaces of two or more rotating members.
- 21** This subclass is indented under subclass 19. Apparatus in which a dimension of the working chamber is changed by moving the cylinder or a part thereof or the working member in a direction along the axis of rotation of the working member.
- 22** This subclass is indented under subclass 16. Apparatus comprising two or more working chambers, a surface portion of at least one of the chambers being movable to vary the voluminal space thereof.
- (1) Note. Circumferentially spaced working chambers about a common working member are not considered plural work-

- ing chambers under this definition and such devices are classified on other features.
- (2) Note. The plural chambers may be separated by a common intervening element having opposing surfaces each forming part of a respective chamber.
- (3) Note. A separate working fluid may be used for each working chamber.
- 23** This subclass is indented under subclass 16. Apparatus in which the effective volume of the working chamber is varied by adjustably restricting the limit of outward movement of a vane or abutment, from the working or cylinder member, respectively, in which it is mounted whereby to control the extent of sweeping contact of its outer edge with the peripheral working chamber surface of the other member.
- (1) Note. A vane or abutment adjustable merely for making a better seal is not considered proper subject matter for classification here and such devices have been classified in subclasses 105 and 106.
- 24** This subclass is indented under subclass 16. Apparatus provided with either a mechanical resilient means (e.g., spring) or a fluid pressure means other than that normally occurring within the working chamber in the operation of the device tending to move either the movable cylinder or portion thereof or the working member relative to one another to thereby vary the volumetric capacity of the working chamber.
- (1) Note. The cylinder or outer member may be the working member or it may be in the form of a ring or a segment thereof.
- SEE OR SEARCH CLASS:**  
417, Pumps, subclasses 212+ and especially subclass 220 for rotary expansible chamber pumps in which the capacity is varied by a movable member (e.g., stator) the member being moved by the pump fluid and there being a condition responsive valve
- control of the pump fluid in its application or release to move the member.
- 25** This subclass is indented under subclass 24. Apparatus in which either the cylinder or portion thereof or the working member is urged to move in both a direction to enlarge the working chamber and a direction opposite thereto.
- (1) Note. Not included herein are variable capacity devices pressure balanced by fluid or other means, the pressure balancing thereof merely facilitating ease of adjustment of the device by other means to thereby vary the working chamber dimension.
- 26** This subclass is indented under subclass 25. Apparatus in which the cylinder or the working member is urged to move in at least one of the directions by the working fluid.
- 27** This subclass is indented under subclass 24. Apparatus wherein either the cylinder or the working member is positively urged in one direction by a resilient mechanical means to vary the volumetric capacity of the device.
- (1) Note. Included herein are devices where the force exerted by pressures within the working chamber act against the force exerted by the resilient mechanical means.
- 28** This subclass is indented under subclass 16. Apparatus in which a dimension of the working chamber is changed by moving a part thereof in a direction along the axis of rotation of the working member.
- 29** This subclass is indented under subclass 16. Apparatus in which either the working member or other inner rotatable member forming a part of the working chamber is translatably adjusted with respect to an adjacent surface of the cylinder to thereby vary the volumetric dimension of the working chamber.
- 30** This subclass is indented under subclass 16. Apparatus in which the cylinder or segment thereof is hingedly connected for swinging movement to thereby vary the volumetric capacity of the working chamber.

- 31** This subclass is indented under subclass 16. Apparatus in which the cylinder or a segment thereof is movable in a direction normal to the working member rotational axis, that portion of the cylinder or segment thereof nearest the working member, when moved, having to or fro straight line movement with respect to the working member rotational axis.
- 32** This subclass is indented under the class definition. Apparatus in which there is provided a means movable to one of a plurality of positions in response to a condition of operation or a change in the condition of operation of the device to either (1) allow reverse rotation of the working member without reversing the direction of working fluid flow or (2) allow reverse working fluid flow without reversing the direction of working member rotation.
- 33** This subclass is indented under the class definition. Apparatus including a plurality of members each of which is rotatable about a common axis substantially in a common plane and having working chamber surfaces rotating in the same path, movement in one direction of at least one of the members being alternately and relatively increased and retarded whereby to expand and contract the working chamber and at least one of the members producing work.
- (1) Note. A rotary expansible chamber device having working member portions (e.g., vanes, etc.), undergoing relative acceleration and deceleration only because of either the eccentricity of the device or the working chamber design is not deemed proper for classification here.
- 34** This subclass is indented under subclass 33. Apparatus in which one of the members comprises an outer movable cylinder having a surface against which motive fluid acts surrounding a member having a surface of substantially like dimension against which the motive fluid reacts.
- 35** This subclass is indented under subclass 33. Apparatus in which each one of the rotatable members produces work.
- 36** This subclass is indented under subclass 35. Apparatus in which the alternate relatively increased and retarded movement of each working member is controlled by connecting each working member to a separate member of an interengaging rotating member group.
- 37** This subclass is indented under subclass 35. Apparatus in which a rotating member rotating about an axis other than the rotatable (working) member axis is either, per se, connected to the working member or is connected thereto by an intermediate member to rotate simultaneously therewith for alternately increasing and decreasing the speed of movement of the working member, a separate rotating member being associated with each working member.
- 38** This subclass is indented under subclass 35. Apparatus in which working member movement is controlled by coating elements one of which has a surface or groove of irregular contour for controlling the movements of the other elements and the working member associated therewith.
- 39** This subclass is indented under the class definition. Apparatus, (A) adapted to be rearranged to perform different functions or (B) adapted to be altered so as to operate in a different way or change its function or enhance its operation in some way by (1) disassembling the apparatus in some portion and then reassembling the apparatus with the same or different portion, (2) disassembling some portion from the apparatus, or (3) assembling some portion of the apparatus.
- (1) Note. A mere adjustment of some part of the rotary expansible chamber device merely to perfect its cooperation with another part of the device is not considered proper for classification here. Such devices will be found in subclasses 104+.
- (2) Note. A portion of a rotary expansible chamber device, such as for example a working chamber liner which is adapted to be reversed, replaced, removed or added to present a new working member engaging surface but which does not change the mode of operation of the

- device is excluded from this subclass, however, where such a change effects a change in the size or shape of the device, classification is in this subclass.
- (3) Note. A reversible device in which is provided either a plurality of vanes or a plurality of abutments, some of which are placed in a nonworking position while the remaining ones are in a working position and vice versa depending on the desired direction of rotation of the working member is not considered to be convertible for classification here. Such devices are found in subclass 239.
- 40** This subclass is indented under the class definition. Apparatus in which means responsive to the speed of rotation of the working member is provided to govern the speed of rotation of the working member whereby an optimum speed of rotation thereof may not be exceeded.
- (1) Note. The means may be adjustable to adapt the working member of the device to operate at but not exceed any desired working member speed of rotation.
- 41** This subclass is indented under subclass 40. Apparatus in which the means comprises a mass of solid material subject to a centrifugal force commensurate with the speed of rotation of the working member and movable in a direction to, per se, impede working fluid flow through the expansible chamber device when an optimum speed of working member rotation tends to be exceeded.
- (1) Note. Included in this definition is an enlarged mass of solid material and any other element rigidly connected therewith.
- 42** This subclass is indented under subclass 40. Apparatus in which the means comprises a rotating mass of solid material which is mounted either (1) to an outer surface of the working member or (2) to the working member within the confines of its periphery.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
185, for a working member having an inlet or an outlet passage therethrough controlled by a movable flow restricting means positioned therein.
- 43** This subclass is indented under subclass 40. Apparatus in which the means comprises a mass of solid material which rotates about an axis either (1) coincident with or (2) parallel to the working member axis of rotation.
- 44** This subclass is indented under subclass 43. Apparatus in which the mass of solid material rotates about an axis other than the axis of rotation of the working member.
- 45** This subclass is indented under the class definition. Apparatus in which the working chamber is formed at least in part by a flexible wall, said wall being progressively distorted by contact with a member external thereto having a surface substantially circumferentially coextensive therewith to expand or contract the working chamber.
- (1) Note. For a definition of collapsible wall, see Class 92, Expansible Chamber Devices, subclass 89.
- (2) Note. A flexible coating material forming a surface of the working chamber disclosed merely for wear prevention, sealing, protection against corrosiveness, etc., of the coated part is not considered to be a flexible wall for classification here. See this class, subclass 152 and the notes therein for rotary expansible chamber devices having parts either coated with or made of non-metallic material.
- 46** This subclass is indented under the class definition. Apparatus in which the rotary expansible chamber device is provided with either (1) a trap or screen means to respectively collect or separate solid foreign material from the working fluid either in the working chamber or at the inlet or outlet thereto or (2) an enlargement of a working chamber part especially designed for allowing passage of solid foreign material laden working fluid through the working chamber of the device, the trap or screen means or the enlargement of the working chamber part enhancing the operation of the expansible chamber device.

- (1) Note. Not included under part 2 of this definition are devices wherein there is included a seal, wear or other coating means forming part of the working chamber surface which may either be moved by or absorb the abrasive effect of the working fluid and any solid impurities therein. Nor are devices wherein the working member or the cylinder is made of nonmetallic material included here. However, such devices provided with an additional enlarged means especially designed for coping with solid foreign material in the working fluid are deemed proper for classification here.
- (2) Note. The removal of foreign particles from between substantially contacting relatively moving surfaces of the device by flushing with either pressurized fluid or mere leakage fluid is not considered proper for classification here. Such devices have been classified on other features.
- (3) Note. A working fluid may include solid particles not considered to be foreign material (e.g., cement, wood pulp, etc.).
- 47** This subclass is indented under subclass 46. Apparatus wherein there is provided a screen device to strain incoming working fluid.
- 48** This subclass is indented under the class definition. Apparatus in which a cylinder and a rotating working member of substantially like axial extent have interfitting internal and external helical surfaces of unlike pitch, rotation of the working member causing relative gyratory movement between the cylinder and the working member to thereby expand and contact the working chamber.
- (1) Note. Such devices wherein the cylinder is the working member are considered proper for classification here.
- (2) Note. Included herein are devices in which the cylinder is made of a tubular material, helical surfaces thereon being formed by the helical surfaces of the working member pressing thereagainst.
- 49** This subclass is indented under the class definition. Apparatus in which the working member includes a working chamber forming surface having cyclic wobbling or undulating motion and having progressively moving line contact with a complementary working chamber forming surface of another member to thereby produce a rotating working chamber, the central axis of the working member describing a cone whose apex is the point about which the working member wobbles.
- 50** This subclass is indented under subclass 49. Apparatus in which the working member or other working chamber part is either made of or coated with a nonmetallic material.
- (1) Note. A mere seal means made of nonmetallic material is not considered proper for classification here. See subclasses 104 for mechanical sealing and 152 for a nonmetallic working member, cylinder or partition.
- 51** This subclass is indented under subclass 49. Apparatus in which either the working member or the other member is provided with a movable, expandable, adjustable or deformable means for engaging the other of said members to oppose the passage of working fluid therepast to constrain the working fluid to move in a prescribed path of flow.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
104, and the subclasses thereunder for other rotary expandible chamber devices having sealing means.
- 52** This subclass is indented under subclass 49. Apparatus in which a single working member has opposed working surfaces, each of which forms a movable surface of a separate working chamber for expanding and contracting the working chamber.
- 53** This subclass is indented under subclass 52. Apparatus in which the working chambers are spaced in a direction generally along or parallel to the working member axis about which it wobbles.

- 54** This subclass is indented under the class definition. Apparatus in which the working member either (1) rotates about its axis while the axis moves in an orbit or (2) has circular translatory or oscillatory movement without rotation or substantial rotation about its axis while the axis moves in an orbit.
- 55.1 Helical working member, e.g., scroll:**  
This subclass is indented under subclass 54. Apparatus in which the working member includes continuous working portions in the form of a spiral either (1) lying in the same plane and having increasing radius or (2) extending axially.
- 55.2 Having specific wrap or end plate, e.g., shape, material, coating:**  
This subclass is indented under subclass 55.1. Apparatus in which the end plate or wrap has a specific shape, or coating or is made out of a specific material.
- 55.3 With specific rotation preventing or rotation coupling means:**  
This subclass is indented under subclass 55.1. Apparatus in which (1) a locking means prevents the moveable scroll from rotating and forces the moveable scroll to move in an orbital motion or (2) a connecting means joins both scrolls for relative movement about an eccentric axis.
- 55.4 With mechanical sealing:**  
This subclass is indented under subclass 55.1. Apparatus in which a means is provided to prevent leaking of the working fluid.
- SEE OR SEARCH CLASS:  
277, Seal for a Joint or Juncture, for a generic sealing means or process, subclass 398 for a relatively rotatable radially extending sealing face member (e.g., face, mechanical, etc.) that accommodates or exhibits eccentric, gyratory, or oscillatory motion or subclasses 399+ for a relatively rotatable radially extending sealing face member (e.g., face, mechanical, etc.) having a particular configuration.
- 55.5 With biasing means, e.g., axial or radial:**  
This subclass is indented under subclass 55.1. Apparatus in which a means is provided to keep the scrolls in sealing engagement.
- 55.6 With lubricant, liquid seal or nonworking fluid separation:**  
This subclass is indented under subclass 55.1. Apparatus in which a means is provided to remove a lubricant, liquid seal or nonworking fluid from the working fluid.
- 56** This subclass is indented under subclass 54. Apparatus in which the working member, cylinder or partition element is either made of or coated with a nonmetallic material.
- (1) Note. A mere seal means made of nonmetallic material is not classifiable here. Classification of such devices will be made on other features.
- 57** This subclass is indented under subclass 54. Apparatus in which means is provided to either (1) selectively move the working member with respect to the cylinder wall surface or (2) positively urge the working member into sealing engagement with the cylinder wall surface by a spring or other biasing means as the working member moves incident to the expansion and contraction of the working chamber.
- 58** This subclass is indented under subclass 54. Apparatus in which there is provided either (1) a plurality of working members mounted to rotate in the same or different working chambers or (2) two or more working chambers.
- 59** This subclass is indented under subclass 58. Apparatus in which at least one working chamber surrounds another.
- 60** This subclass is indented under subclass 58. Apparatus in which at least one of the plurality of working members is spaced in the direction of or along the rotational axis of one other working member.
- 61.1 Circumferentially spaced working chambers:**  
This subclass is indented under subclass 58. Apparatus in which there is provided a plurality of working chambers spaced about the

- periphery of the working member, the working chambers being successively alternately filled and exhausted by the oscillating rotating motion of the working member.
- 61.2 Rotor has one more than cylinder (i.e., wankel type):**  
This subclass is indented under subclass 61.1. Apparatus wherein the working member has one lobe more than the number of working chambers.
- 61.3 Rotor has one less lobe than cylinder (i.e., gerotor type):**  
This subclass is indented under subclass 61.1. Apparatus wherein the working member has one lobe less than the number of working chambers.
- 62** This subclass is indented under subclass 54. Apparatus in which a bladelike element is hingedly connected to both the working member and to the cylinder.
- 63** This subclass is indented under subclass 54. Apparatus in which there is provided a displaceable divider element mounted on either the cylinder member or the working member but engaging the other member and moving incident to the expansion and contraction of the working chamber to separate the low and high pressure zones of the working chamber.
- 64** This subclass is indented under subclass 63. Apparatus in which the divider element has reciprocal movement in the working member.
- 65** This subclass is indented under subclass 63. Apparatus in which the divider element is provided with a passage means to allow ingress or egress of the working fluid.
- (1) Note. A blade-like partition element having a passage for pressurized working fluid for biasing the blade-like partition element but not for intake or exhaust of working fluid to or from the working chamber is not classifiable here. See subclass 249 for fluid biased abutments and subclasses 267 and 268 for fluid biased vanes.
- 66** This subclass is indented under subclass 63. Apparatus in which the divider element and the working member are either (1) inseparable component parts of a unitary structure or (2) are separable parts rigidly connected for concurrent movement.
- 67** This subclass is indented under subclass 63. Apparatus in which the divider element is hingedly connected to the working member.
- 68** This subclass is indented under the class definition. Apparatus in which in addition to rotary movement a rotating internal member has periodic to-and-fro movement incident to the expansion and contraction of the working chamber.
- 69** This subclass is indented under the class definition. Apparatus in which (1) there is provided in the working member drive a weakened member designed to break or rupture on overload of the working member to thereby discontinue the drive or (2) a releasable means is provided in the drive connected to the working member for interrupting the drive either in response to a condition of operation of the device or at the will of an operator.
- 70** This subclass is indented under the class definition. Apparatus in which the device is made of detachably secured parts which are readily assembled or disassembled by manually operable securing means only and without the aid or use of a tool means.
- (1) Note. The manually operable securing means may include an enlarged portion or a portion so made as to provide a mechanical advantage to thereby facilitate manual assembly or disassembly of the device.
- 71** This subclass is indented under the class definition. Apparatus in which radial forces or bias acting on a rotating member periphery because of fluid pressure in a pressure area or zone comprising part of the working chamber is substantially counterbalanced by an opposing area or zone of substantially equal pressure acting either on the rotating member periphery or the mounting means therefor.

- (1) Note. A counterbalancing zone or force may be in a resultant direction substantially opposite a resultant zone or force.
- (2) Note. The mere filling of intervene or inter-tooth spaces which may also tend to counter-balance the radial forces caused by exhaust or inlet fluid pressure is not deemed proper for classification here; nor are opposing inlet or outlet zones, per se, considered proper for classification here. Such devices are classified on other features.
- 72** This subclass is indented under subclass 71. Apparatus in which the opposing fluid zones are spaced about the rotating member periphery and are inter-connected by passage means extending through the rotating member.
- 73** This subclass is indented under subclass 71. Apparatus wherein at least one of the opposing fluid zones is at the journal means for the rotating member.
- 74** This subclass is indented under subclass 71. Apparatus in which at least one of the opposing fluid zones comprises a part of the working chamber and the counterbalancing fluid directed thereto pressurizes the space between adjacent vane or tooth surfaces.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
180, for similar devices wherein pressurized fluid at the high pressure working chamber zone is directed to a lower pressure working chamber zone.
- 75** This subclass is indented under the class definition. Apparatus in which there is provided an elongate, relatively shallow recess or depression of substantially the same cross-sectional dimension along its center line on at least one-side surface of either one of the adjacent substantially engaging cylinder or rotating member side surface, the recess or depression being other than the inlet or outlet or a part of the inlet or outlet of the device.
- (1) Note. The recess or depression may be fluidly connected to the inlet or outlet of the device or may be connected to a source of nonworking fluid or it may collect leakage pressure fluid only.
- (2) Note. The recess or depression enhances the operation of the device and may be used for lubricating, cooling, sealing, balancing, conducting fluid to or from a vane slot, etc.
- (3) Note. A mere port is not considered proper for classification here, however, a port having a flared mouth portion is considered classifiable here. Otherwise, the elongate shallow recess or depression has substantially the same dimensions about its center line for a substantial portion of its length.
- 76** This subclass is indented under subclass 75. Apparatus in which fluid other than working fluid is positively directed to the shallow recess or depression.
- (1) Note. Devices having grooves receiving leakage fluid whether working non working or a mixture thereof are not considered proper for classification here. See subclass 75 and subclasses 77 through 82 for similarly grooved devices.
- 77** This subclass is indented under subclass 75. Apparatus in which the working member is provided with the shallow recess or depression.
- 78** This subclass is indented under subclass 75. Apparatus in which the shallow recess or groove traverses a plurality of spaces formed in part by adjacent sides of adjacent vanes or tooth-like projections on a working member, one end of the shallow recess or groove terminating in zone of higher or lower fluid pressure to at least sequentially interconnect the spaces with the fluid pressure zone.
- 79** This subclass is indented under subclass 75. Apparatus in which the shallow recess or depression has parallel sides or edges parallel to a radial line therebetween extending from the axis of rotation of the working member.
- 80** This subclass is indented under subclass 75. Apparatus in which an abutting surface has a plurality of spaced shallow recesses or depres-

- sions of which at least two are spaced at unequal distances from the working member axis of rotation.
- (1) Note. Two or more members may combine to form the abutting surface.
- 81** This subclass is indented under subclass 75. Apparatus in which the abutting surface is provided with a ring-like recess or depression extending entirely around the working member axis of rotation.
- (1) Note. The recess or depression may be formed by surface portions of each of a plurality of members, one of which having a surface in abutting relationship with the adjacent working member surface.
- 82** This subclass is indented under subclass 75. Apparatus in which the elongated recess or depression lies in a path traversed by the vane slot of a rotating working member for fluid communication therebetween.
- 83** This subclass is indented under the class definition. Apparatus in which there is provided means to either (1) heat or cool either the working or the nonworking fluid or any part of the device, (2) direct a fluid other than working fluid to the device or to the working fluid to provide a film or coating between adjacent surfaces of a plurality of relatively moving parts to prevent direct rubbing contact therebetween or passage of working fluid therepast or (3) at least partially immerse the device in a nonworking liquid whereby to enhance the operation of the device.
- (1) Note. A lubricating or sealing agent comprising nonworking finely divided solids having flow characteristics of a fluid, performing a lubricating or sealing function under part 2 of the above definition is considered proper for classification here.
- 84** Apparatus under 83 in which there is provided means for sensing either a condition of operation or a change in a condition of operation of the device and for controlling nonworking fluid flow in response thereto.
- SEE OR SEARCH CLASS:  
417, Pumps, subclass 228 for similar subject matter in which the pump is of the reciprocating type.
- 85** This subclass is indented under subclass 83. Apparatus wherein the nonworking fluid is itself heated or cooled by means specifically designed to either add or remove heat therefrom prior to its entry to the device or working parts thereof.
- 86** This subclass is indented under subclass 83. Apparatus in which the working fluid either prior to entering or upon leaving the working chamber is caused to follow a tortuous path thereabout for either giving off or absorbing heat in the operation of the device.
- (1) Note. Incidental heat exchange by working fluid entering or leaving the working chamber of the device by the most direct or expeditious path is not considered proper for classification here. Also, diversion of a portion of the working fluid merely for lubrication purposes but which may incidentally cool is not considered proper for classification here and classification of such devices will be based on other features.
- 87** This subclass is indented under subclass 83. Apparatus in which the flow of nonworking fluid to the relatively moving surfaces may be varied by the adjustment of a movable flow restrictive means in the path of flow.
- 88** This subclass is indented under subclass 83. Apparatus in which nonworking fluid is positively applied to the device or part thereof by a fluid displacement device having a movable fluid displacing element for impelling the nonworking fluid thereto.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
101, for devices in which a fan or other air impelling means directs air to an outer surface of the device to remove heat therefrom generated in the operation of the device.

- 89** This subclass is indented under subclass 83. Apparatus provided with porous means to remove physical impurities from the nonworking fluid.
- 90** This subclass is indented under subclass 83. Apparatus in which the nonworking fluid is fed by means of the capillary action of an element either to the incoming working fluid for contacting therewith the relatively moving parts of the device or directly to one of the relatively movable parts of the device.
- 91** This subclass is indented under subclass 83. Apparatus in which an inner working or reacting member is provided with a flow path or passageway for conducting nonworking fluid therethrough.
- (1) Note. The working and nonworking fluid may be intermixed.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
101, for rotary expansible chamber devices having a central passage therethrough open to the atmosphere combined with ambient air impelling means to move the air through the passage for removing heat generated in the operation of the device. However, similar devices in which the working member has at least one passage portion extending generally radially so that air passing therethrough is caused to approach the working member circumferentially periphery to remove heat therefrom are classified here.
- 92** This subclass is indented under subclass 91. Apparatus comprising a working member with a vane wherein the nonworking fluid flow path includes a passageway or duct means through the vane.
- 93** This subclass is indented under subclass 91. Apparatus in which the device includes a vane which is moved into cylinder wall engagement either by (1) pressurized nonworking fluid directed to the vane slot or (2) pressurized working fluid combined with a nonworking fluid directed to the vane slot.
- 94** This subclass is indented under subclass 91. Apparatus in which the flow path for the nonworking fluid includes a duct means in the drive shaft of the device.
- 95** This subclass is indented under subclass 83. Apparatus in which the working and nonworking fluids are in separate compartments of the device and including means intermediate the compartments to divert or vent away either fluid tending to move in a direction to mix with the other fluid.
- (1) Note. A mere seal means between the two compartments is not considered proper for classification here. See subclass 104 for such subject matter.
- 96** This subclass is indented under subclass 83. Apparatus in which the device is placed in a liquid so that the cylinder thereof is at least partially covered thereby.
- 97** This subclass is indented under subclass 83. Apparatus in which the nonworking fluid enters the working chamber of the device to mix with the working fluid therein either (1) by directly conducting the nonworking fluid to the working chamber or (2) by the leakage or flow of the nonworking fluid thereto after being initially directed to another part of the device.
- 98** This subclass is indented under subclass 97. Apparatus in which the nonworking fluid is initially directed to impinge on the shaft trunnions or bearings of the device from whence it passes to enter into a zone of lower pressure of the working chamber.
- 99** This subclass is indented under subclass 97. Apparatus in which the nonworking fluid is initially directed to impinge against the working member from whence it passes to enter into a zone of lower pressure of the working chamber.
- 100** This subclass is indented under subclass 83. Apparatus in which the nonworking fluid is initially directed so as to unite with the working fluid prior to its entry into the working chamber of the device.

- 101** This subclass is indented under subclass 83. Apparatus in which there is provided either a means to produce and direct a current of air to a surface of the rotary expansible chamber device or a projection means on the cylinder surface for dissipating heat to the atmosphere whereby heat generated in the operation of the device is removed therefrom.
- 102** This subclass is indented under the class definition. Apparatus in which at least part of the working fluid is directed by means of a passageway to another part of the device to provide a film or coating between adjacent surfaces of relatively moving parts to prevent direct rubbing contact therebetween or passage of working fluid or ambient air therepast.
- 103** This subclass is indented under the class definition. Apparatus in which the working member includes a plurality of parts having working chamber surface portions movable relative to each other in the direction of working member rotation as the working member rotates.
- 104** This subclass is indented under the class definition. Apparatus in which a working chamber part comprising either the working member, cylinder or partition member is provided with a movable, expansible, adjustable or deformable means having at least substantial engagement with another working chamber part to oppose the passage of working fluid therepast to constrain the working fluid to move in a prescribed path of flow.
- (1) Note. The means may include an adjustable working member or cylinder.
- (2) Note. A movable vane or abutment moved incident to the expansion and contraction of the expandable chamber is not considered to be sealing, however, if additionally to such a vane or abutment there is provided a movable, expandable, adjustable or deformable means enabling closer tolerances to be maintained between the relatively moving parts to thereby oppose the passage of fluid therebetween such is considered to be sealing and proper for classification here.
- SEE OR SEARCH THIS CLASS, SUBCLASS:**
- 179, for rotary expansion chamber devices made of specific or diverse materials whereby sealing may be obtained or maintained solely by the difference in expansion characteristics of the material.
- SEE OR SEARCH CLASS:**
- 277, Seal for a Joint or Juncture, for a generic sealing means or process, subclass 357 for a dynamic seal for a rotary piston.
- 105** This subclass is indented under subclass 104. Apparatus in which the abutment is movable and is provided with an adjusting means for repositioning the abutment to compensate for wear.
- 106** This subclass is indented under subclass 104. Apparatus wherein the vane is movable and is provided with an adjusting means for repositioning the vane to compensate for wear.
- 107** This subclass is indented under subclass 104. Apparatus in which the working member and the cylinder are bodily movable relative to each other for establishing or maintaining a line or arcuate surface of contact therebetween to oppose the passage of working fluid therepast.
- 108** This subclass is indented under subclass 107. Apparatus in which the working member and the cylinder are mounted for relative movement normal to the axis of rotation.
- 109** This subclass is indented under subclass 108. Apparatus wherein the working member is mounted for adjustment normal to its axis of rotation.
- 110** This subclass is indented under subclass 104. Apparatus wherein the working member comprises a plurality of axially movable portions of substantial dimension, each having a side surface movable into sealing relationship with a respective cylinder side.
- 111** This subclass is indented under subclass 104. Apparatus wherein a vane or an abutment comprises a plurality of axially movable portions of

- substantial dimension having end surfaces movable into sealing relationships with respective cylinder sides.
- (1) Note. A vane or abutment provided with axially movable seal means at its ends to engage the cylinder sides is not considered to comprise a plurality of axially movable portions of substantial dimension and is classified in the appropriate sealing subclasses below.
- 112** This subclass is indented under subclass 104. Apparatus in which the movable, expandable, adjustable or deformable means is mounted on the working member periphery to have wiping contact with the cylinder peripheral surface.
- 113** This subclass is indented under subclass 112. Apparatus wherein the working member includes a protruding (e.g., apex) portion on its periphery which is provided with a movable, expandable, adjustable or deformable means for engaging a cylinder working chamber surface to oppose the passage of working fluid therepast and wherein the movable, expandable, adjustable or movable means does not move or is a part of a member that moves incident to the expansion or contraction of the working chamber.
- 114** This subclass is indented under subclass 113. Apparatus wherein the working member includes a protruding part that is either (1) fixedly repositionable thereon or (2) integral therewith but extendable thereon, the part being movable to sealingly engage another working chamber surface.
- 115** This subclass is indented under subclass 113. Apparatus in which the movable, expandable, adjustable or deformable means is either (1) interconnected with a weight so that outward movement thereto because of centrifugal force is at least partially counterbalanced by the weight or (2) is fixedly attached to the working member and is adapted to be moved to at least one other fixed position thereon.
- 116** This subclass is indented under subclass 113. Apparatus in which the movable, expandable, adjustable or deformable means is at least in part, in the form of a circular band or loop and lies in a plane generally normal to the direction of working member rotation.
- 117** This subclass is indented under subclass 113. Apparatus in which there is provided at least two separate, movable, expandable, adjustable or deformable means on a protruding portion of the working member for engaging the cylinder working chamber surface.
- 118** This subclass is indented under subclass 113. Apparatus in which the deformable, expandable, adjustable or deformable means has an end portion pivotally secured to the working member, the other end being movably maintained in wiping contact with the cylinder working chamber peripheral surface to oppose the passage of working fluid therepast.
- 119** This subclass is indented under subclass 113. Apparatus in which the movable, expandable, adjustable or deformable means includes an elongate side portion integral or immovably fixed therewith of substantially greater radial dimension to depend therefrom for engaging the working chamber cylinder side surface.
- 120** This subclass is indented under subclass 113. Apparatus in which the movable, expandable, adjustable or deformable means is movable in a direction along or parallel to the working member rotational axis.
- 121** This subclass is indented under subclass 120. Apparatus in which the movable, expandable, adjustable or deformable means is positively urged to engage a cylinder working chamber side surface by means of a resilient, deformable, mechanical device.
- 122** This subclass is indented under subclass 113. Apparatus in which the means for urging the movable, expandable or deformable means includes a resilient mechanical device.
- 123** This subclass is indented under subclass 122. Apparatus in which the means for urging the movable, expandable or deformable means includes a pressurized fluid.
- 124** This subclass is indented under subclass 113. Apparatus in which the means for urging the movable, expandable or deformable means comprises a pressurized fluid.

- 125** This subclass is indented under subclass 104. Apparatus in which the movable, expandable, adjustable or deformable means is mounted on the cylinder to have wiping contact with the rotary member periphery to prevent leakage of fluid therebetween.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
191, for interengaging rotary members and see the search note to this subclass (125) in the definition thereto for the distinction between similar subject matter in these subclasses.
- 126** This subclass is indented under subclass 125. Apparatus in which the expandable, movable, adjustable or deformable means has wiping contact with the periphery of each of a plurality of rotary members.
- 127** This subclass is indented under subclass 125. Apparatus in which means is provided to selectively move the movable, expandable, adjustable or deformable means into sealing engagement with the rotary member surface.
- 128** This subclass is indented under subclass 127. Apparatus in which there is provided an elastic biasing means intermediate the selective moving means and the movable, expandable, adjustable or deformable means to urge the last mentioned means into engagement with the rotary member surface.
- 129** This subclass is indented under subclass 125. Apparatus in which there is provided an elastic biasing means to urge the expandable, movable, adjustable or deformable means into engagement with the rotary member surface.
- 130** This subclass is indented under subclass 104. Apparatus in which there is provided an axially movable cylinder member having an annular, axially extending lip portion abutting an adjacent cylinder surface portion to thereby oppose the passage of working fluid therepast, the axially movable cylinder member and the adjacent cylinder surface cooperating to produce a cavity in which a member having a peripheral surface forming part of the working chamber is housed.
- 131** This subclass is indented under subclass 104. Apparatus in which the cylinder comprises a side plate or end wall or a portion thereof having a face or surface axially movable into engagement with the adjacent working member side face or surface to oppose the passage of working fluid therepast.
- 132** This subclass is indented under subclass 131. Apparatus wherein the side plate or end wall is urged into sealing engagement with the side of the working member, the urging thereof being in opposition to and at least substantially commensurate with the differing working fluid pressures within the working chamber as the working fluid moves from inlet to outlet thereof.
- 133** This subclass is indented under subclass 131. Apparatus wherein the side of the end wall engaging the working member has a portion abutting an adjacent face or surface portion of the cylinder which is coplanar with the working member face, the cylinder being either fixed or moving.
- 134** This subclass is indented under subclass 131. Apparatus in which means is provided to selectively move the end plate into sealing engagement with the adjacent working member side surface.
- (1) Note. An end plate or wall may consist of a ring-like plate member having a surface forming a complete wall of the working chamber.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
140+, for ring-like members for providing a seal means between the working member and cylinder and which may incidentally form a surface portion of the working chamber.
- 135** This subclass is indented under subclass 131. Apparatus wherein a resilient mechanical means urges the end plate or wall into engagement with the working member side.
- 136** This subclass is indented under subclass 104. Apparatus in which the means is mounted on either the working member or the vane but

- engages the other to oppose the passage of working fluid therepast.
- 137** This subclass is indented under subclass 136. Apparatus wherein the means opposing the passage of working fluid is mounted on the working member.
- 138** This subclass is indented under subclass 137. Apparatus in which the means opposing passage of working fluid is rockable about its axis.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
241, for similar devices in which a seal element between the working member and the vane is not provided.
- 139** This subclass is indented under subclass 104. Apparatus provided with a movable abutment and means mounted thereon or on either the working member or the cylinder for engagement therebetween to oppose the passage of fluid therepast.
- 140** This subclass is indented under subclass 104. Apparatus provided with a means mounted on either the cylinder or the working member but either engaging the other or having slight clearance with the other to oppose the passage of fluid therepast.
- 141** This subclass is indented under subclass 140. Apparatus wherein the means opposing the passage of fluid comprises a succession of baffles having slight clearance with each other to impede the passage of fluid by the tortuous path made thereby.
- 142** This subclass is indented under subclass 140. Apparatus wherein the means opposing the passage of fluid is mounted or positioned on the working member.
- 143** This subclass is indented under subclass 142. Apparatus wherein the means opposing the passage of fluid is mounted or positioned on the working member circumferential surface.
- 144** This subclass is indented under subclass 140. Apparatus wherein the means opposing the passage of fluid is mounted or positioned on the side surfaces (i.e., end face) of the cylinder
- to engage the adjacent side surface of the working member.
- 145** This subclass is indented under subclass 104. Apparatus ... in which the working member is provided with a movable vane having a movable, expandable, adjustable or deformable means mounted thereon for engaging the cylinder to oppose the passage of working fluid therepast.
- 146** This subclass is indented under subclass 145. Apparatus in which the means opposing the passage of fluid is mounted to extend beyond the side edge of the vane to engage the adjacent working chamber surface.
- 147** This subclass is indented under subclass 145. Apparatus in which the means opposing the passage of fluid is movable mounted or positioned on the vane.
- 148** This subclass is indented under subclass 147. Apparatus in which the means opposing the passage of fluid is movable and is biased into engagement or maintained in engagement with the cylinder surface by means other than an inherent property of the opposing means.
- (1) Note. For example, gravity, centrifugal force, and elasticity are deemed to be inherent properties of a sealing element.
- 149** This subclass is indented under subclass 104. Apparatus provided with means mounted or positioned on a cylinder portion to engage another cylinder portion to oppose the passage of fluid therepast.
- 150** This subclass is indented under the class definition. Apparatus in which either the cylinder or working member surface forming part of the expansible working chamber is represented in a claim by a mathematical formula or equation.
- 151** This subclass is indented under the class definition. Apparatus in which the device is provided with a mass of material rotatable with the working member and positioned so that it at least partially opposes unbalanced forces of either (1) the rotating working member or (2) a movable part thereon moving incident to the expansion and contraction of the working chamber.

- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
 210, for devices in which axially spaced rotating working members counter-balance each other.
- 152** This subclass is indented under the class definition. Apparatus in which the working member, cylinder, vane or abutment is either made of or coated with a nonmetallic material.
- (1) Note. A mere seal means made of non-metallic material for the vane, abutment or working member is excluded here. See subclass 104 for such seals.
- 153** This subclass is indented under subclass 152. Apparatus in which the nonmetallic material is a deformable elastic material.
- 154** This subclass is indented under subclass 153. Apparatus in which the working member is provided with a vane member thereon, the working member and the vane member comprising a resilient impartible unit of manufacture.
- 155** This subclass is indented under subclass 154. Apparatus in which the vane extends axially from a working member side to engage and be deflected by the undulating surface of the opposing working chamber side to expand and contract the working chamber.
- 156** This subclass is indented under the class definition. Apparatus in which the working member, cylinder or a partition element on either the working member or the cylinder comprises a flexible working chamber portion flexing relative to the expansion and contraction of the working chamber.
- 157** This subclass is indented under the class definition. Apparatus in which a portion of either the cylinder or the working member peripheral working chamber surface comprises either a nonmetallic resilient segment or a resiliently biased segment to cushion either relatively moving parts of the device at a cyclically occurring, direction changing movement of a part thereof or to temporarily accommodate or relieve a working fluid condition tending to exceed the capacity of the working chamber.
- 158** This subclass is indented under the class definition. Apparatus in which a vane or an abutment is urged to move at least in one direction by a magnetic field.
- 159** This subclass is indented under the class definition. Apparatus in which the cylinder includes a normally stationary working chamber surface portion or part that is selectively movable and when moved, an edge portion thereof adjacent either the working fluid inlet or outlet controllably modifies working fluid flow therepast.
- 160** This subclass is indented under the class definition. Apparatus wherein the working chamber comprises an outer movable member surrounding a member of substantially like axial dimension, adjacent spaced surfaces of which form the working chamber; a boundary thereof against which working fluid reacts being formed by the convergence of the adjacent surfaces whereby line contact therebetween is substantially maintained and at least one of the members being a working member.
- 161** This subclass is indented under subclass 160. Apparatus in which the outer cylinder member revolves about its axis.
- 162** This subclass is indented under subclass 161. Apparatus in which there is provided a barrier member for separating the inlet from the outlet having surface portions forming part of the working chamber surface, the barrier member moving or having relative movement with a working chamber surface in a direction along or parallel to the axis of rotation of the working member incident to the expansion and contraction of the working member.
- 163** This subclass is indented under subclass 162. Apparatus wherein the inner member forming part of the working chamber surface rotates about an axis that is at an angle to the axis of rotation of the cylinder.
- 164** This subclass is indented under subclass 161. Apparatus wherein the inner member forming part of the working chamber is continuously rotatable about a fixed or movable axis.

- 165** This subclass is indented under subclass 164. Apparatus in which two or more rotating members each rotating about a separate axis are encompassed by the cylinder.
- 166** This subclass is indented under subclass 164. Apparatus wherein the rotating outer and inner members have matched projecting and recessed surface portions of substantially like dimension which interfit during at least a portion of their rotative movement.
- 167** This subclass is indented under subclass 166. Apparatus in which the internal reacting member is provided with an opening through which working fluid enters or leaves the working chamber.
- 168** This subclass is indented under subclass 166. Apparatus in which the recessed portion of the cylinder comprises a through passage.
- 169** This subclass is indented under subclass 168. Apparatus provided with a partition separating the cylinder and reacting member during a portion of their rotative movement, said partition generally being in the shape of a crescent.
- 170** This subclass is indented under subclass 166. Apparatus provided with a partition separating the cylinder and reacting member during a portion of their rotative movement, said partition generally being in the shape of a crescent.
- 171** This subclass is indented under subclass 166. Apparatus in which rotary internal reacting member is provided with five or more projecting portions.
- 172** This subclass is indented under subclass 164. Apparatus wherein either the outer rotating cylinder or the member forming the inner surface is provided with a movable divider member (e.g., vane or abutment) having a wall or portion thereof forming part of the expansible working chamber.
- 173** This subclass is indented under subclass 172. Apparatus wherein the member forming the inner surface includes a relatively movable member that slides back and forth therein in a direction that is generally radial thereof, said relatively movable member also cooperating with the rotating cylinder to form the working chamber.
- 174** This subclass is indented under subclass 172. Apparatus wherein the rotating cylinder includes a relatively movable member that slides back and forth therein in a direction that is generally radial thereof, said relatively movable member also cooperating with the inner rotating surface to form the working chamber.
- 175** This subclass is indented under subclass 161. Apparatus wherein the member forming the inner surface acting as an abutment against which the motive fluid reacts is stationary and is formed with an additional relatively movable member that moves back and forth in relation thereto, said relatively movable member also cooperating with the outer fluid actuated surface to form the working chamber.
- 176** This subclass is indented under subclass 161. Apparatus wherein the rotating cylinder includes a relatively movable member that is pivoted thereon to oscillate back and forth in relation to said cylinder, said relatively movable member also cooperating with the radially spaced inner surface to form the working chamber.
- 177** This subclass is indented under subclass 161. Apparatus wherein the rotating cylinder includes a relatively movable member that slides back and forth therein in a direction transversely of said cylinder, said relatively movable member also cooperating with the radially spaced inner surface to form the working chamber.
- 178** This subclass is indented under the class definition. Apparatus in which a part having a surface portion comprising a portion of the working chamber is provided at least in part with either (1) a coating of a material other than that making up the remainder of the part intimately forming an impartible part thereof or (2) is made of a single material which has been treated to provide the working chamber surface portion with specific properties which properties are different from the properties of the remainder of the part.

- 179** This subclass is indented under the class definition. Apparatus relating to the particular metal or alloy or the properties of either of which the device is made.
- (1) Note. The mere recitation of iron or steel, per se, is excluded as being too common, however, specifying iron and steel or different types of iron and steel would be included.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 152, and the subclasses indented thereunder for such devices having a nonmetallic material forming part of the working chamber.
- 156, for such devices in which a resilient metallic material is utilized to form a working chamber surface portion.
- 178, for a working chamber plated wear surface.
- SEE OR SEARCH CLASS:
- 428, Stock Material or Miscellaneous Articles, subclasses 544+ for metallic stock material or intermediate articles from which parts for a rotary expansible chamber device can be made.
- 180** This subclass is indented under the class definition. Apparatus in which a passage having an orifice conducts working fluid to or from a working chamber portion separate from and having a working fluid pressure intermediate the inlet and outlet pressures of the working chamber, inlet or outlet pressure communicating with the intermediate pressure zone via the passage.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 74, for similar devices wherein the pressurized fluid also radially balances the working member.
- 181** This subclass is indented under the class definition. Apparatus claimed in combination with features other than drive means, valving or support structure and not provided for in preceding subclasses.
- SEE OR SEARCH CLASS:
- 417, Pumps, subclass 321 and the subclasses indented thereunder for the combination of a motor driving pump.
- 182** This subclass is indented under the class definition. Apparatus in which there is provided a loose or compensation drive connection either between the working member and its drive shaft or between adjacent shaft end portions in the vicinity of the working member to allow for slight or temporary axial misalignment therebetween.
- 183** This subclass is indented under the class definition. Apparatus in which the working member is provided with a fluid passage means through which working fluid passes enroute to or from the working chamber.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 189+, for devices in which residual trapped working fluid may escape by way of a passage means in the rotating working member.
- 184** This subclass is indented under subclass 183. Apparatus in which the working fluid passage means provided in the working member comprises the slot in which a vane moves incident to the expansion and contraction of the working chamber.
- 185** This subclass is indented under subclass 183. Apparatus in which the fluid passage means is provided with a movable flow restrictive means for controlling the flow of working fluid to or from the working chamber.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 42, for a speed controlled flow restrictive means positioned on or within an inner rotating member to control working fluid flow.
- 186** This subclass is indented under subclass 183. Apparatus in which the working member is provided with passage means through which working fluid passes enroute to and from the working chamber.

- 187** This subclass is indented under subclass 186. Apparatus wherein the passage means includes at least one working fluid passage passing through or including the working member axis of rotation.
- 188** This subclass is indented under subclass 183. Apparatus wherein the passage means includes at least one working fluid passage passing through or including the working member axis of rotation.
- 189** This subclass is indented under the class definition. Apparatus in which the rotating working member either engages another rotating member or a cylinder casing or part thereof thereby barring the passage of working fluid therepast and a relief passage is provided at the convergence of these elements for the removal of the unexhausted residual working fluid normally confined thereat in the operation of the device.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
183, and the subclasses thereunder for devices in which the working fluid enroute to or from the working chamber passes through at least a portion of the rotating working member.
- 190** This subclass is indented under subclass 189. Apparatus wherein at least one of the rotating members has peripheral lobed portions altered to allow for the escape of fluid when in meshing relationship with the other rotating member.
- 191** This subclass is indented under the class definition. Apparatus in which a plurality of members rotating about fixed or substantially fixed axes have surface portions disposed to maintain or substantially maintain line contact therebetween against which pressure fluid reacts to thereby form a boundary of the working chamber; at least one of the rotating members being a working member.
- (1) Note. Included herein are rotating members rotating about spaced axes, each having portions thereof sweeping a separate one of intersecting channels which have radially inward and outward stationary working chamber surface, the chambers intersecting at a common line of tangency whereat each rotating member may act as an abutment for the other as the members rotate.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
125+, for a roller means incidentally forming a part of the working chamber and functioning merely to perfect the seal relationship between the working member and the cylinder at the convergence of their surfaces whereby a boundary of the working chamber is formed thereby.  
189+, for rotary expansible chamber devices of the interengaging rotary members type in which provision is made for relieving trapped fluid.
- SEE OR SEARCH CLASS:  
73, Measuring and Testing, subclass 261, for expansible chamber rotary piston meters having interengaging pistons and see the search notes thereunder.
- 192** This subclass is indented under subclass 191. Apparatus in which in addition to the interengaging rotating members there is provided a relatively movable partition element having engagement with either (1) both rotating members or (2) with one of the rotating members and the cylinder, the partition element thereby forming a wall of the working chamber and moving incident to the expansion and contraction of the working chamber.
- 193** This subclass is indented under subclass 192. Apparatus wherein the displaceable partition element is moved in a direction along or parallel to the axis of rotation of the working member of which it is a part.
- 194** This subclass is indented under subclass 101. Apparatus in which each of the coating rotating members comprises an elongate circumferential surface complementary to the other and progressively enlarged or reduced from end to end thereof.
- 195** This subclass is indented under subclass 191. Apparatus in which the axes of a working member and at least one other coating rotating member are not parallel.

- 196** This subclass is indented under subclass 191. Apparatus having three or more rotating members at least one of which has a peripheral surface engaging the peripheral surface of two or more other rotating members.
- 197** This subclass is indented under subclass 196. Apparatus in which the peripheral surfaces of the interengaging rotary members are formed with intermeshing teeth or ribs and grooves either in the form of a helix or discontinuous, angularly related, straight line segments (i.e., herringbone shape).
- 198** This subclass is indented under subclass 191. Apparatus in which at least one of the rotating members partakes of a step by step rotary movement.
- SEE OR SEARCH CLASS:  
74, Machine Element or Mechanism, appropriate subclasses, for mechanical movements providing for step by step rotation.
- 199** This subclass is indented under subclass 191. Apparatus comprising two or more spaced apart sets or groups of interengaging rotary members each set or group being, per se, capable of performing a pump or motor operation.
- 200** This subclass is indented under subclass 199. Apparatus including a plurality of sets of interengaging rotating members which are longitudinally spaced and at least one rotating member of each set rotating on a common axis.
- 201.1 Helical or herringbone:**  
This subclass is indented under subclass 191. Apparatus wherein the surface portions of the interengaging rotary member are formed with intermeshing teeth or ribs and grooves, the teeth or ribs and grooves being in the form of a helix or discontinuous, angularly related, straight line segment (i.e., herringbone shape).
- 201.2 With valve:**  
This subclass is indented under subclass 201.1. Apparatus wherein there is provided a means to regulate fluid flow.
- 201.3 Having specific tooth shape:**  
This subclass is indented under subclass 201.1. Apparatus wherein the teeth or ribs and grooves have an explicitly set forth form.
- 202** This subclass is indented under subclass 201.1. Apparatus in which each rotating member includes axially spaced ribs or grooves extending thereabout in reverse directions.
- 203** This subclass is indented under subclass 201.1. Apparatus in which the device is provided with a means for applying an axial force to at least one of the members in opposition to an axial force produced by the member in the operation of the device.
- (1) Note. It is not considered that thrust bearings or the like are force applying means for classification here. Such devices have been classified on other features.
- 204** This subclass is indented under subclass 191. Apparatus in which at least one rotating member has a substantially circular periphery and is affixed to its shaft to rotate therewith on an axis other than its central or symmetrical axis.
- 205** This subclass is indented under subclass 191. Apparatus in which each of the interengaging rotary members has the same dimensions and configurations.
- 206.1 Having each radial protuberance of like dimension:**  
This subclass is indented under subclass 205. Apparatus in which each tooth or toothlike projection of the interengaging rotary members has the same dimensions and configurations.
- (1) Note. Teeth or projections having the same dimensions and configurations except that they are mirror images of each other are considered proper subject matter for inclusion here.
- 206.2 With timing gear adjustment or arrangement:**  
This subclass is indented under subclass 206.1. Apparatus in which a means to coordinate the rotation of the interengaging members can be realigned or has a particular configuration.

- 206.3 With heating or cooling:**  
This subclass is indented under subclass 206.1. Apparatus comprising means to vary the temperature of the apparatus.
- 206.4 Having specific inlet or outlet port shape:**  
This subclass is indented under subclass 206.1. Apparatus in which the entrance or exit to a chamber has a particular configuration.
- 206.5 Having specific rotor or tooth shape:**  
This subclass is indented under subclass 206.1. Apparatus in which the interengaging members have an explicitly set forth form.
- 206.6 With sealing means:**  
This subclass is indented under subclass 206.1. Apparatus comprising means to prevent leaking of the working fluid.
- 206.7 With bearings:**  
This subclass is indented under subclass 206.1. Apparatus comprising means to support, guide, and reduce the friction between moving parts.
- 206.8 With lubrication:**  
This subclass is indented under subclass 206.1. Apparatus comprising a means for supplying a substance between moving parts that reduces friction.
- 206.9 Using specific material:**  
This subclass is indented under subclass 206.1. Apparatus wherein the chamber or the rotary interengaging members are composed of a particular substance.
- 207** This subclass is indented under the class definition. Apparatus in which there is provided a plurality of circular paths or chambers each of which has movable member therein having movement relative thereto and relative to each other, the circular paths or chambers include a portion common to each and the working chamber being formed in part by a surface of one of the movable members and an end surface or face of another movable member as the movable members alternately move across the common path, or chamber portion.
- 208** This subclass is indented under the class definition. Apparatus in which there is provided a movable partition element having end portions
- in touching relationship with the peripheries of a plurality of spaced parallel working members thereby form a boundary of the working chamber or chambers against which working fluid react.
- 209** This subclass is indented under the class definition. Apparatus comprising two or more working chambers, each chamber being adapted to receive either a separate rotating working member or a separate working face or wall of a rotating member common to each working chamber.
- 210** This subclass is indented under subclass 209. Apparatus having a plurality of spaced members rotating about the same or different axis, at least one of the members being spaced in the direction of or along the rotational axis of another one of the rotating members.
- 211** This subclass is indented under subclass 210. Apparatus provided with either a vane or an abutment movable in a direction along or parallel to the axis of rotation of the rotating members and movable incident to the expansion and contraction of the respective working chambers or working chamber portions.
- 212** This subclass is indented under subclass 210. Apparatus in which a divider element is interposed between adjacent sides of the rotating members for engagement or substantial engagement therewith.
- 213** This subclass is indented under subclass 212. Apparatus in which there is provided three or more rotating members and a separate divider element is interposed between adjacent ends of adjacent rotating member pairs.
- 214** This subclass is indented under subclass 212. Apparatus in which there is provided at least one partition or abutment member for each of the spaced working members against which working fluid reacts and means is provided to engage a partition member of one working member with a partition member of another working member so that a movement of one of the partition members causes a concurrent movement of the other partition member.

- 215** This subclass is indented under subclass 209. Apparatus wherein the chambers are axially spaced.
- 216** This subclass is indented under subclass 215. Apparatus in which there is provided in each working chamber a working member or a working portion thereof in the form of a helix, the helix extending along or generally parallel to the working member axis of rotation.
- (1) Note. Devices in which a working chamber is partitioned by a member in the form of a helix so that a working chamber is formed on each side thereof are considered proper for classification here.
- 217** This subclass is indented under subclass 215. Apparatus in which either an abutment or a vane is movable along or parallel to the axis of rotation of the working member.
- 218** This subclass is indented under subclass 217. Apparatus in which the moving vane or abutment is mounted to move incident to the expansion and contraction of the working chamber about an axis other than either (1) the axis of rotation of the working member or (2) an axis parallel thereto.
- 219** This subclass is indented under subclass 217. Apparatus provided with a vane that is movable in a direction along or parallel to the axis of rotation of the rotating members.
- 220** This subclass is indented under the class definition. Apparatus in which the working member is provided with a continuous circumferential working portion in the form of a helix extending from one end to the other end thereof.
- 221** This subclass is indented under the class definition. Apparatus in which there is provided a displaceable abutment and a displaceable vane, each of which moves incident to the expansion and contraction of the working chamber.
- 222** This subclass is indented under the class definition. Apparatus in which an abutment comprises a plurality of relatively movable elements or portions which part to allow a working portion of the working member to pass therebetween.
- 223** This subclass is indented under the class definition. Apparatus having a vane or abutment which moves incident to the expansion and contraction of the expansion chamber, said vane or abutment having primary means and separate and distinct supplemental means to move the vane or abutment.
- (1) Note. Neither centrifugal force nor the weight of a vane or abutment is considered to be either a primary or a supplementary moving means.
- (2) Note. The supplementary moving means may concurrently with the primary moving means move the vane or abutment or it may move idly in its prescribed path of movement in lagging relationship with the primary moving means to move the vane or abutment only when the primary moving means fails.
- 224** This subclass is indented under the class definition. Apparatus in which there is provided a valve means mounted on a working fluid partition element of the device.
- 225** This subclass is indented under the class definition. Apparatus in which either an abutment or a vane comprises or includes a rotatable anti-friction member to engage the working member or the cylinder respectively.
- 226** This subclass is indented under subclass 225. Apparatus in which the vane or abutment has rotation about an axis either other than the working member axis of rotation or an axis parallel thereto.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
 195, for interengaging rotating members having nonparallel axis of rotation.  
 198, for interengaging rotary members wherein at least one of the rotary members is intermittently rotated.
- 227** This subclass is indented under subclass 225. Apparatus wherein the abutment or vane is mounted for rotation on the cylinder or working member respectively and is urged to have

- relative rotation with the element (cylinder or working member) to which it is mounted by means other than the surface of the other element.
- 228** This subclass is indented under the class definition. Apparatus in which a vane or abutment moves or has a component of movement in a direction along or parallel to the axis of rotation of the working member incident to the expansion and contraction of the working chamber.
- 229** This subclass is indented under subclass 228. Apparatus wherein the vane or abutment has to-and-fro straight line movement along or parallel to the working member axis of rotation.
- 230** This subclass is indented under subclass 229. Apparatus in which the vane or abutment is positively moved in at least one direction by means other than the cylinder or working member surface respectively or another vane or abutment and is moved incident to the expansion and contraction of the working chamber.
- 231** This subclass is indented under subclass 230. Apparatus in which the vane or abutment is positively moved in both directions.
- 232** This subclass is indented under subclass 231. Apparatus in which the axially sliding vane or abutment is urged to move in one of the directions by either a resilient mechanical means or a nonsolid pressurized substance.
- 233** This subclass is indented under subclass 228. Apparatus comprising a movable vane which has oscillatory movement about an axis normal to and intersecting the working member rotational axis.
- 234** This subclass is indented under the class definition. Apparatus comprising a vane or abutment which has (1) nonparallel or (2) semi-circular surface portions to engage adjacent surface portions of a vane or abutment slot respectively, in which it moves incident to the expansion and contraction of the working chamber.
- 235** This subclass is indented under the class definition. Apparatus in which the rotary expandible chamber device is of the sliding vane type and included in the vane slot thereof for engagement with the vane is either an insert of suitable material to absorb wear or a rolling means for the prevention of wear.
- SEE OR SEARCH THIS CLASS, SUBCLASS:**
- 104, for a biased insert providing a seal means between the vane and the vane slot.
- 241, for oscillating bearings mounted in walls of the working member through which vanes slide.
- 236** This subclass is indented under the class definition. Apparatus in which there is provided either a movable vane or abutment that slides relative to the working member or cylinder respectively in a direction generally toward or away from the axis of rotation and other than in a radial plane containing the axis of rotation of the working member.
- (1) Note. A sliding vane or abutment is considered to slide radially when a plane thereof including or parallel to the plane of a side face thereof is coincident with a radial plane of the working member. Where the sliding vane or abutment has nonparallel sides, it is considered to slide radially if the median plane thereof is coincident with the radial plane of the working member.
- 237** This subclass is indented under subclass 236. Apparatus wherein the sliding vane or abutment moves in an arcuate path.
- 238** This subclass is indented under subclass 236. Apparatus in which the vane or abutment is urged to move at least in one direction in the operation of the device by means other than the surface of the cylinder or working member respectively, another vane or abutment or the weight of the vane or abutment and is moved incident to the expansion and contraction of the working chamber.
- 239** This subclass is indented under the class definition. Apparatus in which there is provided a plurality of partitioning members or partitioning member portions in which either (1) at least one of the partitioning members remains in a nonworking position while at least one other

- partitioning member performs work when the working member is rotating in one direction and vice versa or (2) a partitioning member having portions alternately movable to either one of two positions to perform work whereby the direction of working member rotation may be reversed.
- 240** This subclass is indented under the class definition. Apparatus in which the cylinder is provided with a plurality of moving abutments thereon, one of said abutments being connected to at least one other abutment to move concurrently therewith.
- 241** Apparatus under the class in which either a generally radially sliding vane or abutment is mounted respectively to the working member or to the cylinder to have simultaneous oscillating movement in the direction of rotation of the working member.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
138, for similar devices in which there is an oscillating seal element between the vane and working member.
- 242** This subclass is indented under the class definition. Apparatus provided with an abutment having spaced working member periphery engaging end portions rockable about an axis and in the plane of rotation of the working member, the abutment being moved in each direction by the abutment end portions incident to the expansion and contraction of the working chamber.
- 243** Apparatus under the class having a moving abutment which is urged to move in at least one direction by means other than the working member surface, weight of the abutment or another abutment and is moved incident to the expansion and contraction of the working member.
- 244** This subclass is indented under subclass 243. Apparatus wherein the abutment is moved in at least one direction by coacting elements one of which has a surface or groove of irregular contour for controlling the movement of another element and the abutment associated therewith.
- (1) Note. A mere eccentric, i.e., a circular surface rotating about an offset axis is not a cam under this definition. See subclass 247 for an abutment that is actuated by an eccentric.
- 245** This subclass is indented under subclass 244. Apparatus wherein the abutment is moved in each direction by the coacting elements.
- 246** This subclass is indented under subclass 244. Apparatus in which either a resilient mechanical device or a nonsolid pressurized substance sequentially urges the abutment to return to an initial position whereupon the abutment may again be moved by the irregularly contoured groove or surface.
- 247** This subclass is indented under subclass 243. Apparatus in which the abutment is urged to move in each direction.
- 248** This subclass is indented under subclass 243. Apparatus in which the abutment is urged into engagement with the working member by a resilient mechanical means.
- 249** This subclass is indented under subclass 243. Apparatus wherein fluid under pressure exerts a force upon the abutment to move it into engagement with the working member.
- 250** This subclass is indented under subclass 249. Apparatus wherein the abutment is provided with working member abutable portions extending from a common pivot and oscillating in a common plane and each abutable portion being adapted to engage the working member whereby the working member may be rotated in either direction.
- 251** This subclass is indented under subclass 249. Apparatus in which the abutment is provided with a fluid passage means through which working fluid passes enroute to or from the working chamber.
- 252** This subclass is indented under the class definition. Apparatus in which the working member is provided with a vane and the cylinder encasing the working member is provided with either a normally closed port means through which the vane or a portion thereof may be

- replaced, the replacement of the vane being performed without dismantling the device.
- 253** This subclass is indented under the class definition. Apparatus in which the working member is provided with a plurality of vanes thereon, one of said vanes being connected to at least one other vane to move concurrently therewith.
- (1) Note. Each vane may be an end portion of a common blade-like member.
- (2) Note. An element other than the working member, shaft or cylinder interposed between or encompassing a plurality of vanes or abutments and having an abutting or restraining relationship with adjacent ends of two or more vanes or abutments whereby to maintain the vanes in a desired spatial relationship is considered to connect the vanes or abutments and proper for classification here.
- 254** This subclass is indented under subclass 253. Apparatus in which two or more vanes are rigidly connected to each other for simultaneous movement.
- 255** This subclass is indented under subclass 254. Apparatus in which each of two vanes lies in a common plane passing substantially through the center of the working member.
- 256** This subclass is indented under subclass 253. Apparatus in which a plurality of radially movable vanes have their divergent end portions engageable by a movable element encircling the same to control outward movement of the vanes whereby to simultaneously maintain either a desired clearance or close fitting engagement of the blades with the cylinder wall surface.
- 257** This subclass is indented under subclass 253. Apparatus wherein an element is provided to engage adjacent inner ends of a plurality of vanes to simultaneously urge and maintain the vanes in cylinder wall engagement.
- 258** This subclass is indented under subclass 257. Apparatus wherein the interposed member is a resilient mechanical device.
- 259** This subclass is indented under the class definition. Apparatus in which a working member is provided with a vane moved in at least one direction by means other than the weight of the vane, centrifugal force or the cylinder wall surface and moving incident to the expansion and contraction of the working chamber.
- 260** This subclass is indented under subclass 259. Apparatus in which the vane is moved in at least one direction by coating elements one of which has a surface or groove of irregular contour for controlling the movements of the other element and the vane associated therewith.
- (1) Note. A circular surface is not considered to have an irregular contour and is not a cam under this definition.
- 261** This subclass is indented under subclass 260. Apparatus in which the vane is positively moved in each direction.
- (1) Note. The vane movement in the opposite direction may be performed by the cam or by other positive vane moving means.
- 262** This subclass is indented under subclass 261. Apparatus in which the other element of the coating elements comprises or includes a pivoted link member intermediate the first mentioned element and the vane.
- 263** This subclass is indented under subclass 261. Apparatus in which either a resilient mechanical means or a nonsolid pressurized substance urges the vane in the other direction.
- 264** This subclass is indented under subclass 261. Apparatus wherein the other element is provided with a rotatable antifriction means to engage the surface or groove of irregular contour.
- 265** This subclass is indented under subclass 259. Apparatus in which the vane is moved in both directions.
- 266** This subclass is indented under subclass 259. Apparatus wherein the vane is positively urged in one direction, usually into engagement with

the cylinder wall surface, by a resilient mechanical means.

**267** This subclass is indented under subclass 266. Apparatus wherein fluid under pressure assists the resilient mechanical means to urge the vane into cylinder wall engagement.

**268** This subclass is indented under subclass 259. Apparatus wherein the vane is urged into engagement with the cylinder wall surface by pressure fluid.

(1) Note. A vane having a lateral lip or flange portion at its cylinder surface contacting end which is acted upon by fluid pressure to maintain a vane in sealing engagement with the cylinder wall surface is not considered to be fluid urged and classification is based on other features.

**269** This subclass is indented under subclass 268. Apparatus in which a plurality of vanes have their opposed inner surfaces continuously subject to fluid pressure in a zone of fluid pressure common to each to maintain the vanes in cylinder wall engagement.

**270** This subclass is indented under the class definition. Subject matter not otherwise provided for.

END