

1	METHOD OF OPERATION	19	.Including control of starting motor or runner blade starting position
2.1	WITH MEANS FOR CONTROLLING CASING OR FLOW GUIDING MEANS IN RESPONSE TO NATURAL FLUID CURRENT FORCE OR DIRECTION	20	.Control of working fluid and diverse apparatus part
3.1	.Having specific features for water current	21	..Diverse part is runner portion or connection to shaft
4.1	.Natural fluid current force responsive	22	...Runner bypass from inlet controlled
4.2	..Vertical runner axis	23	.Responsive to working fluid discharge angle from blade or vane
4.3	..Axial flow runner		
4.4	.Vertical runner axis		
4.5	.Axial flow runner	24	.Responsive to liquid level or weight
5	ENDLESS FLEXIBLE RUNNER (E.G., CHAIN, ETC.)	25	.Centrifugally initiated valve controlling fluid flow in shaft or runner
6	CYCLICALLY DIPPING, LIQUID RETAINING, ELEVATING AND DISCHARGING RECEPTACLE OR CONDUIT	26	.Responsive to moving member developed fluid force, current or pressure
7	FLOAT SUPPORTED OR BUOYANT RUNNER	27	..Of relief valve in branched pump discharge line
8	DRIVEN, FLUID IMMersed RUNNER WITH VANE IN UNCONFINED FLUID STREAM (E.G., TROLLING PLATE, ETC.)	28	..Of valve bypassing runner stage
		29	..Motor and upstream working fluid flow control
9	INCLUDING DESTRUCTIBLE, FUSIBLE, OR DEFORMABLE NON-REUSABLE PART	30	.By shaft speed or torque responsive means
10	WITH CONTROL MEANS RESPONSIVE TO MOTION DEVELOPED FLUID EDDY, ELECTRICAL, OR MAGNETIC EFFECT	31	..Helix or screw runner
		32	..Including reset or manual adjustment
11	WITH PUMP RECIRCULATION PASSAGE CONTROL RESPONSIVE TO WORKING FLUID CONDITION OR CHARACTERISTIC	33	..Of adjustable runner, blade, shaft or bearing
		34	...Axially shifted runner, shaft or bearing
12	WITH BIMETALLIC BLADE, VANE, OR ADJUSTMENT MEANS THEREFOR	35	..Of movable deflector intermediate jet discharge and runner
13	WITH CONTROL MEANS RESPONSIVE TO NON-CYCLIC CONDITION SENSING, CENTRIFUGAL ACTUATION OR TORQUE	36	..Of working fluid valve or vane
		37	...Including valve in interstage or re-entry passage
14	.Casing, runner, or shaft position or extent of motion responsive	38	...Plural passages with sequential or reverse fluid control
15	.With input signal of independent condition	39	...Inlet and relief or bypass valves
16	.With testing means for speed control	40	...Fluid motor operated valve
		41	...With latch means for valve actuator
17	.Plural diverse condition responsive (e.g., temperature and pressure, speed and level, etc.)	42	...Actuated by runner or separate motor
		43	...Fluid servo-motor and speed responsive means actuated pilot valve
18	.Control of clutch or brake surface		

44	...Multiple working fluid inlets to runner	57.1	.Plural, independent, serially acting re-entry means
45	...On same radial plane with blade	57.2	..Having additional blade set in re-entry path
46	...Downstream of runner	57.3	..Re-entry from opposite sides of blade face
47	.Temperature or fluid force responsive member	57.4	..Re-entry into blade in radial plane of blade
48	..For adjustment of runner, shaft, vane or blade	58.1	.Having additional blade set in re-entry path
49	..Fluid force responsive member controls working fluid	58.2	.Radial flow runner portion guides re-entry working fluid (e.g., hub, back plate, etc.)
50	...For a plurality of runners	58.3	..Runner inlet shroud
51	WITH INDEPENDENTLY OPERATED TIMER OR PROGRAMMER ACTUATOR FOR WORKING FLUID CONTROL	58.4	.Re-entry working fluid joins inlet working fluid upstream of runner
52.1	WITH MEANS FOR RE-ENTRY OF WORKING FLUID TO BLADE SET (E.G., RE-ENTRY TYPE DEVICE, PASSAGE, ETC.)	58.5	..Axial flow runner
53.1	.Cross flow runner	58.6	.Open recirculation from and to blade set
53.2	..Having vane or deflector within runner blade set	58.7	.Axial flow runner
53.3	..Having selectively adjustable vane or working fluid control means	59.1	.Plural blade sets
54.1	.To opposite face of blade	60	PLURAL RUNNERS SUPPORTED FOR RELATIVE MOTION OR ON SEPARATE SHAFTS
55.1	.Turbine regenerative pump	61	.With means for selective runner operation or drive shaft connection
55.2	..Having specific means to deflect working fluid in regenerative passage	62	.Diverse type runners, blade systems or working fluid paths in runners
55.3	..Means extends parallel to passage	63	..Including internally passaged runner with reaction type jet discharge nozzle
55.4	...Positioned at passage end (e.g., stripper seal, etc.)	64	.Radial flow through concentric radially spaced blade rows
55.5	..Having plural, rigidly related blade sets	65	.Interdigitated, oppositely extending, coaxial, axially spaced blade rows
55.6	...Acting serially but nonalternating (e.g., multistage, etc.)	66	.Serially spaced in working fluid flow path
55.7	...In separate regenerative passages	67	..With initial fluid flow path to each runner
56.1	.Pump priming means	68	..Coaxial runners
56.2	..Vertical runner shaft	69	...One runner support surrounds another
56.3	..Having plural and arcuately arranged vanes around runner	70	RUNNER HAS PLANETARY MOTION OR ROTATES AROUND OBLIQUE OR CONSTANTLY MOVING AXIS
56.4	..Re-entry through working fluid discharge passage for runner	71	RUNNER HAS SPIRALLY ARRANGED BLADE OR FLUID PASSAGE
56.5	..Re-entry working fluid joins inlet working fluid upstream of runner	72	.Extending along runner axis (i.e., axial flow)
56.6	..Walled pumping chamber positioned within liquid separation chamber	73	..Fluid conducting passage

74	..With additional impingement means in fluid flow path	100	...Serially arranged in working fluid path
75	..Motor runner	101	.Plural, separate, parallel, simultaneous flow paths
76	FLUID FLOW BETWEEN PLURAL SINUOUS RUNNER SURFACES	102	..Towards each other and common exhaust
77	AXIAL FLOW RUNNER WITH BLADES EXTENDING RADIALY INWARD AND OUTWARD FROM COMMON ANNULUS	103	..Plural, axially spaced blades in each path
78	.With means selecting only one blade row for working fluid flow	104	WITH SHAFT CONNECTED FLUID FORCE SUBJECTED THRUST BALANCING SURFACE
79	.Serial flow through inward and outward extending blade rows	105	.In separate chamber having non-system fluid inlet
80	MOTOR RUNNER MOTIVATED BY REACTION TYPE JET DISCHARGE NOZZLE FROM INTERNAL WORKING FLUID CONDUIT	106	.Fluid force on opposite face of blade or blade support member
81	.With additional rotary, fluid impinged blades	107	.Motor shaft
82	.With control of runner speed or direction	108	CASING AND SPACED HOUSING WITH SPACE VENTED TO WORKING FLUID
83	RUNNER WITH ANNULAR BLADE ROWS OR FLUID CHANNELS SPACED ON COMMON RADIAL PLANE	109	WITH SHAFT CONNECTED FLUID ABUTMENT MEMBER IN SEALING FLUID FILLED CHAMBER
84	.Including peripheral blade row	110	WITH LUBRICATING, SEALING, PACKING OR BEARING MEANS HAVING INTERNAL WORKING FLUID CONNECTION (E.G., FLUID OR FLUID BIASED SEAL, ETC.)
85	.With means for reversing runner rotation	111	.For shaft sealing, packing, lubricating or bearing means
86	.Blades projecting axially from plural transverse runner faces	112	..With inlet and outlet connections
87	..From opposed faces of common central disc	113	..Fluid biased, movable or resilient portion
88	PUMP HAVING ROTATING INLET END OR SCOOP IMMERSSED IN LIQUID	114	WITH CHANGING STATE CONFINED HEAT EXCHANGE MASS
89	CENTRIFUGAL BOWL PUMP	115	WITH PASSAGE IN BLADE, VANE, SHAFT OR ROTARY DISTRIBUTOR COMMUNICATING WITH WORKING FLUID
90	SMOOTH RUNNER SURFACE FOR WORKING FLUID FRICTIONAL CONTACT (E.G., UNBLADED RUNNER, ETC.)	116	WITH DIVERSELY ORIENTED INLET OR ADDITIONAL INLET FOR DIVERSE FLUID (E.G., HEATING, COOLING OR MIXED WORKING FLUID, ETC.)
91	ANNULAR RUNNER WITH INWARDLY PROJECTING BLADE	117	.Diverse fluids to motor
92	MOTOR RUNNER HAVING WORKING FLUID TRAPPING POCKET	118	WITH INSPECTION, SIGNALING, INDICATING OR MEASURING MEANS
93	AXIALLY OPPOSED WORKING FLUID PATHS TO OR FROM RUNNER (E.G., END BALANCE, ETC.)	119	WITH SOUND OR VIBRATORY WAVE ABSORBING OR PREVENTING MEANS OR ARRANGEMENT
94	.With working fluid regulation or control means	120	CENTRIPETAL PUMP
95	..For fluid motor	121.1	WITH CUTTER OR COMMINUTOR FOR DEBRIS IN WORKING FLUID
96	.With additional shaft connected end balancing fluid force reactor surface	121.2	WITH SEPARATING MEANS OR GUARD FOR SOLID MATTER IN WORKING FLUID (E.G., DEBRIS, ETC.)
97	.Pump impeller means	121.3	COMBINED
98	..Impeller blades extending from opposite sides of common central support		
99	..Plural axially spaced impellers		

122.1	INCLUDING SHAFT TRANSMISSION TRAIN, BRAKE, CLUTCH, OR ATTENDANT ACTUATED DRIVE MEANS	146	INCLUDING WORKING FLUID FORCE RESPONSIVE VANE OR FLOW CONTROL
123	.Brake or clutch	147	.Upstream of runner
124	.Hand or foot operated crank, pedal or traction wheel	148	SELECTIVELY ADJUSTABLE VANE OR WORKING FLUID CONTROL MEANS
124.1	.Runner supported portion engages shaft transmission train (e.g., peripheral gear drive, etc.)	149.1	.Separate means upstream and downstream of blade set
124.2	.Shaft transmission train having flexible means or coupling	149.2	..Including axial flow blade set
125	INCLUDING MEANS TO CAUSE CYCLICAL MOVEMENT OF A PART (E.G., BLADE, VALVE, ETC.)	149.3	...Means to reverse flow through blade set
126	INCLUDING CASING PART SELECTIVELY MOVABLE RELATIVE TO FIXED SUPPORT	149.4	...Plural, selectively adjustable, alternating vane assemblies and blade rows (A,B,A,B)
127	.Circularly around fixed runner axis	150	.Runner, shaft, or separate motor operated
128	.Separate liner portion	151	.Upstream of runner
129	RUNNER OR BLADE SELECTIVELY ADJUSTABLE RELATIVE TO CASING	152.1	..Motor runner with selective inlet paths for reversible rotation
130	.Relatively angularly adjustable plural blades or runners	152.2	...Runner includes radial flow blade set
131	.Axially adjusted	153.1	...Separate runner blade set acted upon for reverse rotation
132	..Shaft end supported on movable bearing	153.2	...Axial flow blade set
133	.Radially adjusted or centered shaft	154.1	...Plural inlets simultaneously discharging working fluid onto single blade set
134	INCLUDING THERMAL EXPANSION JOINT	154.2	...Axial flow blade set
135	.Resilient	154.3	...Including axial flow blade set
136	.Radially sliding	155	..Plural, independently adjustable
137	..Stator vane in shroud ring opening	156	..Deformable, resilient or resiliently biased
138	..And axial or circumferential expansion	157	..Single, axially movable cylinder or plate
139	.Circumferentially spaced nozzle or stator segments	158	...Movable to position surrounding blade
140	RESILIENT OR MOVABLY MOUNTED BLADE PORTION OR AXIALLY MOVABLE RUNNER OR SHAFT	159	..Plural and arcuately or circularly arranged around runner axis
141	.Yieldingly or pivotedly mounted or flexible blade	160	...Individually pivoted vanes
142	SHAFT BEARING COMBINED WITH OR RETAINED BY ARM OR VANE IN SURROUNDING WORKING FLUID SPACE	161	...And fixed vane
143	PLURAL RUNNERS HAVING DIFFERENT TYPE FLOW PATHS	162	...Plural, selectively adjustable vane sets
144	WORKING FLUID BYPASS	163	...Pivoted parallel to runner axis
145	.Selectively adjustable vane or working fluid control for bypass	164Vaness and blade in same radial plane
		165	...On same radial plane with blade
		166	...Circumferentially movable around shaft

167	..Movable pipe or nozzle	177	INCLUDING HEAT INSULATION OR EXCHANGE MEANS (E.G., FINS, LAGGING, ETC.)
167.1	..Convertible series-parallel pump		
168.1	INCLUDING MEANS FOR HANDLING WORKING FLUID LEAKAGE	178	.Working fluid on at least one side of heat exchange wall
168.2	..Leakage through seal between runner or shaft and static part	179	..Interstage heat exchanger
168.3	..Screw type pumping seal	180	.Cooling fluid contacts shaft, seal or bearing
168.4	..Means specific to axial flow runner	181	MEANS, DISPOSITION OR ARRANGEMENT FOR CAUSING SUPERSONIC WORKING FLUID VELOCITY
169.1	INCLUDING MEANS FOR HANDLING PORTION SEPARATED FROM WORKING FLUID	182.1	WORKING FLUID PASSAGE OR DISTRIBUTING MEANS ASSOCIATED WITH RUNNER (E.G., CASING, ETC.)
169.2	..Moisture or liquid separated from gaseous working fluid e.g., condensate removal, etc.)	183	.Plural distributing means immediately upstream of runner
169.3	..Vane having specific moisture or liquid directing surface	184	..Inlet scrolls, or distributors within inlet scroll
169.4	..Axial flow blade set and area for collecting moisture or liquid thrown radially outward	185	..Arcuately or circularly arranged around runner axis
170.1	BEARING, SEAL, OR LINER BETWEEN RUNNER PORTION AND STATIC PART	186	...On radial plane with runner blade
171.1	..Dynamically created seal	187	...Plural, axially spaced sets of distributors
172.1	..Means to seal radial flow pump runner inlet from outlet	188	...Radially inward of blade
173.1	..Between blade edge and static part	189	...Removably secured or mounted in casing
173.2	..Selectively adjustable	190	...Axially arranged securing or mounting means
173.3	..Resilient, flexible, or resiliently biased	191	...Vaness
173.4	..Erodable or permanently deformable	192	...Differentially twisted about radial axis
173.5	..Labyrinth seal	193	...Plural, axially spaced vane sets
173.6	..Between blade supported radial tip ring and static part	194Diverse size or spacing in different spaced vane sets
173.7	..Between axial flow runner and vane or vane diaphragm structure	195	...Varied spacing between vanes in same set
174.1	..Selectively adjustable	196	.Passage or casing attached removable liner or wear member
174.2	..Resilient, flexible, or resiliently biased	197	..Nonmetallic material
174.3	..Seal lies against axial face of runner hub	198.1	.Plural rigidly related blade sets
174.4	..Erodable or permanently deformable	199.1	..Including serial radial flow blade sets and intermediate stationary flow diverter(s)
174.5	..Labyrinth seal	199.2	...Wherein the diverter includes divider vane(s) between the blade sets
175	INCLUDING ADDITIONAL MEANS CAUSING OR CONTROLLING FLUID FLOW FOR HEAT EXCHANGING, LUBRICATING OR SEALING	199.3	...Including spirally configurated vane(s)
176	..Means subjected to or is working fluid	199.4	..Including an axial-flow blade set

199.5	...Plural serial axial-flow blade sets with intermediate stationary flow diverter(s)	217.1	.With runner having corrosion resistant or nonmetallic portion
199.6	...And radial-flow blade set in series therewith	218.1	.With runner having conical hub including small diameter facing upstream
200	.Specific casing or vane material	219.1	.Casing with axial, conical flow runner
201	.Access opening through portion of casing or cover	220	.Casing with axial flow runner
202	.Nozzle discharging onto motor runner	221	..Having specific features for liquid flow
203	.Casing having tangential inlet or outlet (i.e., centrifugal type)	222	..Pump with casing narrowing to runner
204	..Scroll-type casing	223	..Having runner in orifice of radially extending partition or casing element
205	...Inlet scroll	224	.Casing with nonradial flow runner (e.g., circumferential flow, etc.)
206	..Axially directed inlet and tangential outlet	224.5	.Radial flow casing having vaneless annulus diffuser
207	.Pump outlet or casing portion expands in downstream direction	225	.Exit chamber in radial plane axially offset from runner (e.g., sludge pump, etc.)
208.1	.Vane or deflector	226	.Annular exit chamber outward of runner
208.2	..Plural and arcuately or circularly arranged in radial plane around runner axis	227	.Runner having flow confining continuous passage
208.3	...Plane intersects with runner blade	228	.Runner having full circular shroud for blades
208.4	...Plural, radially spaced vane sets	229	BEARING, SEAL, OR LINER BETWEEN SHAFT OR SHAFT SLEEVE AND STATIC PART
208.5	...Nonradial flow runner	230	.Seal
209.1	...Plural, axially spaced vane sets acting successively or having specific spacing means	231	..Resiliently biased
209.2	..Having means for mounting diaphragm or plural vane holder to casing	232	MISCELLANEOUS
209.3	...Having specific vane mounting means		
209.4	...Vane fixed between radially separate surfaces		
210.1	...Fixed between radially separate surfaces		
211.1	..In radial plane with runner blade	<u>CROSS-REFERENCE ART COLLECTIONS</u>	
211.2	..Downstream of runner	900	ROTARY BLOOD PUMP
212.1	.Scroll or helical type casing with specific exit nozzle	901	DRILLED WELL-TYPE PUMP
213.1	.Casing with mounting means	902	ROTARY PUMP TURBINE PUBLICATIONS
214.1	.Casing having multiple parts releasably clamped (e.g., casing seal, etc.)	903	WELL BIT DRIVE TURBINE
215.1	.Casing having multiple parts welded, cemented, or fused	904	TOOL DRIVE TURBINE (E.G., DENTAL DRILL, ETC.)
216.1	.With runner shaft of specific shape or material	905	NATURAL FLUID CURRENT MOTOR
		906	.Having specific features for water current
		907	.Vertical runner axis
		908	.Axial flow runner
		909	AIR STACK OR SHAFT HAVING NATURAL FLUID CURRENT MOTOR

- 910 REVERSIBLE BETWEEN PUMP AND MOTOR
USE
- 911 PUMP HAVING REVERSIBLE RUNNER
ROTATION AND SEPARATE OUTLETS
FOR OPPOSING DIRECTIONS OF
ROTATION
- 912 INTERCHANGEABLE PARTS TO VARY
PUMPING CAPACITY OR SIZE OF
PUMP
- 913 INLET AND OUTLET WITH CONCENTRIC
PORTIONS
- 914 DEVICE TO CONTROL BOUNDARY LAYER
- 915 PUMP OR PORTION THEREOF BY
CASTING OR MOLDING
- 916 PERPETUAL MOTION DEVICES

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