1 R **MISCELLANEOUS**
1 A .Fuels, lubricants and additives
2 **COMBINED DEVICES**
3 .Generating plants
200 **ROTARY**
201 .Reversible
202 .With means to control degree of compression
203 .With combusted gas treatment or handling means
204 .With compression volume means in uninterrupted communication with expansion volume means
205 .With fuel injection means
206 ..And pump or control means
207 ..Into intake port
208 ..Into intake chamber
209 ..Into prechamber
210 .With ignition means
211 ..Plural
212 .With plural compression volume means
213 ..In series
214 .With plural expansion volume means
215 ..In series
216 .With charge treatment means
217 ..Exhaust gas recirculation
218 ..Rotor shape
219 ..Stratification
220 ..Preheating
221 .With transfer means intermediate single compression volume means and single expansion volume means
222 ..Isolated charge in movable transfer element
223 ..Reciprocating or oscillating compression volume means
224 ...Radially spaced from expansion volume means
225 ....Abutment acts as compression means
226 ....Compression means disposed in rotor
227 .....Vane acts as compression means
228 ..Compression volume means circumferentially disposed relative to expansion volume means
229 ...Transfer means in rotor
230 ...Compression volume is also expansion volume
231 ...Vane
232 ...Interengaging rotors
233 ....Nonparallel axes
234 ..Compression volume means axially disposed relative to expansion volume means
235 ...Transfer means in rotor
236 ...Vane
237 ...Abutment
238 ...Interengaging rotors
239 ..Compression volume means radially disposed relative to expansion volume means
240 ...Concentric
241 .With compression, combustion, and expansion in a single variable volume
242 ..Planetating rotor
243 ..Vane
244 ..Abutment
245 ..Alternately approaching and receding elements
246 ...Eccentric interengaging rotors
247 .Only combustion and expansion of charge in engine
248 ..Abutment
249 ..Interengaging rotors
18 R **OSCILLATING PISTON**
18 A .Toroidal cylinder
19 **LIQUID PISTON**
21 **CONVERTIBLE CYCLE**
22 **INTERNAL COMBUSTION AND AIR**
23 **SOLID FUEL**
24 R **GUNPOWDER**
24 A .Single shot gun powder motors
25 R **WATER AND HYDROCARBON**
25 A .Water in charge
25 B .Water plus heat into charge
25 C .Water into cylinder
25 D .Water plus heat into charge
25 E .Water introduced by mixing with other materials
25 F .Water plus heat by mixing with other materials
25 G .Washers and cleaners
25 H .Washers and cleaners with heat
25 J .Automatic water control
25 K .Automatic water control; thermostatic
25 L .Automatic water control; suction
25 M .Automatic water control; speed

25 N .Automatic water control interconnected with throttle
25 P .Steam injection
25 Q .Cooling regulation
26 **ADDITIONAL AIR SUPPLY**
250 **ENGINE MEANS HAVING INTERNAL VAPORIZING IN PRECHAMBER WITH ALL COMBUSTION IN MAIN CHAMBER**
251 .Whirling in prechamber
252 .Vaporizing by a hot surface of prechamber
253 **PRECOMBUSTION AND MAIN COMBUSTION CHAMBERS IN SERIES**
254 .Chamber temperature control means
255 .Vaporizing in precombustion chamber
256 .Plural precombustion chambers
257 .Two-cycle
258 .Having timed valves to precombustion and main combustion chambers
259 .Having volumetric relation between precombustion and main combustion chambers
260 .With ignition means particularly positioned relative to precombustion and main combustion chambers
261 .With injection means particularly positioned relative to precombustion and main combustion chambers
262 .Having fluid whirling means
263 ..Whirling in precombustion chamber only
264 .Precombustion chamber is carried by a valve
265 .Precombustion and main chambers form an "I" head
266 .Precombustion chamber assembly inserted in spark plug hole
267 ..Separate fuel or combustible mixture added to precombustion chamber
268 .Valveless precombustion chamber
269 .Piston shape complements precombustion chamber discharge
270 .Precombustion chamber liner or coating
271 ..With liner mounting means
272 ..Including combustion catalyst liner or coating means
273 .Precombustion chamber mounting means
274 .Having combustible mixture forming means
275 ..By fuel injection into precombustion or main combustion chamber
276 ...Fuel injected into precombustion chamber formed in piston
277 ...By fuel injection into precombustion chamber with carbureted main chamber
278 ...By fuel injection into main chamber with carbureted precombustion chamber
279 .Piston carried precombustion chamber
280 .Atomizer, deflector, or shield in precombustion chamber
281 .Precombustion chamber shape is a figure of revolution
282 ..Figure of revolution is multishaped to form a precombustion chamber
283 ..Cylindrical
284 ..Spherical
285 .Precombustion chamber having a specific shape
286 .Having specific connecting passage means between precombustion and main combustion chambers
287 ..With ignition means in connecting passage
288 ..Having fuel, a combustible mixture, or air added in the connecting passage
289 ..Fluid flow through passage controlled by working piston
290 ...With whirling
291 ...Multiple connecting passages
292 ..With valve means or variable orifice means in the passage
293 ..Having multiple passages
294 **COMBUSTION CHAMBER MEANS HAVING FUEL INJECTION ONLY**
295 .Combustible mixture stratification means
296 .Injector is an integral part of engine valve
297 .Combination igniting means and injector

298 .Injection of fuel onto igniter, deflector, heater, or atomizer
299 .Using multiple injectors or injections
300 ..Alternating multiple injectors (e.g., series injection)
301 .Injected fuel spraying into whirling fluid
302 .Air entering combustion chamber through plural inlets
303 ..Having inlet uncovered by working piston
304 .Injecting diverse fuels or different states of same fuel
305 .Having a particular relationship between injection and ignition characteristics (e.g., nozzle location, spray pattern, timing relative to igniter location, timing)
27 R **BURNING BY HIGHLY COMPRESSED AIR**
27 GE .Gas engines (diesel type) convertible from liquid to gas or operable with liquid and gas
27 A .Oil engine air preheated
OIL ENGINES
.Pump supply to air inlet
37 **MULTIPLE EXPLOSION**
38 **ATMOSPHERIC**
39 **NONCOMPRESSION**
41 R **REVERSIBLE**
41 E .Electrical
41.01 **COOLING**
41.02 .Automatic coolant flow control
41.03 ..Float control
41.04 ..Shutters, air valves, dampers or adjustable cowls
41.05 ...Temperature and engine operation responsive
41.06 ...Servomotor-operated type
41.07 ...Interrelated shutter and throttle control
41.08 ..Valves for fluid coolant
41.09 ...Coolant source bypass
41.1 ....Radiator or condenser source
41.11 ..Air impeller
41.12 ...Temperature-responsive
41.13 .Interrelated coolant flow and throttle control
41.14 .System drained and/or heat-storing
41.15 .Indicators and safety devices
41.16 .Coolant sealed in cylinder valve or piston
41.17 .Coolant released into cylinder or valve passages
41.18 .Convertible
41.19 .Refrigerating cycle
41.2 .With vapor generation and/or condensing
41.21 ..Coolant circulation with condensing
41.22 ...Intake or carburetor connection
41.23 ...Entrained in secondary circuit
41.24 ...From top of jacket to bottom of radiator
41.25 ...Water bypasses condenser
41.26 ...Vapor only circulated
41.27 ...Overflow vent to condenser
41.28 .Multiple cylinders with equalized cooling
41.29 .Parallel flow
41.3 .Mixed air and liquid
41.31 .With cooling of additional parts or materials
41.32 ..With spark plug heat exchange
41.33 ..With lubricant heat exchange
41.34 .Internal cooling of moving parts; e.g., hollow valves, pistons, and movable cylinder
41.35 ..Piston
41.36 ...Telescoping piston and stationary conduits
41.37 ...Hollow piston rod
41.38 ....Wrist pin type; e.g., nonrigidly connected
41.39 ...Side wall opening
41.4 ..Rotary valves
41.41 ..Poppet-type valves
41.42 .Liquid coolants other than water and water treatment
41.43 .Movably mounted tank or radiator
41.44 .With liquid coolant circulating means
41.45 ..Jet pumps
41.46 ..Common drive for pump and fan
41.47 ..Engine shaft driven
41.48 .Devices for cooling liquid by air flow
41.49 ..Fan type
41.5 .Yielding or resilient walls
41.51 .Plural radiators and/or tanks in series
41.52 .Engine or cylinder-mounted heat dissipators
41.53 ..Hopper type
41.54 .With vent

41.55 .Combined
41.56 .Air-cooled
41.57 ..With liquid cooling
41.58 ..Flow-regulating means
41.59 ...Adjustable discharge
41.6 ..Steam dividing vanes, baffles, conduits, or the like for multiple cylinders
41.61 ...Individual deflecting cylinder baffles
41.62 ...Air duct with discharge ports or conduits
41.63 ..With impelling means
41.64 ...Jet type
41.65 ...Fan type
41.66 ....Suction
41.67 ..Jacketed cylinder
41.68 ...Spiral passages
41.69 ..Finned cylinder and/or head
41.7 ..Engine encasing air duct; e.g., cowling
41.71 .Plural materials
41.72 .With jacketed head and/or cylinder
41.73 ..Jet or spray within jacket
41.74 ..Multiple cylinder
41.75 ..Reentrant head
41.76 ..With cooled valve seats or guides
41.77 ...Poppet-type valves
41.78 ...Cylinder side wall valves
41.79 ..With passages, baffles, etc.
41.8 ...Spiral passages
41.81 ..Cylinder jacket supported solely by cylinder
41.82 R ..With head-cooling arrangements
41.82 A ...Composite head
41.83 ..Cylinder detachable
41.84 ...Flanged cylinder or liner
41.85 .Valve seats or guides
41.86 **CRANKCASE VENTILATION**
42 **OSCILLATING CYLINDER**
43 R **ROTATING CYLINDER**
44 R .Radial
44 A ..Wheel
44 B ..Combustion chamber is center of star
44 C ..Two-cycle
44 D ..Valve casing-cylinders have no valves but have ports which register with ports in casing
44 E ..Cam transmission
43 A .Parallel to shaft
43 AA ..Parallel to shaft cam track
43 B .Toroidal cylinders
43 C .Cam transmission
45 R **ROTARY RECIPROCATING PISTON**
45 A .Piston and crankshaft coaxial
46 R **FREE PISTON**
46 A .Two chambers; one piston
46 B .Phasing means between two or more units
46 SC .Single chamber; one piston
46 E .Electric generating means
46 H .Hammer
47 R **VALVED PISTON**
47 A .Charge passes from crankcase through valve in piston
47 AA .Lost motion connection actuates valve
47 AB .Inlet and exhaust valve in piston
48 R **ADJUSTABLE COMBUSTION CHAMBER**
48 A .Piston in head adjusted manually or mechanically
48 AA .Piston in head adjusted
48 B .Piston varied by means in crankshaft, connecting rod or piston
48 C .Cylinder or sleeve-moved
48 D .Auxiliary chamber
50 R **RECIPROCATING CYLINDER**
50 A .Four-cycle
50 B .Two-cycle
51 R **MULTIPLE PISTON, COMMON NONRESTRICTIVE COMBUSTION CHAMBER**
51 A .Four-cycle
51 AA ..Four-cycle separate crankshaft for piston
51 AC ..Two or more combustion chambers between the piston
51 B .Two-cycle
51 BA ..Two-cycle separate crankshaft for piston
51 BB ..Piston offset from crankshaft
51 BC ..Plural combustion chamber and plural piston
51 BD ..Inlet or exhaust ports in two or more planes
52.1 **MULTIPLE CYLINDER**
52.2 .Simultaneous compression, distinct pistons, restricted communication to a single combustion chamber
52.3 ..Four-stroke cycle
52.4 ...Multiple crankshafts
52.5 ..Two-stroke cycle
52.6 ...Multiple crankshafts

53.1 .Cylinder offset from crankshaft axis
53.2 ..Multiple crankshafts
53.3 ..Cylinders opposite
53.4 ...Two-stroke cycle
53.5 ..Crankshaft between parallel cylinders
53.6 .Cylinders having opposing heads
54.1 .Cylinders radiating
54.2 ..Star
54.3 ...Cam on rotary output shaft
54.4 .."V" type
54.5 ...Odd number of cylinders
54.6 ...Six cylinder
54.7 ....Eight cylinder
54.8 .....More than eight cylinder
55.1 ..Semi-radial
55.2 ..Cylinders opposite
55.3 ...Cam on rotary output shaft
55.4 ...Four-stroke cycle
55.5 ....Cylinders opposite and aligned
55.6 ...Two-stroke cycle
55.7 ....Cylinders opposite and aligned
56.1 .Having rotary output shaft parallel to cylinders
56.2 ..Cam on rotary output shaft
56.3 ...Swash plate type
56.4 ....Single bank of cylinders
56.5 ....Motion converting means between two banks of cylinders
56.6 ....Multiple swash plate drive
56.7 ...Single bank of cylinders
56.8 ...Motion converting means between two banks of cylinders
56.9 ...Multiple cam drives
57.1 ..Shaft rotates through piston
58.1 .Cylinders in-line
58.2 ..Locked pistons
58.3 ...Two-stroke cycle
58.4 ..Lengthwise charging
58.5 ...Step piston
58.6 ..Step piston
58.7 ..Cylinder supercharged by pressure pulse of released exhaust gases
58.8 ..Exhaust to next cylinder ready to fire
58.9 ..Oscillating or reciprocating, nonpoppet valve
59.1 ..Rotary valve
59.2 ...Tapered
59.3 ...Sleeve valve
59.4 ...Disc valve
59.5 ..Plural carburetors
59.6 ..Multiple crankshafts
59.7 ..Two-stroke cycle
60.1 .Locked annular piston
DOUBLE-ACTING
61 R .Two-cycle
62 ..Combined pump and motor cylinder
61 V ..Lengthwise scavenging of cylinders from cylinder head to piston
63 .Four-cycle
64 **SIX-CYCLE**
65 R **TWO-CYCLE**
66 .Combined pump and motor cylinder
67 .Divided pump discharge
68 .Pump compression
69 R .Separate air and gas pumps
69 V ..Lengthwise scavenging of cylinder by gas from cylinder head to piston
70 R .Pump and cylinder adjacent
70 V ..Lengthwise scavenging of power cylinder
71 R .Pump and cylinder coaxial
71 V ..Lengthwise scavenging of cylinder from head to piston
71 VA ..Sleeve valve
72 .Pump and cylinder inclined
.Rear compression
73 R ..Crankcase
73 A ...Fuel to crankcase
73 AA ...Ported piston
73 AV ....Valved
73 AB ...Inlet valve in head
73 AC ...Varies compression space
73 AD ...Lubricant oil and fuel mixing devices
73 AE ...Auxiliary piston moves synchronously with piston to enlarge volume of crankcase or incoming charge
73 AF ...Crankcase compression with auxiliary pump means
73 B ...Fuel to bypass
73 BA ....Lengthwise scavenging of cylinders from head
73 C ...Fuel to cylinder
73 CA ....Lengthwise scavenging of cylinders from head
73 CB ....With liquid pump to separate inlet
73 CC ....With gas or vapor pump to separate

73 D ...Disc valves
73 DA ....Charge to crankcase through crankshaft
73 E ...Reentrant cylinder head
73 F ...Stepped piston
73 FA ....Ported
73 S ...Supercharging of crankcase
73 V ...Valves for crankcase
73 SC ...Returns charge to crankcase or rejects to exhaust
73 PP ...Distinct passages from crankcase to cylinder
73 SP ...Slow-speed operation
74 R ..Cylinder
74 A ...Fuel to rear of piston
74 AA ....Lengthwise scavenging from head
74 AP ...Reduced portion of piston acts as guide
74 AC ...Cross head between piston and crank
74 AE ...Enclosed crankcase
74 B ...Lengthwise bypass
74 C ...Lengthwise cylinder combustion space
74 D ...Slide valve between chamber of pump and crankcase
65 PE .Exhaust ports
65 A .Inlet and exhaust ports in two or more planes
65 B .Pumps
65 BA .Blowers
65 PD .Port deflectors
65 E .Scavenging by inertia of exhaust gas and charging by use of pressure waves
65 S .Step piston (see sub. 59 BS)
65 V .Valves
65 VA ..Sleeve valve
65 VS ..Sleeve driven by auxiliary crankshafts
65 VB .Lengthwise scavenging list above
65 VC .Lengthwise scavenging exhaust above
65 VD .Intake and exhaust valve in top of cylinder
65 W .Whirl through piston-controlled ports
65 WA ..Whirl in top of cylinders and lengthwise scavenging
65 WV .Vacuum intake
65 SP .Single port for inlet and exhaust
65 EM .Exhaust manifolds
65 P .Ports
306 **MEANS TO WHIRL FLUID BEFORE, UPON, OR AFTER ENTRY INTO COMBUSTION CHAMBER**
307 .Structural projection on working piston causes whirling
308 .Having multiple oxidant inlet means
309 .Specific spark plug location
310 **COMBUSTION CHAMBER HAVING MULTIPLE SPARK GAPS**
311 **FOUR-CYCLE**
312 .Engine cylinder having a reciprocating sleeve valve
313 ..Having a junk ring seal
314 ..Having sleeve valve lubrication means
315 .Multiple exhaust
316 .Having subcharger associated with the cylinder
317 .Crankcase compression of air or combustible mixture to be subsequently pumped into the working cylinder
318 .Rear compression of air or combustible mixture to be subsequently pumped into the working cylinder
76 .Scavenging
77 .Single revolution
78 R .Variable clearance
78 A ..Piston in head adjusted mechanically
78 AA ...Piston in head adjusted by fluid means
78 B ..Varying means is in the piston
78 BA ...Varying means is in the piston connection
78 C ..Cylinder or sleeve moved
78 D ..Auxiliary chamber
78 E ..Varying means is in the connecting rod
78 F ..Varying means is in the crankshaft
79 R .Single poppet valve
79 A ..Rotary valve and poppet which extends through rotary valve
79 C ..Concentric valves; relatively movable
80 R .Rotating valve
80 BA ..Rotary valve is perpendicular to cylinder
80 BB ..Rotary valve is parallel to cylinder
80 C ..Sleeve valve

80 D ..Disc valve
80 DA ..Rotary plug
81 R .Oscillating valve
81 B ..Oscillating valve - not sleeve or disc
81 C ..Sleeve valve
81 D ..Disc valve
82 .Rotating side shaft
83 .Rotating transverse shaft
84 .Adjacent supply and exhaust valves
85 .Aligned supply and exhaust valves
86 .Opposite supply and exhaust valves
87 .Longitudinal valve and lever
88 .Transverse valve and lever
89 .Transverse valve and bell crank
319 **ENGINE SPEED REGULATOR**
320 .Responsive to deceleration mode (e.g., engine acting as a brake)
321 ..Valve timing altering means (e.g., axially sliding cam shaft)
322 ...Electrical means adapted to alter valve timing
323 ..Exhaust throttling or blocking
324 ..Part of the air or combustible mixture to the engine cylinder omitted
325 ..Deceleration responsive cutoff of fuel to engine (e.g., pollution control)
326 ...Rich resupply of fuel at end of deceleration
327 ..Auxiliary air fed to the engine
328 ..Idle jet bypassed by a slight opening of the throttle
329 ..Having means to retard spark (e.g., ignition timing)
330 .Engine speed reduction by overriching the combustible mixture (e.g., choking engine)
331 ..By electric means
332 .Engine speed reduction by fuel cutoff
333 ..By electric means
334 .Engine speed reduction by partial or complete omission of the ignition
335 ..By electric means
336 .Having plural throttle valve structure
337 .Specific throttle valve structure
338 .Fuel injection pump bypass control
339.1 .Idle speed control
339.11 ..By regulating spark ignition timing
339.12 ..And air-fuel ratio feedback controlled
339.13 ..Manual adjustment
339.14 ..Electrically operated control means
339.15 ...With fail-safe, backup, or malfunction detecting means
339.16 ...External load condition responsive
339.17 ....Air conditioner operating mode responsive (i.e., compressor on-off)
339.18 ....Accessory load (e.g., lights, heater blower motor, radiator fan motor, generator) on engine electrical system responsive
339.19 ...By engine speed error feedback
339.2 ....Dynamic state variable model
339.21 ....And integral or derivative control
339.22 ....And temperature responsive
339.23 ....Controlling throttle bypass
339.24 ...Temperature responsive
339.25 ...Including rotary actuator
339.26 ....Stepping motor type
339.27 ...Including linear reciprocating solenoid control device
339.28 ....Having valve controlled vacuum actuator
339.29 ..By overriding injection pump governor
342 .Regulator changes length of accelerator linkage
343 .Regulator accessory (e.g., cleaner, adjusting tool, etc.)
344 .Charge proportion varying (e.g., the fuel-air ratio is varied)
345 .By changing valve lift
346 ..Intake valve lift altered
347 .By changing valve timing
348 ..Intake valve timing altered
349 .Having condition responsive means with engine being part of a closed feedback system (e.g., cruise control)
350 ..Electrical sensing or regulating

351 ...Engine overspeed sensing with an indicator or alarm and speed regulation
352 ...Engine speed sensing having an error signal producing circuit
353 ....Having variable duty cycle multivibrator (e.g., length of "time on" in each cycle)
354 ....Having variable frequency multivibrator (e.g., number of "time ons" per unit of time)
355 ....Having phase difference detector
356 ....Circuit resonates (e.g., tuned) at governed speed
357 ....Electric fuel injection pump governor
358 .....Max-min governor (i.e., no control in between)
359 .....Fail-safe feature (e.g., cuts off fuel pump)
360 ....Circuit controls a fluid throttle operator (e.g., vacuum)
361 ....Circuit controls an electric throttle operator
362 ...Cold engine control
363 ..Mechanical sensor or regulator
364 ...Fuel injection pump governor (e.g., diesel)
365 ....Governor override
366 .....Engine starting or warm-up control
367 .....Variable throttle or control rod stop
369 ....Three-dimensional cam control
370 ....Acceleration responsive
371 ....Deceleration responsive
372 ....Biased axial link (e.g., sliding rod with spring return)
373 ....Pivoted link connected to pump rack
374 .....Movable fulcrum (e.g., slot and pin)
375 ...Fuel injection pressure governor
376 ...Throttle positioning
377 ....Safety override of dangerous manual position
378 ..Fluidic sensor or regulator
379 ...Fuel injection pump governor
380 ....Barometric sensor
381 ....Fuel viscosity sensor (e.g., temperature sensing)
382 ....Manifold pressure sensor
383 .....Supercharger
384 ....Floating piston-type governor (e.g., Bessiere)
385 ....Liquid fluid governor
386 .....Lubrication pressure sensor
387 .....Fuel pressure sensor
388 .....Override for basic mechanical governor
389 ...Intake manifold vacuum responsive
390 ...Fuel injection pressure governor
391 ...Responsive to intake airflow
392 ...Responsive to cooling fan airflow
393 ...Responsive to exhaust gas
394 ..By combustion air or air-fuel mixture cutoff
395 .Open loop condition responsive
396 ..Resistance or override acts on input connection to regulator
397 ...Shutdown safety device
398 ...Throttle position lock
399 ..Having an electrical device between input and speed regulator
400 ..Mechanical connection between input and speed regulator
401 ..Fluidic device between input and regulator
402 .Charge volume varying (e.g., total amount of mixture fed to engine is varied; relative amounts of air and fuel are fixed)
403 ..Throttling (e.g., volume varying using throttle valve)
404 ..Suction operated supply valve lift regulating
405 ..By engine operated valve
406.11 **SPARK IGNITION TIMING CONTROL**
406.12 .Electronic control
406.13 ..With fail-safe, backup or malfunction detecting means
406.14 ...Including spark failure responsive means (e.g., misfire)
406.15 ...Fuel sensor malfunction responsive
406.16 ...Knock control malfunction responsive
406.17 ...Cylinder pressure sensor malfunction responsive

406.18 ...Engine shaft rotational position sensor malfunction responsive (e.g., crank shaft, cam shaft)
406.19 ..Closed loop feedback control of spark timing
406.2 ...Separate control for each cylinder
406.21 ....Knock responsive
406.22 ....Cylinder pressure responsive
406.23 ...Engine output (e.g., torque, speed, horsepower) or fuel consumption optimization
406.24 ...Including means responsive to the instantaneous change in engine speed (e.g., roughness, unstable combustion, etc.)
406.25 ....Acceleration or deceleration responsive
406.26 ...Combustion condition responsive
406.27 ....Combustion failure responsive (e.g., misfire)
406.28 ....Combustion condition sensed by optical sensor
406.29 ....Engine knock responsive
406.3 .....Fuel quality or composition signal responsive
406.31 ......Alcohol concentration responsive
406.32 ......Having a plurality of speed/load maps related to fuel quality or composition
406.33 .....With modifying or updating memory (i.e., learning)
406.34 .....Modification of knock signal by engine operating condition signal
406.35 ......Engine operating condition is load or speed
406.36 ....Acceleration or deceleration responsive
406.37 .....Having specific knock detecting means
406.38 ......Knock frequency distribution pattern responsive
406.39 ....Knock signal counting
406.4 ......And specific system component mounting or location details
406.41 ....Engine cylinder pressure responsive
406.42 .....Peak pressure responsive
406.43 .....Responsive to derivative, integral or average of pressure
406.44 ...Exhaust gas condition responsive control of spark timing
406.45 ..Including control of combustible mixture or a constituent thereof (e.g., air, fuel, exhaust gas)
406.46 ...Acceleration or deceleration responsive
406.47 ...With fuel injection control
406.48 ...With exhaust gas recirculation (EGR) control
406.49 ..Barometric pressure responsive
406.5 ..Acceleration or deceleration responsive
406.51 ...Acceleration responsive
406.52 ..Throttle position responsive
406.53 ..Starting condition responsive
406.54 ...Start detected by engine speed
406.55 ..Temperature responsive (e.g., ambient, engine, etc.)
406.56 ..With magneto
406.57 ...And capacitor discharge for ignition spark energy
406.58 ..Having engine shaft rotational position signal generator (e.g., crank shaft, cam shaft)
406.59 ...Speed responsive timing control
406.6 ....Having counter or addressable memory (e.g., digital timing circuit)
406.61 .....Plural engine shaft position sensors
406.62 ......Position sensors at separate shafts
406.63 ......Position sensors having different pulse rates
406.64 .....Memory addressed by engine speed or load
406.65 ......With microprocessor
406.66 ....With resistor/capacitor (RC) timing circuit (e.g., multivibrator)
406.67 .Vacuum timing control
406.68 ..Barometric pressure responsive
406.69 ..Condition responsive valve in fluid path from vacuum source
406.7 ...Temperature responsive
406.71 ..Fluid delay between vacuum source and actuator (e.g., fixed restriction)

406.72 ..Increasing vacuum retards spark timing
406.73 ..Plural diaphragms or actuators
406.74 .Mechanical or hydraulic link to throttle valve or accelerator
406.75 .Centrifugal timing mechanism
406.76 .Spark delay actuated or deactuated by starting device
429 **COMBUSTION CHAMBER MEANS COMBINED WITH AIR-FUEL MIXTURE FORMING MEANS**
430 .Stratification in combustion chamber
431 .Having a single combustible mixture inlet combined with means for injecting additional fuel into the combustion chamber
432 .Air or combustible mixture entering the combustion chamber through plural inlets
433 ..One inlet is uncovered by piston travel
434 **CHARGE FORMING DEVICE (E.G., POLLUTION CONTROL)**
435 .Including cylinder pressure or temperature responsive means
436 .Including means responsive to instantaneous change in engine speed
672 .Including exhaust gas condition responsive means
673 ..With sensor controlling each cylinder individually
674 ..With modifying or updating memory (i.e., learning)
675 ...Acceleration or deceleration responsive
676 ..Exhaust gas temperature or pressure repsonsive
677 ..Combined with ambient condition responsive means (e.g., pressure)
678 ...Ambient temperature responsive
679 ..Combined with engine condition responsive means
680 ...Idling responsive
681 ...Engine load responsive
682 ....Acceleration or deceleration responsive
683 ....Throttle position responsive
684 ....Pressure downstream of throttle valve responsive
685 ...Starting or warmup responsive
686 ....Engine coolant temperature responsive
687 ...Speed responsive
688 ...Inoperative sensor responsive
689 ...Engine fluid or engine component temperature responsive
690 ..With fail-safe, backup, or malfunction means
691 ..Multiple sensors controlling group of cylinders
692 ...Controlling plural groups of cylinders
693 ..With compensator for sensor output (e.g., current or voltage)
694 ...Output fed to compensating circuit
695 ....Variable reference value
696 ....Proportional or integral circuit
697 ...Heater for sensor or sensor environment
698 ..With addition of secondary fluid (e.g., fuel or exhaust gas)
699 ...Secondary fluid is auxiliary air or oxygen (e.g., carburetor air bleed)
700 ....Fed to air/fuel mixture
701 ..With auxiliary control of carburetor
702 ...Variable venturi carburetor
703 ..Exhaust gas composition sensor
704 .Air/fuel ratio prior to combustion responsive means
437 .Auxiliary control of carburetor fuel metering
438 ..By electrical or electronic control system
439 ...Variable venturi carburetor
441 ..By mechanical speed sensor
442 .Injection or carburetion system having a series of throttle valves
443 .Alternate or simultaneous lean-rich
444 .Having fluidic logic control means
445 .Fuel injection system
446 ..Fuel pump flow regulation
447 ...With accumulator
448 ...Sequential distributor
449 ....Rotary and reciprocating distributor

450 ....Rotary distributor
451 ....Reciprocating distributor
452 ...Nonsequential distributor
453 ....Enrichment of the combustible mixture for cold starting or cold running
454 ....Equal pressure valve type
455 ....Distributor and metering unit are in common housing
456 ....Common rail system
457 ...Regulating means adjusts fuel pressure
458 ....Electric regulator
459 ....Bleed off valve
460 ....Series regulator
461 ....Having vapor returned to tank or pump inlet
462 ....By throttle control
463 ....Manifold pressure responsive
464 ....Temperature responsive
465 ....Barometric responsive
466 ....Having an antitampering device
467 ..Drip prevention means at injector nozzle
468 ..Having a specific shape, material, or location of fuel line
469 ...Specific fuel line mounting means
470 ..Injection nozzle mounting means
471 ...Nozzle isolated from manifold vacuum effect
472 ..Electrically actuated injector
473 ...Mechanically actuated switching
474 ....Ignition distributor used as switch
475 ...Actuated by ignition pulse
476 ...Magnetically actuated switching
477 ...Radiation actuated switching
478 ...Actuator circuit (e.g., engine condition responsive electronic circuit actuates injector valve)
479 ....Backup systems, fail-safe, failure indicator
480 ....Having microprocessor
481 ....Engine cylinder cutout
482 ....Circuit activates valve for continuous fuel flow
483 ....Having plural multivibrators
484 ....Having single multivibrator
485 ....Having ramp generator
486 ....Having a digital memory addressed by an engine parameter
487 ....Having an up or up-down counter in circuit
488 ....Subcircuit operates on a parameter sensor output before input to main fuel control (e.g., function generator)
490 ....Injector solenoid drive
491 ....Starting condition responsive
492 ....Acceleration or full load condition responsive
493 ....Deceleration condition responsive
494 ....Having specific transducer
495 .With fuel pump
496 ..Variable rate of injection stroke
497 ..Electric fuel pump
498 ...Piezoelectric drive
499 ...Solenoid drive
500 ..Variable beginning and ending of pumping stroke
501 ..Variable beginning of pumping stroke
502 ...Fluid pressure control
503 ..Variable ending of pumping stroke
504 ..Variable stroke
505 ..Fuel pump and intake air controls interconnected
506 ..Having pressure relief valve
507 ..Pumping member driven by a piston or valve of the internal combustion engine
508 ..Pumping member driven by the internal combustion engine valve operating mechanism
509 ..Specific location or mounting of pump
510 .Fuel flow regulation between the pump and the charge-forming device
511 ..Regulator means adjusts fuel pressure
512 ...Engine parameter responsive
513 ...Environmental condition responsive
514 ..Excess fuel returned to tank
515 ..Regulator controls flow of a plurality of fuels
516 ..Air or fuel vapor purging system
517 ..Carburetor float bowl drain

518 .Having fuel vapor recovery and storage system
519 ..Having an adsorbent canister
520 ...Purge valve controlled by engine parameter
521 ....Responsive to secondary air pressure
522 .Liquid fuel evaporating by submerged air supply
523 .Liquid fuel evaporating by extended fuel film
524 ..Screen or mat
525 .Combined liquid and gaseous fuel
526 ..Diesel engine convertible from liquid to gas
527 .Gaseous fuel and air mixer
528 ..Supercharged engine
529 ..Safety device (e.g., cutoff)
530 .Constant flow fuel supply
531 .Auxiliary air or gas used to inject fuel
532 ..Air is bled from the cylinder on the compression stroke in that cylinder
533 ..Having a separate pump for the air or gas
534 ..Air is bled from another engine cylinder
535 ..Constant fuel level
536 .Combustible mixture ionization, ozonation, or electrolysis
537 ..Before intake valve (e.g., in manifold)
538 ..Fuel only
539 ..Air only
540 .Cooling of combustible mixture
541 ..Fuel only
542 ..Air only
543 .Heating of combustible mixture
544 ..Lighter fuel is used during starting
545 ..Heating meduim surrounds combustible mixture
546 ..Combustible mixture surrounds heating medium
547 ..Combustible mixture and heating meduim adjoin one another
548 ..Trap for liquid particle vaporization
549 ..Electric heater
550 ..Combustion heater
551 ...Part of combustible mixture is burned
552 ..Automatic control
553 ..Intermediate fluid used for heating
554 ..Combustible mixture, air, and fuel are heated separately
555 ..Air and fuel heated separately
556 ..Air only
557 ..Fuel only
558 ...Fuel is heated to ignition temperature
559.1 .Supercharger
559.2 ..Pressure exchange with exhaust gas
559.3 ..With clutch
560 ..Two-cycle compressor feeds a four-cycle engine
561 ..Variable ratio compressor driven supercharger
562 ..Multiple superchargers
563 ..Intercooler
564 ..Boost control
565 ..Supercharger is driven independently of the engine
566 ..Funnel-type supercharger (e.g., ram-air)
567 .Oxidant is solely oxygen
568.11 .Exhaust gas used with the combustible mixture (e.g., emission control Exhaust Gas Recirculation (EGR) valve)
568.12 ..Exhaust gas cooled during recirculation
568.13 ..Having recirculation path formed entirely in the cylinder block or head
568.14 ..Internal exhaust gas recirculation (e.g., exhaust gas retained in the combustion chamber)
568.15 ..Having exhaust gas mixed with a constituent before entry into intake manifold
568.16 ..With electrical means for fail-safe, backup, or malfunction detecting of EGR system
568.17 ..Having specific exhaust gas outlet structure at intake manifold
568.18 ...Having a valve located at the outlet of the EGR passage
568.19 ..EGR valve position controlled only in relationship to intake throttle valve position
568.2 ..Plural EGR valves in the recirculation passage

568.21 ..Having electrically actuated control means
568.22 ...Ambient condition responsive (e.g., atmospheric temperature, atmospheric pressure)
568.23 ...Having rotary actuator control of EGR valve
568.24 ....Electrical rotary actuator rotates the EGR valve
568.25 ....Vacuum actuator control of EGR valve
568.26 ...Having electromechanical actuator control of EGR valve
568.27 ....Controlling vacuum actuator
568.28 .....Including auxiliary vacuum pump
568.29 ..Vacuum actuator control of EGR valve
568.3 ...Including auxiliary vacuum pump
568.31 ...Temperature responsive
568.32 ...Having fixed restriction in vacuum line
572 .Crankcase vapor used with combustible mixture
573 ..Vapor treated before mixing with combustible mixture (e.g., cooling)
574 ..Specific control valve (e.g., PCV valve)
575 .Diverse fuel supply
576 ..Fuel switched in response to engine starting condition
577 ..Fuel switched, condition responsive to load
578 ..Fuel switched in response to engine temperature
579 .Multiple carburetors
580 ..Each carburetor feeds a cylinder or group of cylinders (e.g., split engine)
581 ..Separate carburetor for starting
582 ..Separate carburetor for high load
583 ..With linkage between carburetor throttle valves
584 ...Staged opening of carburetor throttle valves
585 .Auxiliary air or oxygen added to combustible mixture
586 ..Oxidant controlled by throttle
587 ..Oxidant controlled by intake manifold vacuum
588 ..Oxidant controlled by engine temperature
590 .Charge-mixing device in intake (e.g., device which insures the atomization of the combustible mixture)
591 ..Having liquid fuel collector
592 ..By fan means
593 ..By screen means
594 **HIGH TENSION IGNITION SYSTEM**
595 .Retrofit conversion ignition unit
596 .Using capacitive storage and discharge for spark energy
597 ..Regulating sensed ignition capacitor voltage
598 ..Having an oscillator
599 ..Having a magneto
600 ...Triggering voltage obtained from capacitor charging winding
601 ...Specific design of charge or trigger winding core
603 ...Antireverse protection
604 ..Inductive capacitive discharge system
605 ..Having a specific capacitor, ignition coil means, or switching element circuit path
606 .High frequency ignition system
607 ..Free running oscillator supplies coil primary
608 ..Having a specific spark plug
609 .Having dwell control
610 ..Using a monostable multivibrator
611 ..Dwell maintained at constant value
612 .Having engine component position sensor
613 ..Optical sensing
614 ..Including a zero crossing detector
615 ..Includng an oscillator
616 ..Piezoelectric sensor
617 ..Inductive or magnetic sensor
618 .Having specific trigger circuitry
619 ..Oscillatory trigger circuit
620 .Additional spark energy supply
621 .Having an ignition coil with multiple primary or secondary windings
622 ..Separate circuit for each winding

623 .Having supply voltage regulation
624 .Having ballast resistor cutout or control
625 .Responsive to engine or environmental condition
626 ..Oscillator or trigger circuit responsive to engine condition
627 .Having auxiliary spark gap in series or parallel with the coil
628 .Having a continuous high voltage output to the high voltage distributor
629 .Monostable multivibrator controls timing of coil primary current
630 .Safety device
631 ..Reverse engine rotation protection
632 ..Ignition switch opened when engine stops
633 .Radio interference protection
634 .Having a specific ignition coil
635 .Specific coil location
636 .Multiple spark ignition system
637 ..System fires single spark plug per cylinder
638 ..System fires multiple spark plugs per cylinder
639 ..System using vibrator for multiple sparks upon starting
640 .Dual systems
641 ..One for starting
642 .Piezoelectric voltage generator
643 .Electronic cylinder sequencing
644 .Current or voltage sensing in coil primary
645 .Maverick spark suppressor
646 ..Point bounce or arc suppression system
647 .Having a specific mounting of system component
648 .Having SCR triggered by lowering cathode voltage below ground
649 .Multiple primary current interrupters
650 .Power supply, ignition coil primary, and interrupter element all in series
651 ..Interrupter is multiple transistor circuit
652 ..Interrupter is single transistor
653 ..Additional capacitor other than breaker point capacitor is in series with coil primary or secondary
654 ..Additional capacitor other than breaker point capacitor is in parallel with coil primary or secondary
655 ..Diode is in series with coil primary or secondary
656 ..Diode is in parallel with coil primary or secondary

90.1 **POPPET VALVE OPERATING MECHANISM**
90.11 .Electrical system
90.12 .Hydraulic system
90.13 ..With manifold and distributor
90.14 .Pneumatic system
90.15 .With means for varying timing
90.16 ..Cam-to-valve relationship
90.17 ..Camshaft or cam characteristics
90.18 ...Axially shiftable camshaft
90.19 .With temperature compensation
90.2 .With compound movement of cam follower
90.21 .Follower displaced axially of camshaft
90.22 .Plural valve trains, single actuator
90.23 ..Intake and exhaust
90.24 .Valve driven closed
90.25 ..By valve-opening rocker
90.26 ..By cam-actuated unitary follower
90.27 .Overhead camshaft
90.28 .With nonvalving movement (e.g., about valve stem)
90.29 ..Oscillating movement converted internally
90.3 ..Positive rotation provided by internal means
90.31 .Camshaft drive means
90.32 .With alternate interruption of drive train
90.33 .Lubrication
90.34 ..Camshaft
90.35 ..Tappet as conduit
90.36 ..Rocker fulcrum as conduit
90.37 ..Seals and shields
90.38 ..Housings
90.39 .Rocker
90.4 ..Plural valves
90.41 ..Individually fulcrumed
90.42 ...Rotation prevention
90.43 ...Lash adjustment at fulcrum
90.44 ..Cam engaged

90.45 ..Lash adjustment
90.46 ...Hydraulic
90.47 ..Yieldable engagement
90.48 .Tappet
90.49 ..Cushion and silencer
90.5 ..Rotation prevention
90.51 ..Composition, surface treatment manufacture
90.52 ..Lash adjustment
90.53 ...Self-operating
90.54 ....Screw
90.55 ....Hydraulic
90.56 .....Pressure flow upwardly into pressure chamber
90.57 .....Vent or bleed means for pressure chamber
90.58 .....Self-contained
90.59 .....With provision for horizontal positioning
90.6 .Cam
90.61 .Rod
90.62 ..Self-adjusting
90.63 ...Hydraulic
90.64 ..Pull type
90.65 .Spring
90.66 ..Attenuated
90.67 ..Seat and retainer
143 R **IGNITERS**
144 .Flame
145 R .Incandescent
146 ..Valve controlled
145 A ..Electric (incandescent ignitors using electricity as a source of heat)
146.5 R .Sparkers
147 ..Low tension
149 R ..Dynamos
149 A ...Inductor type
149 B ...Impulse starters
149 D ...Flywheel type
149 E ...Oscillating armature type
149 F ...Special waveforms
149 FA ....Double current generators
149 G ...Movable pole shoes and bell-magnets
149 H ...Reciprocating
150 ..Combined adjusting and exhaust regulating
151 ..Combined sparker and valve
152 ..Combined valve and sparker operating
169 R ..Plugs
169 CL ...Cleaners automatic
169 CM ....Cleaners manual
169 CA ...Compound insulation
169 CB ...Core retaining
169 DW ...Disk wrappings type
169 EL ...Electrodes
169 EA ...Adjustable gap
169 EB ...Replaceable electrode
169 EC ...Adjustable and replaceable
169 C ...Cool
169 E ...Insulated electrodes
169 G ...Intensity in gap only
169 P ...Insulating protecting
169 PA ....Tubes and attachments
169 PB ....Heaters
169 PH ....Hoods and shields
169 MG ...Multiple firing gap
169 TC ...Transparent combustion chamber
169 V ...Valved
153 ..Make and break
154 ...Electromagnetic
155 ...Pneumatic
162 ...Piston-operated
156 ...Reciprocating electrode
157 ...Rocking-electrode hammer action
158 ...Rocking and rigid electrodes
159 ...Rocking and yielding electrodes
160 ...Oscillating electrodes
161 ...Rotary electrodes
163 ...Stationary-electrode structure
164 ...Adjusting mechanism
146.5 A ..Timers
146.5 B ..Ignition locks
146.5 C ..Fluid level or pressure-actuated ignition switches
146.5 D ..Devices for opening the ignition circuit when engine stops in order to save battery
143 A .High compression igniters
143 B .Special charge igniters
143 C .Insulated casing enclosing wires leading to plugs, distributor, etc.
192.1 **VIBRATION COMPENSATING DEVICE**
192.2 .Balancing arrangement
197.1 **TRANSMISSION MECHANISM FROM PISTON**
197.5 .Including clutch
197.2 .With particular piston
197.4 .Crankshaft and connecting rod
197.3 ..Particular connecting rod
179.1 **STARTING DEVICE**
179.2 .Remote control

179.3 .Condition responsive control of starting device
179.4 ..Including automatic engine stop
179.5 .Control of spark ignition during starting
179.6 .Control of glow plug during starting
179.7 .Auxiliary fuel supply device
179.8 ..Starting fluid
179.9 ..Priming means
179.11 ...Manual pump device or squeeze bulb
179.12 ...Condition responsive
179.13 ....Temperature
179.14 ..Condition responsive
179.15 ...Temperature
179.16 .With fuel or intake air control
179.17 ..Fuel injection pump
179.18 ..Intake air control
179.19 .Includes auxiliary internal combustion engine
179.21 .With charge or cylinder heating
179.22 .Inertia type
179.24 .Either power or manual starting device
179.27 .For airplane
185.7 ..Manual type
179.28 .With electric generating means
179.29 ..Auxiliary magneto
179.31 .Having fluid-driven starting motor
183.1 .Gunpowder type
182.1 .Compression relieving type
179.25 .Having specific mounting or drive connection for electric starter motor
179.26 ..For nonoperator supporting wheeled platform
185.1 .Mechanical
185.14 ..Includes mechanical potential motor (e.g., spring motor)
185.15 ...Operated by wheels of vehicle
185.2 ..Includes cable
185.3 ...Including recoil mechanism
185.4 ....Lever connected to the cable
185.5 ..Includes lever or slide linkage
185.6 ...Lever or slide actuates a gear segment
185.8 ..Includes friction means in linkage
185.9 ..Includes coaxial cooperating threaded members in linkage
185.11 ..Includes worm gear in linkage
185.12 ..Including crank-type handle
185.13 ...Means provided to prevent counter rotation of crank
184.1 .With auxiliary igniters
184.21 **INTAKE MANIFOLD**
184.22 .Passage to crankcase
184.23 ..For use with carburetor upstream of manifold
184.24 ..Manifold having plenum
184.25 ...Plural plenums
184.26 ....Interconnection between plenums
184.27 ..Multiple passage leading to inlet of head
184.28 .For engine having radiating cylinders
184.29 ..Star-type engine
184.31 ..For V-type engine
184.32 ...For use with carburetor upstream of manifold
184.33 ....Inlet manifold heated by outlet manifold
184.34 ...Manifold having plenum
184.35 ....Plural plenums
184.36 .....Interconnected between plenums
184.37 ...Multiple passage leading to inlet of one cylinder
184.38 .For in-line engine
184.39 ..For use with carburetor upstream of manifold
184.41 ...Intake manifold heated by outlet manifold
184.42 ..Manifold having plenum
184.43 ...Plural plenums
184.44 ....Interconnection between plenums
184.45 ..Multiple passage leading to inlet of one cylinder
184.46 .For use with carburetor upstream of manifold
184.47 .Manifold having plenum
184.48 ..Plural plenums
184.49 ...Interconnection between plenums
184.51 ..Adjustable plenum
184.52 .Multiple passage leading to inlet of one cylinder
184.53 .Manifold tuning, balancing or pressure regulating means
184.54 ..With back flow prevention valve
184.55 ..Adjustable length passage
184.56 ..Adjustable cross section passage
184.57 ..Resonator chamber

184.58 ..Return loop to inlet
184.59 ..Interconnection between passages
184.61 .Manifold material or composition
142.5 R **WITH HEATING MEANS**
142.5 E .Electric heaters for heating cooling system
657 **COMBUSTION CHAMBER**
658 .L- or T-shaped
659 .Having groove to aid combustion
660 .An acoustic cavity used to attenuate detonation shock waves (e.g., Bodine)
661 .Having squish area
662 .Multiple annular combustion chambers
663 .Annular combustion chamber
664 .Combustion chamber shape is a figure of revolution
665 ..Spherical
666 ..Hemispherical
667 .Asymmetric combustion chamber
668 .Having coating or liner
669 ..With means for mounting coating or liner
670 .Having catalytic cambustion aid
671 .Cylinder head shape conforms to piston shape
193.1 **PARTICULAR PISTON AND ENCLOSING CYLINDER CONSTRUCTION**
193.5 .Cylinder head
193.3 ..Having detail of connection to other cylinder structure
193.6 .Piston
193.4 ..Having detail to guiding structure cooperating with cylinder
193.2 .Cylinder detail
188.1 **VALVE**
189 .Detachable
188.14 .Valve head cooperates with manifold
188.4 .Reciprocating valve
188.15 ..Shepherd type
188.2 ..Poppet
188.16 ...Pivoted
188.3 ...Material or structure
188.5 ..Sleeve
190.1 .Rotary
190.12 ..Sleeve
190.13 ...With lubrication means
190.3 ..For crankcase
190.4 ..Double function type
190.5 ...For two or more cylinders
190.6 ...Elongated rotary double-function valve
190.7 ....Tapered
190.8 ...In horizontal plane above cylinder
190.9 ....Tapered
190.11 ...In horizontal plane on the side of the cylinder
190.14 ..Disc, cone, or sphere shaped
190.15 ...Controls plural cylinders
190.2 ..Single function, (i.e., exhaust and intake by separate tube)
190.16 ..Lubricant
190.17 ..Seal
188.6 .Packing
188.7 .Combustion improving accessory
188.8 .Valve seat relation
188.9 .Guide, lubricant, or coolant
188.11 .Wear feature
188.12 ..For spring
188.13 ...Including attaching means
188.17 .Having actuation springs concentric with valve stem
195 R **FRAME CONSTRUCTION**
195 A .Auxiliaries, brackets
195 C .All covers
195 E .Electrical
195 P .Outboard motor frames
195 S .Sheet metal frames
195 AC .Inclined cylinder
195 H .Horizontal stress members
195 HC .Horizontal cylinder
196 R **LUBRICATORS**
196 A .Filtering
196 CP .Crankcase, pressure control
196 AB .Heating and cooling
196 M .Upper cylinder lubricants
196 S .Safety devices
196 V .Sleeve valve lubrication
196 W .Vertical shaft
198 R **ACCESSORIES**
198 A .Decarbonizers and antiknocks
198 B .Antitheft valves and locks
198 C .Pumps
198 D .Safety devices
198 DA .Bearing wear, cylinder, oil drain, auto ignition
198 DB .Fuel cut-off
198 DC .Ignition cut-off control
198 E .Covers, trays, vibrators, corrosion inhibitors, air filters
198 F .Cylinder cut out

198 P .Pressurizing - crankcase, clutch housing, transmission housing

FOREIGN ART COLLECTIONS

FOR 000 **CLASS-RELATED FOREIGN DOCUMENTS**

Any foreign patents or non-patent literature from subclasses that have been reclassified have been transferred directly to FOR Collections listed below. These Collections contain ONLY foreign patents or non-patent literature. The parenthetical references in the Collection titles refer to the abolished subclasses from which these Collections were derived.

STARTING DEVICE

FOR 100 .Spark delaying (123/186.1)
FOR 101 **SPARK IGNITION TIMING CONTROL (123/406)**
FOR 102 .Vacuum timing control (123/407)
FOR 103 ..Multiple diaphragms (123/408)
FOR 104 ..Fluid delay in fluid path line from vacuum source (123/409)
FOR 105 ..Including sensor responsive to barometric pressure to alter vacuum level (123/410)
FOR 106 ..Increasing vacuum retards the spark (123/411)
FOR 107 .Barometric pressure responsive controller (123/412)
FOR 108 .By mechanical or hydraulic link to throttle valve or accelerator (123/413)
FOR 109 .Having engine shaft position sensor (123/414)
FOR 110 .Analog electronic control (123/415)
FOR 111 .Digital electronic control (123/416)
FOR 112 ..Having microprocessor (123/417)
FOR 113 .Speed responsive (123/418)
FOR 114 ..Responsive to instantaneous changes in engine speed (e.g., roughness) (123/419)
FOR 115 ..Centrifugal timing mechanism (123/420)
FOR 116 .Ambient or engine temperature responsive (123/421)
FOR 117 .Acceleration responsive (123/422)
FOR 118 .Deceleration responsive (123/423)
FOR 119 .Starting or cold running condition responsive (123/424)
FOR 120 .Cylinder pressure or cylinder temperature responsive (123/425)
FOR 121 .Feedback correction (123/426)
FOR 122 .Timing control derived from ignition capacitor (123/427)
FOR 123 .Having circuit that alters response of an oscillatory engine shaft position sensing circuit (123/428)
FOR 124 .Exhaust gas used with the combustible mixture (e.g., emission control (e.g.r. valve) (123/568)
FOR 125 ..Diesel engine (123/569)
FOR 126 ..Exhaust gas cooled before recirculation (123/570)
FOR 127 ..Electrical control of e.g.r. valve (e.g., between exhaust gas and intake manifold) (123/571)
FOR 128 ...Having controllable timing means (123/602)

DIGESTS

DIG 1 **INTERCHANGEABLE**
DIG 2 **ACCUMULATED FUEL RETURN TO TANK OR ENGINE-INDUCTION SYSTEM**
DIG 3 **MODEL**
DIG 4 **STRATIFICATION**
DIG 5 **CRANKCASE PRESSURE-OPERATED PUMPS**
DIG 6 **DETACHABLE**
DIG 7 **CONVERTIBLE**
DIG 8 **MULTIPLE ENGINE UNITS**
DIG 9 **FLAME IGNITION**
DIG 10 **FLUIDIC AMPLIFIER FUEL CONTROL**
DIG 11 **ANTIDIESELING (STOPPING)**
DIG 12 **HYDROGEN**
DIG 13 **GAS**