This Class 508 is considered to be an integral part of Class 252 (see the Class 252 schedule for the position of this Class in schedule hierarchy). This Class retains all pertinent definitions and class lines of Class 252.

100 **SOLID ANTI-FRICTION DEVICE, ARTICLE OR MATERIAL THEREFOR (I.E., SHAPED SOLID ARTICLES WHICH RETAIN THEIR SHAPE DURING USE, SUCH AS BEARINGS, RINGS, SEALS, JOURNAL BOXES, BUSHINGS, BRAKES, CLUTCHES, GUN WADS, JOURNAL BEARINGS, OR LINERS FOR BEARINGS, BRAKES OR CLUTCHES, OR MATERIAL THEREFOR, WHEREIN A LUBRICANT IS A PERMANENT PART OF THE SOLID ANTI-FRICTION DEVICE, ARTICLE OR MATERIAL, WHETHER BY PERMANENT COATING, IMPREGNATION INTO THE INTERSTICES THEREOF, OR BY BEING PART OF THE COMPOSITION) (E.G., SYNTHETICRESIN TYPE SOLID ANTI-FRICTION DEVICES, ETC.)**

101 .Animal or plant matter (e.g., blood, hair, skin, wood, hemp, cotton, paper, lard, castor oil, shellac, glue, beeswax, etc.)

102 ..With graphite or elemental carbon

103 .Elemental or alloyed metal

104 ..With fluorine compound

105 ..With graphite, coal, or elemental carbon

106 .Halogen compound

107 .Silicon compound

108 .Heavy metal or aluminum compound (e.g., MoS2,etc.)

109 .Graphite, coal, or elemental carbon

110 **LUBRICANTS OR SEPARANTS FOR MOVING SOLID SURFACES AND MISCELLANEOUS MINERAL OIL COMPOSITIONS (E.G., WATER CONTAINING, ETC.)**

111 .Processes of purifying or recovering used lubricant compositions, and purified or recovered products thereof

112 .Halogenated graphite, or microorganism metabolic product or culture product of indeterminate structure

113 .Graphite, coal, or elemental carbon

114 ..With silk, sponge, hair, skin, leather, meat, or fibrous plant matter (e.g., cork, bamboo, bark, sawdust, cotton, etc.)

115 ..With naturally occurring resin, salt thereof, agar, natural rubber, tar, pitch, animal glue, turpentine, or carbohydrate gum

116 ..With organic -C(=O)O-compound

117 ...Phosphorus, nitrogen, or halogen attached directly or indirectly to the -C (=O)O- group by nonionic bonding

118 ...The organic -C(=O)O- compound is a polymer resulting from polymerization of an olefinic double bond (e.g., ethylene-vinyl acetate copolymer, polyacrylate, etc.)

119 ...The organic -C(=O)O- compound is sulfurized, or elemental sulfur is present (e.g., sulfurized sperm oil, etc.)

120 ...The organic -C(=O)O- compound is a naturally occurring carboxylic acid ester wax, or a reaction product thereof of indeterminate structure (e.g., beeswax, spermaceti, lanolin, degras, Japan wax, etc.)

121 ...With boron or silicon compound

122 ...The organic -C(=O)O- compound is a carboxylic acid or salt thereof, or inorganic base is present with the organic -C(=O)O- compound

123 ..With elemental or alloyed metal

124 ...With silicon compound

125 ..With boron compound or elemental sulfur

126 ..With silicon compound

127 ...With non-silicon inorganic compound (except water)

128 ..With organic sulfur, phosphorus, or nitrogen compound
129 ..With inorganic compound (except water)
130 ..With organic oxygen or halogen compound
131 ..With synthetic polymer (e.g., ethylene-propylene copolymer, etc.)
132 .Tar, tar distillate, or chemically reacted tar or tar distillate
133 .Asphalt, pitch, pitch distillate, or chemically reacted asphalt or pitch (e.g., sulfurized, salified, reduced, blown, etc.)
134 ..With carboxylic acid or salt thereof
135 .Distillation residues of crude chemical reaction mixtures, or such residues chemically reacted (e.g., oxo still bottoms, etc.)
136 .Silicon dioxide, silicic acid, orthosilicate, or metasilicate, including surface-treated (e.g., clays, onium clays, estersils, etc.)
137 ..With non-siliceous boron compound as additional component or surface- treating agent
138 ..With non-siliceous fluorine-containing polymer as additional component or surface-treating agent (e.g., polytetrafluoroethylene, etc.)
139 ..With elemental sulfur, elemental metal, or alloy as additional component or surface-treating agent
140 ..Asbestos
141 ..With non-siliceous inorganic heavy metal or aluminum compound as additional component or surface-treating agent (e.g., molybdenum disulfide, alumina, etc.)
142 ..With carbohydrate or fibrous plant matter as additional component or surface-treating agent (e.g., starch, elm bark, cellulose compounds, etc.)
143 ..With added water
144 ..With carboxylic acid, salt thereof, sulfonic acid, or salt thereof as additional component or surface-treating agent
145 ..With triazine or triazole hetero ring compound as additional component or surface-treating agent
146 ..With heterocyclic ring compound that has ring sulfur or has chalcogen double bonded to heterocyclic ring carbon as additional component or surface-treating agent; a heterocyclic ring is one having as ring members only carbon and at least one hetero atom selected from chalcogen (i.e., oxygen, sulfur, selenium, or tellurium) and nitrogen (e.g., thiadiazoles, cyclic carbonates, etc.)
147 ..With azo compound, inorganic phophorus salt, or oxidate of undetermined composition as additional component or surface-treating agent
148 ..Talc, mica, or ultramarine blue
149 .Elemental halogen or elemental phosphorus
150 .Elemental metal or boron, or alloyed metal
151 ..With nitrogen, sulfur, or halogen compound
152 .Elemental sulfur, selenium, or tellurium
153 ..With compound containing nitrogen, sulfur, phosphorus, boron, or halogen
154 .Inorganic compound (except water) (Overbased or carbonated organic acidic compounds are not classified in this subclass or its indents on the basis of inorganic overbasing or carbonating agents; the overbased or carbonated compounds are treated as complexes, and are classified with the particular organic acidic compound)

155 ..The inorganic compound contains boron (e.g., boron nitride, boramine, etc.)
156 ...Oxygen bonded directly to the boron (e.g., metal borates, boric oxide, etc.)
157 ....With triglyceride or naturally occurring ester wax (e.g., beeswax, palm, oil, tallow, etc.)
158 ....With carboxylic acid or salt thereof
159 ....With phosphorus compound
160 ....With acyclic organic compound consisting of carbon, hydrogen, and oxygen (e.g., glycols, glycol ethers, alcohols, etc.)
161 ..The inorganic compound contains phosphorus or silicon (e.g., phosphorus sulfide, etc.)
162 ...Oxygen bonded directly to the phosphorus (e.g., orthophosphoric acid, phosphate salts, etc.)
163 ...With inorganic compound not containing phosphorus (except water)
164 ....With carboxylic acid or salt thereof
165 ..The inorganic compound contains heavy metal or aluminum
166 ...Sulfide, selenide, or telluride of heavy metal or aluminum (e.g., lithopone, etc.)
167 ....The heavy metal is molybdenum or tungsten (e.g., molybdenum sulfide, etc.)
168 .....With organic nitrogen or halogen compound
169 .....With sulfur compound or additional inorganic metal compound
170 ...Ammonium or additional diverse metal in the inorganic compound (e.g., alum, sodium molybdate, etc.)
171 ...The heavy metal is iron or lead
172 ...Aluminum or zinc in the inorganic compound
173 ..With organic compound containing silicon
174 ..With organic phosphorus compound
175 ..With organic -C(=O)O- compound (e.g., ester waxes, etc.)
176 ...The inorganic compound contains nitrogen
177 ...With organic nitrogen compound
178 ...The inorganic compound is a metal hydroxide or metal oxide
179 ..With organic nitrogen or sulfur compound
180 ..The inorganic compound is a carbonate
181 .PTFE (polytetrafluoroethylene)
182 ..With compound having ether group
183 ..With silicon compound, or organic phosphorus or sulfur compound
184 .Azo compound (i.e., compound having two acyclic nitrogens double bonded to each other, and carbon single bonded to each of the nitrogens)
185 .Organic compound containing boron
186 ..Borated or boronated carbonated or overbased organic acid salts (e.g., borated overbased carbonated sulfonates, etc.)
187 ..Phosphorus or silicon containing
188 ...Nitrogen containing
189 ..Nitrogen containing (i.e., nitrogen and boron in the same compound)
190 ...The nitrogen is in a heterocyclic ring, which ring either appears in the compound or has been reacted with a boron compound; a heterocyclic ring is one having as ring members only carbon and at least one hetero atom selected from nitrogen and chalcogen (i.e., oxygen, sulfur, selenium, or tellurium)
191 ....The nitrogen heterocyclic ring contains ring chalcogen (e.g., oxazoline compounds, etc.)

192 ....The nitrogen heterocyclic ring has chalcogen bonded directly to ring carbon adjacent to ring nitrogen (e.g., succinimide compounds, etc.)
193 ...Sulfur containing
194 ...Carbonyl containing
195 ...Oxygen and nitrogen bonded directly to the same carbon atom or carbon chain (e.g., borated alkanolamines, etc.)
196 ....With nitrogen heterocycle compound (e.g., thiadiazoles, etc.)
197 ..Sulfur or halogen bonded indirectly to boron
198 ..Carbonyl containing
199 ..Plural oxygens bonded directly to the same saturated carbon atom or saturated carbon chain (e.g., borated 1,2-glycols, borated alkoxylated alcohols, etc.)
200 ..Benzene ring containing
201 .Compound of indeterminate structure, prepared by reacting a silicon compound of known structure
202 .Organic compound containing silicon (e.g., silicon esters)
203 ..The silicon is in a ring
204 ..Nitrogen attached directly or indirectly to the silicon by nonionic bonding
205 ..Phosphorus or -C(=X), wherein X is chalcogen, attached indirectly to the silicon by nonionic bonding
206 ..Halogen attached indirectly to the silicon by acyclic nonionic bonding
207 ..Carbon or hydrogen bonded directly to the silicon
208 ...Two silicons bonded directly to the same chalcogen (e.g., methylphenyl silicon, etc.)
209 ....With organic nitrogen compound
210 .....The nitrogen is in a hetero ring
211 .....Having -C(=X), wherein X is chalcogen, bonded directly to the nitrogen
212 ....With organic -C(=O)O- compound (e.g., lithium 12-hydroxystearate, etc.)
213 .....Heavy metal or aluminum in the organic -C(=O)O-compound
214 .....The single bonded oxygen is bonded directly to an additional carbon (e.g., carboxylic acid esters, etc.)
215 ....With organic phosphorus, sulfur or halogen compound
216 .Protein, carbohydrate, lignin, plant matter of indeterminate structure, or their reaction product of indeterminate structure
217 ..Animal protein (e.g., fish scales, etc.)
218 ...Hair or leather
219 ..Cellulose ether or cellulose ester (e.g., cellulose nitrate, carboxymethylcellulose, etc.)
220 ..With carboxylic acid or salt thereof
221 .Compound of indeterminate structure, prepared by reacting a heterocyclic compound of known structure; a heterocyclic ring is one having as ring members only carbon and at least one hetero atom selected from nitrogen and chalcogen (oxygen, sulfur, selenium, or tellurium)
222 ..The heterocyclic compound reactant contains a lactone or cyclic carbonate ring
223 ..The heterocyclic compound reactant contains a three- or four-membered hetero ring (e.g., aziridine, epoxy compounds, oxetane, etc.)
224 ...An additional reactant contains phosphorus
225 ...An additional reactant contains nitrogen
226 ..The heterocyclic compound reactant is sulfurized by means of an inorganic sulfurizing agent
227 ..An additional reactant contains phosphorus

228 ...The heterocyclic compound reactant has plural chalcogens bonded directly to ring carbons of the hetero ring (e.g., succinimides, anhydrides, etc.)
229 ..An additional reactant is an aldehyde or ketone
230 ..An additional reactant is an inorganic compound containing heavy metal or aluminum (e.g., ammonium molybdate, etc.)
231 ..The heterocyclic compound reactant contains a five-membered hetero ring with at least three ring hetero atoms (e.g., thiadiazole, benzotriazole, etc.)
232 ..The heterocyclic compound reactant contains a carboxylic acid anhydride ring
233 ...An additional reactant is an alkadiene polymer
234 ....The alkadiene polymer is a terpolymer of ethylene, monoolefin, and alkadiene
235 ...An additional olefinic reactant is copolymerized with an unsaturated carboxylic acid anhydride so that the anhydride moiety forms part of the polymer backbone (i.e., addition polymerization)
236 ...An additional reactant is a sulfur compound
237 ...With organic phosphorus compound
238 ...An additional reactant is a polyoxyalkylene compound
239 ...An additional reactant is a hydroxylamine or an alcoholic or phenolic hydroxy compound
240 ....Nitrogen attached directly or indirectly to the hydroxy group by nonionic bonding
241 ...An additional reactant is a copolymer having ethylene and acyclic olefin monomers (e.g., ethylene-alpha olefin copolymer or ethylene-butylene- -styrene terpolymer grafted with maleic anhydride, etc.)
242 ..An additional reactant is a phenol, a thiophenol, a carboxylic acid, or salt thereof
243 .Heterocyclic ring compound; a heterocyclic ring is one having as ring members only carbon and at least one hetero atom selected from nitrogen and chalcogen (i.e., oxygen, sulfur, selenium, or tellurium)
244 ..The hetero ring contains six members including nitrogen and carbon (e.g., pyridine, picoline salts, etc.)
245 ...Chalcogen in the hetero ring
246 ....The chalcogen is oxygen (e.g., oxazines, etc.)
247 .....Chalcogen attached directly to the hetero ring by nonionic bonding
248 .....Acyclic nitrogen attached indirectly to the hetero ring by acyclic nonionic bonding
249 .....Acyclic chalcogen attached indirectly to the hetero ring by acyclic nonionic bonding
250 .....Morpholine, per se, hydrocarbyl-substituted morpholine or salts thereof
251 ....Polycyclo ring system which contains the hetero ring as one of the cyclos (e.g., phenothiazines, etc.)
252 .....With compound having saturated or unsaturated triazine, azole, or pyridine ring
253 .....With organic phosphorus compound
254 .....With organic non-heterocyclic nitrogen compound
255 ...Plural nitrogens in the hetero ring
256 ....Polycyclo ring system which contains the hetero ring as one of the cyclos
257 ....Triazines
258 .....Nitrogen bonded directly to the triazine ring by nonionic bonding
259 ....1,4-Diazines

260 .....Nitrogen and carbonyl attached indirectly to the 1,4-diazine ring by nonionic bonding
261 ...Polycyclo ring system which contains the hetero ring as one of the cyclos
262 ...Piperidines
263 ....Having -C(=X)-, wherein X is chalcogen, bonded directly to the piperidine ring
264 ...Vinyl pyridine polymer (e.g., polyvinylpyridine, vinyl-pyridine-alkyl acrylate copolymer, etc.)
265 ....Non-pyridine organic nitrogen salt of the polymer, or a non-pyridine organic nitrogen compound is present
266 ...Nitrogen attached to the hetero ring directly or indirectly by acyclic nonionic bonding
267 ...Chalcogen or nitrogen attached indirectly to the hetero ring by nonionic bonding
268 ..The hetero ring contains five members including nitrogen and carbon (e.g., polyvinylpyrrolidone, etc.)
269 ...Plural hetero atoms in the hetero ring (e.g., pyrazoles, benzimidazoles, etc.)
270 ....Chalcogen in the hetero ring (e.g., benzoxazoles, etc.)
271 .....The chalcogen is sulfur (e.g., 1,3-thiazole,etc.)
272 ......Plural nitrogens or plural sulfurs in the hetero ring (e.g., thiadiazoles, etc.)
273 ....Acyclic sulfur bonded directly to the 2- and 5-positions of a 1,3,4-thiadiazole ring or a hydrogenated 1,3,4-thiadiazole ring
274 ....Oxygen or nitrogen attached indirectly to one of the acyclic sulfurs by acyclic nonionic bonding
275 ......Polycyclo ring system which contains the hetero ring as one of the cyclos (e.g., benzothiazoles, etc.)
276 ....The 2-position of the hetero ring is substituted by double bonded sulfur, a chain of sulfur atoms, or -SH (wherein H of-SH may be substituted by metal, ammonium, or substituted ammonium)
277 .....Chalcogen or nitrogen bonded directly to ring carbon of the hereto ring (e.g., 2-oxazolidinoes, etc.)
278 .....Exactly one double bond in the hetero ring (e.g., bis-2-oxazolines, etc.)
279 ....Three or four nitrogens in the hetero ring (e.g., 1,2,4-triazole, tetrazole, etc.)
280 .....Polycyclo ring system which contains the hetero ring as one of the cyclos (e.g., alkyl benzotriazoles, etc.)
281 ......Chalcogen or nitrogen attached to the hetero ring directly or indirectly by acyclic nonionic bonding (e.g., methylene bis-benzotriazoles, etc.)
282 ......With organic phosphorus compound
283 ....The hetero ring is a monocyclic 1,3-diazole or a monocyclic hydrogenated 1,3-diazole
284 .....Chalcogen or nitrogen bonded directly to ring carbon of the 1,3-hetero ring , or the 1,3-hetero ring has two double bonds between ring members
285 .....Having -C(=X)-, wherein X is chalcogen, attached indirectly to the 1,3- hetero ring by nonionic bonding
286 .....Organic phosphorus compound salt of the 1,3-hetero ring compound, or an organic phosphorus compound is present
287 ...Plural oxygens double bonded directly to ring carbons of the hetero ring which are adjacent to the ring nitrogen
288 ....Polycyclo ring system which contains the hetero ring as one of the cyclos (i.e., fused or bridged ring system)

289 ....Sulfur attached directly or indirectly to the hetero ring by nonionic bonding
290 ....Additional oxygen attached directly or indirectly to the hetero ring by nonionic bonding
291 .....Nitrogen attached indirectly to the hetero ring by nonionic bonding (e.g., bis-succinimide compounds, etc.)
292 ......The oxygen is part of an ether linkage or is bonded directly to a benzene ring
293 ....Nitrogen attached directly or indirectly to the hetero ring by nonionic bonding
294 .....With organic phosphorus compound
295 .....With organic chalcogen or halogen compound
296 ...Polycyclo ring system which contains the hetero ring as one of the cyclos (e.g., indigo, carbazole, phthalocyanine, etc.)
297 ...Having a -C(=X)X- group, wherein the X`s are the same or diverse chalcogens, attached directly or indirectly to the hetero ring by acyclic nonionic bonding (e.g., vinylpyrrolidone-acrylate copolymers, etc.)
298 ....With metal compound, or organic phosphorus or sulfur compound
299 ..Sulfur-containing hetero ring
300 ...Plural hetero atoms in the hetero ring (e.g., 1,3-dithiane, etc.)
301 ...Polycyclo ring system which contains the hetero ring as one of the cyclos (e.g., benzothiophenes, etc.)
302 ...The hetero ring is five-membered
303 ....Chalcogen bonded directly to ring carbon of the hetero ring
304 ..Oxygen-containing hetero ring (e.g., allyl glycidyl ether, etc.)
305 ...Chalcogen double bonded directly to a ring carbon of the hetero ring which is adjacent to a ring oxygen (e.g., lactones, etc.)
306 ....And chalcogen double bonded directly to the other ring carbon of the hetero ring which is adjacent to the ring oxygen (e.g., maleic anhydride copolymers, etc.)
307 ...The hetero ring contains at least five ring members (e.g., 1,3-dioxane, furan, etc.)
308 ....Having -C(=O)O- attached directly or indirectly to the hetero ring by nonionic bonding (e.g., sorbitan esters, etc.)
309 .....The carbon of the -C(=O)O- group is bonded directly to the hetero ring (e.g., furoic acid, etc.)
310 .....With organic nitrogen compound
311 .....With sulfonic or carboxylic acid, or salt thereof
312 .Organic oxidate of indeterminate composition
313 ..Substance oxidized contains nitrogen, chalcogen, halogen, or phosphorus (e.g., oxidized sulfonate, phenol, ozonide, soap, etc.)
314 ...The substance oxidized is a carboxylic acid ester (e.g., blown lard oil, sperm oil, rapeseed oil, etc.)
315 ..Carboxylic acid ester subsequently formed from alcohol or acid of the organic oxidate
316 ..With an organic nitrogen compound, which may or may not be reacted with the organic oxidate (e.g., reaction of oxidized olefinic copolymer with amine, formaldehyde, and phenol, etc.)
317 ..The organic oxidate is reacted with sulfur, a sulfur compound, halogen, phosphorus, or a phosphorus compound
318 ..With sulfonic acid or salt thereof

319 ..With organic sulfur, phosphorus, or halogen compound
320 ..With a phenol, phenol salt, carboxylic, acid or carboxylic acid salt
321 ..Salt of the organic oxidate
322 .Sulfurized compound of indeterminate structure, which is a reaction product of an organic compound with sulfur halide, elemental sulfur, or metal polysulfide
323 ..Both sulfur and sulfur halide are reacted with the organic compound
324 ..Hydrogen sulfide or a salt thereof is also reacted with the organic compoud
325 ..Phosphorus or an inorganic phosphorus compound is reacted with the organic compound either together with or subsequent to the sulfurizing agent (e.g., terpene-sulfur-phosphorus sulfide reaction products, reaction product of sulfurized olefin with phosphorus sulfide, etc.)
326 ...The organic compound is an organic -C(=O)O- compound (e.g., sulfurized and phosphosulfurized sperm oil, fats, etc.)
327 ....With organic halogen compound
328 ..The organic compound is an organic nitrogen compound (e.g., sulfurized nitriles, phosphatides, unsaturated amines, etc.)
329 ..The organic compound is an organic phosphorus or sulfur compound (e.g., sulfurized phosphate esters, sulfonates, etc.)
330 ..The organic compound is rosin, tall oil, or a derivative thereof of indeterminate structure
331 ..The organic compound is a carboxylic acid or salt thereof
332 ..The organic compound is an organic oxygen compound which does not contain a -C(=O)O- group, or is an organic halogen compound (e.g., sulfurized pentadecenylphenol, etc.)
333 ...The oxygen compound is an ether or has hydroxy bonded directly to acyclic or alicyclic carbon (e.g., sulfurized pine oil or cardanol ether, etc.)
334 ..With an organic nitrogen compound, which may or may not be reacted with the sulfurized compound
335 ...The nitrogen is attached directly or indirectly to -C(=X)-, wherein X is chalcogen, by nonionic bonding (e.g., phosphatides, amides, zinc diamyl dithiocarbamate, etc.)
336 ..With an organic -S(=O)(O- compound, which may or may not be reacted with the sulfurized compound (e.g., sulfates, mahogany sulfonates, etc.)
337 ..With an organic phosphorus compound, which may or may not be reacted with the sulfurized compound
338 ...The organic phosphorus compound is a phosphorus acid, a salt thereof, or an indeterminate reaction product of hydrocarbon and phosphorus sulfide
339 ..With an organic -C(=O)O- compound, which may or may not be reacted with the sulfurized compound
340 ...The organic -C(=O)O- compound is naphthenic acid or a salt thereof
341 ..With organic halogen compound
342 ..With an organic oxygen compound, which may or may not be reacted with the sulfurized compound

343 ..Sulfurized mixture of hydrocarbon and carboxylic acid ester (i.e., products produced by sulfurizing a mixture containing both hydrocarbon and carboxylic acid ester)
344 ..Sulfurized carboxylic acid ester
345 ...The carboxylic acid ester is a naturally occurring triglyceride or a naturally occurring wax ester (e.g., sulfurized lard oil, degras, etc.)
346 .Phosphosulfurized or phosphooxidized organic compound of indeterminate structure (i.e., indeterminate reaction products of organic compounds with phosphorus sulfides or oxides)
347 ..The organic compound is simultaneously reacted with an inorganic phosphorus halide
348 ..The organic compound is an organic nitrogen compound (e.g., phosphosulfurized nitriles, etc.)
349 ..The organic compound is a phosphorus ester or an organic -S(=O)(=O)O- compound (e.g., phosphosulfurized petroleum mahogany sulfonates, etc.)
350 ..Phosphosulfurized or phosphooxidized mixture of hydrocarbon and organic oxygen compound
351 ..The organic compound is a carboxylic acid, salt, or ester (e.g., phosphosulfurized oleic acid, etc.)
352 ...The organic compound is a naturally occurring triglyceride or a naturally occurring wax ester (e.g., phosphosulfurized degras, etc.)
353 ..The organic compound contains -XH, wherein X is chalcogen, bonded directly to carbon and H of -XH may be replaced by metal (e.g., phosphosulfurized alkyl phenol sulfides, etc.)
354 ..The organic compound is a hydrocarbon
355 ...With an organic nitrogen compound, which may or may not be reacted with the phosphosulfurized or phosphooxidized hydrocarbon
356 ....The nitrogen is attached directly or indirectly to -C(=X)-, wherein X is chalcogen, by nonionic bonding (e.g., amides, aminocarboxylic acids, etc.)
357 ...With an organic phosphorus compound, which may or may not be reacted with the phosphosulfurized or phosphooxidized hydrocarbon
358 ...With an organic -S(=O)(=O)O- compound, which may or may not be reacted with the phosphosulfurized or phosphooxidized hydrocarbon
359 ...With an organic -C(=X)X- compound, wherein the X`s may be same or diverse chalcogens, which compound may or may not be reacted with the phosphosulfurized or phosphooxidized hydrocarbon
360 ...With an organic chalcogen compound, which may or may not be reacted with the phosphosulfurized or phosphooxidized hydrocarbon (e.g., phenols, alcohols, quinones, etc.)
361 ...The phosphosulfurized or phosphooxidized hydrocarbon is reacted with water, a base, a metal compound, or elemental metal (e.g., overbased phosphosulfurized hydrocarbon, etc.)
362 .Nitrogen and heavy metal, or nitrogen and aluminum, in the same compound
363 ..The nitrogen is bonded directly to the carbon of a -C(=X)X- group, wherein the X`s may be the same or diverse chalcogens (e.g., dithiocarbamates, etc.)
364 ...With organic nitrogen, phosphorus, or chalcogen compound
365 ....With metal compound

366 ..The nitrogen is multiple bonded to carbon, or is bonded directly to additional nitrogen
367 ..Containing -C(=X)-, wherein X is chalcogen
368 .Heavy metal or aluminum in an organic phosphorus compound having four chalcogens bonded directly to the phosphorus
369 ..The phosphorus is bonded indirectly to an additional diverse metal or to carbonyl (e.g., molybdenum-zinc dialkyldithiophosphates, etc.)
370 ..The phosphorus is attached indirectly to chalcogen by nonionic bonding, or is part of a ring consisting of phosphorus, carbon and chalcogen
371 ..The heavy metal is zinc
372 ...With organic sulfonate compound
373 ....With organic nitrogen compound
374 ....With organic -C(=X)X- compound, wherein the X`s may be the same or diverse chalcogens
375 ...With organic nitrogen compound
376 ....The nitrogen is bonded directly to -C(=X)-, wherein X is chalcogen (e.g., amides, etc.)
377 ...With organic phosphorus compound that does not contain zinc
378 ...With organic chalcogen compound that does not contain phosphorus
379 ..The heavy metal is molybdenum, a rare earth metal, gold, silver, or mercury
380 ..With organic chalcogen compound that does not contain phosphorus
381 .Heavy metal or aluminum in the same compound with alkali or alkaline earth metal
382 .Heavy metal or aluminum bonded directly to carbon
383 ..The heavy metal or aluminum is bonded directly to carbonyl, or is double bonded directly to chalcogen
384 ..The heavy metal or aluminum is directly bonded only to carbon
385 .Heavy metal or aluminum naphthenate, in combination with an organic nitrogen, sulfur, or phosphorus compound
386 .Organic -XCN or -N=C=X compound, wherein X is chalcogen
387 .Compound of indeterminate structure, prepared by reacting an organic sulfonate compound of known structure
388 .Organic sulfur compound, wherein the sulfur is single bonded directly to oxygen (e.g., sulfites, etc.)
389 ..The sulfur is part of an -O-S(=O)(=O)O- group (i.e., sulfates)
390 ..The sulfur is part of an -O-S(=O)(=O)- group (i.e., sulfonates)
391 ...Overbased or carbonated sulfonates
392 ....Prepared by addition of carbon dioxide, carbonic acid, or salt thereof to a reaction mixture containing alkylphenol, substituted alkylphenol, or salt thereof and sulfonic acid or salt thereof
393 ....Prepared by chemical reaction of existing overbased sulfonate in the absence of additional base (e.g., converting overbased sulfonate to non-newtonian or thixotropic composition; further reacting overbased sulfonate with carboxylic acid, etc.)
394 ....Prepared with, or in the presence of, a halogen-containing material
395 ....Prepared by addition of carbon dioxide, carbonic acid, or salt thereof to a reaction mixture prior to addition of sulfonic acid or salt thereof (i.e., carbonating reaction mixture prior to addition of sulfonic acid or salt thereof)
396 ....Prepared with, or in the presence of, a nitrogen-containing material

397 .....The nitrogen-containing material is an ammonium salt or a substituted ammonium salt
398 ....With nonhydrocarbon organic compound in addition to those remaining from overbasing process (e.g., antioxidants, VI improvers, etc.)
399 .....The compound is an organic nitrogen compound
400 .....The compound is a carboxylic acid ester (e.g., as lubricant base, etc.)
401 ....Prepared by addition of carbon dioxide, carbonic acid, or salt thereof
402 .....Multiple additions thereof
403 ...The single bonded oxygen is bonded directly to carbon (e.g., sulfonate esters, etc.)
404 ...Nitrogen attached directly or indirectly to the sulfonate group by nonionic bonding
405 ...Non-sulfonate chalcogen attached indirectly to the sulfonate group by nonionic bonding
406 ...Halogen attached indirectly to the sulfonate group by nonionic bonding
407 ...With rosin, tall oil, or derivatives thereof of indeterminate structure
408 ...With organic phosphorus compound (e.g., phosphate esters, etc.)
409 ...With carboxylic acid ester
410 ...Organic nitrogen compound salt of a sulfonic acid, or an organic nitrogen compound is present
411 ....The organic nitrogen compound is a guanidine or a carboxylic acid amide
412 ....Chalcogen attached indirectly to the nitrogen by nonionic bonding (e.g., trialkanolamines, phenol-aldehyde-amine condensates, etc.)
413 ...With organic -C(=O)O- compound
414 ....Ring bonded directly to the carbon of the -C(=O)O- group (e.g., phthalates, naphthenates, etc.)
415 ....With compound having alcoholic or phenolic -OH, or salt thereof
416 ...With organic halogen or non-sulfonate chalcogen compound (e.g., haloparaffins, ethers, ketones, polyols, etc.)
417 ....The non-sulfonate chalcogen compound is a phenol, or salt thereof
418 ...Aluminum or heavy metal sulfonate salt
419 .Compound of indeterminate structure, prepared by reacting a compound having phosphorus single bonded directly to chalcogen by nonionic bonding and attached directly or indirectly to carbon by nonionic bonding (e.g., by reaction of phosphorus acids and esters, etc.)
420 ..A nitrogen compound is reacted with the phosphorus compound
421 .Organic phosphorus compound, wherein the phosphorus is single bonded directly to chalcogen by nonionic bonding (e.g., phosphorus acids, esters, etc.)
422 ..The phosphorus is in a ring
423 ..Additional phosphorus attached directly or indirectly to the phosphorus by nonionic bonding
424 ...Plural phosphori bonded to the same chalcogen or chain of chalcogens (e.g., pyrophosphates, etc.)
425 ...Nitrogen attached directly or indirectly to the phosphorus by nonionic bonding
426 ...Having -C(=O)O- attached indirectly to the phosphorus by nonionic bonding
427 ..Nitrogen or halogen bonded directly to the phosphorus
428 ..Nitrogen attached indirectly to the phosphorus by nonionic bonding (e.g., phosphatides, etc.)
429 ..Chalcogen attached indirectly to the phosphorus by nonionic bonding
430 ...The chalcogen, X, is part of a -C(=X)- group

431 ...Plural carbons bonded directly to the chalcogen or to a chain of chalcogens
432 ....The chalcogen is sulfur, or the chain of chalcogens is a chain of sulfurs
433 ..Divalent chalcogen double bonded directly to the phosphorus
434 ...Hydrogen bonded directly to the phosphorus
435 ...Phosphorus acid salt with metal or ammonia (e.g., overbased or carbonated phosphorus acids, etc.)
436 ...Organic nitrogen compound salt of phosphorus acid, or organic nitrogen compound is present with phosphorus acid
437 ....With organic -C(=O)O- compound
438 ...With organic nitrogen, sulfur, or halogen compound
439 ....With organic -C(=O)O- compound
440 ...With organic -C(=O)O- compound
441 ..Three divalent chalcogens single bonded directly to trivalent phosphorus
442 ...With organic chalcogen or nitrogen compound
443 .Organic -C(=X)X- compound, wherein the X`s are the same or diverse chalcogens, with at least one X being sulfur
444 ..The single bonded chalcogen is bonded directly to an additional carbon, which carbon may be single bonded to any atom but may be multiple bonded only to carbon (i.e., thiocarboxy esters)
445 ...Chalcogen bonded directly to the carbon of the -C(=X)X- group (e.g., xanthate esters, trithiocarbonate esters, etc.)
446 .Compound of indeterminate structure, prepared by reacting an organic cyano or isocyano compound of known structure
447 .Organic cyano or isocyano compound
448 ..Nitrogen attached directly or indirectly to the cyano group by nonionic bonding
449 .Rosin, tall oil, or derivatives of indeterminate structure thereof
450 .Purified or chemically reacted naturally occurring carboxylic acid ester wax (e.g., acidolized, hydrogenated, halogenated, etc.)
451 .Naturally occurring carboxylic acid ester wax (e.g., carnauba wax, lanolin, beeswax, etc.)
452 .Compound of indeterminate structure, prepared by reacting an organic -C(=O)O- compound of known structure
453 ..An aldehyde or azomethine is reacted with the -C(=O)O- compound
454 ..A nitrogen compound is reacted with the -C(=O)O- compound
455 ..A polyhydroxy compound is reacted with the -C(=O)O- compound
456 ..Polymerized triglycerides
457 ..Benzene ring compound reacted with the -C(=O)O- compound
458 ..A reactant contains halogen
459 .Organic -C(=O)O- compound
460 ..Overbased or carbonated carboxylates
461 ..Phosphorus attached indirectly to the -C(=O)O- group by nonionic bonding
462 ..Additional chalcogen bonded directly to the carbon or the oxy of the -C(=O) O- group (i.e., carbonates, percarboxylates)
463 ..Specified compound wherein the single bonded oxygen is bonded oxygen is bonded directly to an additional carbon, which carbon may be single bonded to any atom but may be multiple bonded only to carbon (i.e., specified carboxylic acid ester)
464 ...Nitrogen bonded directly to the carbon of the -C(=O)O- group
465 ...Plural -C(=O)O- groups attached directly or indirectly to each other by nonionic bonding (e.g., estolides of hydroxy carboxylic acids, etc.)

466 ....Polymer of alpha, beta-olefinically unsaturated dicarboxylic acid ester monomer, or of esterified alpha, beta-olefinically unsaturated dicarboxylic acid or anhydride monomer (e.g., copolymer of maleic acid ester and vinyl alkyl ether, etc.)

467 .....Monocarboxylic acid ester of olefinically unsaturated alcohol is an additional monomer of the polymer (e.g., dialkyl furmarate-vinyl acetate copolymer, etc.)

468 .....Olefin or alpha, beta-olefinically unsaturated carboxylate is an additional monomer of the polymer (e.g., fumarate-ethylene or fumarate-acrylate copolymers, etc.)

469 ....Polymer of alpha, beta-olefinically unsaturated carboxylate monomer (e.g., polymethylmethacrylate, etc.)

470 .....Nitrogen attached indirectly to the -C(=O)O- groups by nonionic bonding (e.g., lauryl methacrylate-diethylaminomethyl-acrylate copolymer, etc.)

471 ......Having -C(=X)- wherein X is chalcogen, bonded directly to the nitrogen (e.g., acrylamide-methyl acrylate copolymer, etc.)

472 .....Olefinically unsaturated compound that is not a carboxylic acid ester is an additional monomer of the polymer (e.g., ethylene-ethylacrylate copolymer, etc.)

473 .....With hydrocarbon polymer, carboxylic acid, or carboxylic acid salt

474 .....With non-acrylate organic chalcogen compound

475 ....Polymer of monocarboxylic acid ester of olefinically unsaturated alcohol (e.g., ethylene-vinyl acetate copolymer, etc.)

476 ....Nitrogen attached indirectly to the -C(=O)O- groups by nonionic bonding

477 .....Benzene ring, chalcogen, or -C(=X)-, wherein X is chalcogen, attached directly to the nitrogen by nonionic bonding

478 ....Benzene ring attached directly or indirectly to the -C(=O)O- groups by nonionic bonding

479 .....The benzene ring is bonded directly to carbon of a -C(=O)O- group

480 ......Carbons of plural -C(=O)O- groups are bonded directly to the same benzene ring (e.g., vanadium salt of oleyl acid phthalate,etc.)

481 ....Three or more -C(=O)O- groups attached indirectly to each other by nonionic bonding

482 ....Phthalic acid dialkyl ester

483 .....The benzene ring is bonded directly to the single bonded oxygen of a -C(=O)O- group

484 ....Cycloaliphatic ring attached directly to carbon of a -C(=O)O- group

485 ....Esterified alcohol is polyhydroxy alcohol (e.g., pentaerythritol tetraalkanoate, etc.)

486 .....Esterified polyhydroxy alcohol is glycerol (i.e., glycerides)

487 ......With organic nitrogen or phosphorus compound

488 ......With carboxylic acid or carboxylic acid salt

489 ......With organic non-carboxylic acid ester oxygen compound or halogen compound

490 ......With hydrocarbon polymer

491 ......Naturally occurring triglyceride (e.g., tallow, castor oil, corn oil, etc.)

492 .....Polycarboxylic acid esterifies polyhydroxy alcohol

493 ......With organic non-carboxylic acid ester chalcogen compound, nitrogen compound, or halogen compound

494 .....Ether or thioether chalcogen attached indirectly to the -C(=O)O- groups (e.g., polyethyleneglycol esters, etc.)
495 .....With organic non-carboxylic acid ester chalcogen compound or nitrogen compound
496 ....Mono-, di-, or polyester of polycarboxylic acid
497 .....Non-carboxylate chalcogen attached indirectly to the -C(=O)O- groups by nonionic bonding (e.g., tartaric acid esters, etc.)
498 .....With carboxylic acid or carboxylic acid salt
499 .....With hydrocarbon polymer, organic halogen compound, or organic non-carboxylic acid ester chalcogen compound
500 ...Nitrogen attached indirectly to the -C(=O)O- group by nonionic bonding
501 ...Chalcogen attached indirectly to the -C(=O)O-group by nonionic bonding (e.g., pentaerythritol monooleate, etc.)
502 ....The chalcogen and the carbon of the -C(=O)O- group are bonded to a single benzene ring (e.g., salicylic acid esters, etc.)
503 ....With carboxylic acid, carboxylic acid salt, or organic nitrogen compound
504 ...Halogen attached indirectly to the -C(=O)O- group by nonionic bonding
505 ...With hydrocarbon polymer or organic non-carboxylic acid ester oxygen compound (e.g., polybutene, dimer carboxylic acids, alcohols, etc.)
506 ..Plural -C(=O)O- groups attached directly or indirectly to each other by nonionic bonding (e.g., alkyl succinic acid, linoleic acid dimer, etc.)
507 ...Polymer of alpha, beta-olefinically unsaturated carboxylate monomer (e.g., acrylic acid-butadiene copolymer, etc.)
508 ...Nitrogen attached indirectly to the -C(=O)O- groups by nonionic bonding
509 ...Halogen, sulfur, selenium, or tellurium attached indirectly to the -C(=O)O- groups by nonionic bonding
510 ...Non-carboxylate oxygen attached indirectly to the -C(=O)O- groups by nonionic bonding
511 ...Organic nitrogen salt of a polycarboxylic acid, or with organic nitrogen compound
512 ...With organic monocarboxylate or non-carboxylate oxygen compound (e.g., phenols, polyethers, hydroxystearates, etc.)
513 ..Nitrogen attached to the -C(=O)O- group directly or indirectly by nonionic bonding (e.g., carbamic acids, amino acids, etc.)
514 ...Having additional -C(=O)O- bonded directly to the nitrogen (e.g., N- lauroyl sarcosine, etc.)
515 ....The additional -C(=O)- is bonded directly to a benzene ring, or additional nitrogen is attached indirectly to the -C(=O)O- group by nonionic bonding (e.g., terephthalamates, polyamide acids, etc.)
516 ..Chalcogen attached indirectly to the -C(=O)O- group by nonionic bonding
517 ...Plural carbons bonded directly to the chalcogen (e.g., ethers, etc.)
518 ...The chalcogen and the carbon of the -C(=O)O- group are bonded to a single benzene ring (e.g., salicylic acid salts, etc.)
519 ...The chalcogen is in an -OH group bonded to an acyclic carbon (wherein H of -OH may be replaced by metal, ammonium, or substituted ammonium; e.g., lithium-12-hydroxy stearate, saponified castor oil, etc.)

520 ....With ether or alcohol (except glycerin)
521 ....With organic nitrogen compound (which may be present as the amine salt of the acid), hydrocarbon polymer or halohydrocarbon polymer
522 ....With hydrocarbon fatty acid or salt thereof, or complexes of such salt mixtures
523 ....Alkaline earth metal, aluminum, or heavy metal salt of the hydroxy carboxylic acid
524 ..Halogen attached indirectly to the C(=O)O- group by nonionic bonding
525 ..Benzene ring bonded directly to the carbon of the -C(=O)O- group (e.g., aluminum complex salts, etc.)
526 ..Benzene ring attached indirectly to the -C(=O)O- group by nonionic bonding (e.g., phenylstearate salts, etc.)
527 ..Organic nitrogen salt of a carboxylic acid, or an organic nitrogen compound is present
528 ...Having -C(=X)-, wherein X is chalcogen, attached directly to the nitrogen (e.g., amides, polyureas, etc.)
529 ...Benzene ring bonded directly to the nitrogen
530 ...The nitrogen is part of an alkanolamine
531 ..With phenol or salt thereof
532 ..With ether or alcohol (except glycerin)
533 ..With organic halogen or sulfur compound
534 ..With rubber, hydrocarbon polymer, petroleum resin or hydrocarbon wax (e.g., polyisobutylene, etc.)
535 ..Mixture of salt of carboxylic acid of six or fewer carbons with salt of carboxylic acid of more than six carbons, or complexes of such mixtures
536 ..Mixture of carboxylic acid salts having different cations
537 ...One of the cations is aluminum or heavy metal
538 ..Naphthenic acid or salt thereof
539 ..Carboxylate salt, with no free acid present
540 .Compound of indeterminate structure prepared by reacting a compound of known structure having halogen attached directly to phosphorus or chalcogen by nonionic bonding
541 .Organic selenium or tellurium compound
542 .Compound of indeterminate structure, prepared by reacting an aldehyde, a phenol or phenol salt, and ammonia or substituted ammonia (e.g., reaction of formaldehyde, phenol, and amine, etc.)
543 .Compound of indeterminate structure, prepared by reacting an organic nitrogen compound of known structure
544 ..An aldehyde is reacted with the organic nitrogen compound
545 .Organic nitrogen compound
546 ..Additional nitrogen bonded directly to the nitrogen (e.g., hydrazines, semicarbazones, etc.)
547 ..Quaternary ammonium salts or N-oxides
548 ..Oxygen, sulfur, or phosphorus attached directly to the nitrogen by nonionic bonding
549 ...Nitro or nitroso bonded directly to carbon
550 ..Carbon double bonded directly to the nitrogen
551 ..Having -C(=X)- bonded directly to the nitrogen, wherein X is oxygen or sulfur
552 ...Additional nitrogen bonded directly to the -C(=X)- group (e.g., ueas, etc.)
553 ...Having -OH substituted benzene ring bonded directly to the -C(=X)- or to the nitrogen (wherein H of -OH may be replaced by metal, ammonium, or substituted ammonium; e.g., salicylamides, etc.)
554 ...Plural nitrogens bonded directly to a single acyclic hydrocarbon chain (e.g., amides of ethylene diamine, etc.)

555 ...Additional oxygen or sulfur attached indirectly to the nitrogen by acyclic nonionic bonding (e.g., oxamides, etc.)
556 ..Nitrogen attached indirectly to the nitrogen by nonionic bonding
557 ...Plural nitrogens bonded directly to a single benzene ring
558 ...Plural nitrogens bonded directly to a single acyclic hydrocarbon chain
559 ....Oxygen or sulfur attached indirectly to the nitrogen by acyclic nonionic bonding
560 ...Oxygen or sulfur bonded directly to a benzene ring (e.g., aniline disulfide, etc.)
561 ..Oxygen or sulfur attached indirectly to the nitrogen by nonionic bonding
562 ...The oxygen or sulfur is attached indirectly to the nitrogen by acyclic nonionic bonding
563 ..Benzene ring bonded directly to the nitrogen
564 .Organic phosphorus compound
565 .Compound of indeterminate structure, prepared by reacting an organic sulfur compound of known structure
566 .Compound of indeterminate structure, prepared by the reaction of a phenol, an aldehyde, and at least one of carbon disulfide, metal sulfide, or ammonium sulfide
567 .Organic sulfur compound (e.g., mercaptans, etc.)
568 ..Sulfur multiple bonded to another, different, atom (e.g., thioketones, sulfones, etc.)
569 ..Sulfides (i.e., plural carbons bonded directly to a single sulfur atom or sulfur chain)
570 ...Halogen, oxygen or additional sulfur attached indirectly to the sulfur atom or sulfur chain by acyclic nonionic bonding
571 ...Benzene ring attached indirectly to the sulfur atom or sulfur chain by acyclic nonionic bonding
572 ...Having plural -OH substituted benzene rings bonded directly to the sulfur atom or sulfur chain wherein H of-OH may be replaced by metal or ammonium; (e.g., sulfurized calcium alkylphenolates, etc.)
573 ....Halogen, a ring, carbonyl, or additional -OH bonded directly to one of the benzene rings
574 ....Overbased or carbonated (e.g., overbased sulfurized phenates, etc.)
575 .Compound of indeterminate structure, prepared by reacting an organic oxygen compound of known structure
576 ..The organic oxygen compound of known structure is a carboxylic acid halide
577 .Organic oxygen compound
578 ..Carbocyclic ring bonded directly to the carbon of a carbonyl group (e.g., phenyl ketones, anthraquinones, etc.)
579 ..Ethers
580 ...Ring bonded directly to the ether oxygen
581 ....Two rings bonded directly to the ether oxygen
582 ...Halogen attached indirectly to the ether oxygen by nonionic bonding
583 ..Having -OH bonded directly to carbon (wherein H of -OH may be replaced by metal or ammonium)
584 ...Benzene ring bonded directly to the -OH group (i.e., beta-naphthol, etc.)
585 ....Plural benzene rings bonded to each other, to the same acyclic carbon or to the same cyclic carbon chain (e.g., phenol-aldehyde condensates, etc.)
586 ....The -OH group is in salt form
587 ....Halogen or additional -OH attached directly or indirectly to the benzene ring by nonionic bonding
588 .Organic halogen compound

589 ..Halogenated acyclic compound or halogenated petroleum fraction
590 ...Fluorinated acyclic compound or fluorinated petroleum fraction (e.g., trifluorochloroethylene telomer, etc.)
591 .Solid hydrocarbon polymer

FOREIGN ART COLLECTIONS

FOR 000 **CLASS-RELATED FOREIGN DOCUMENTS**