

## SEARCH HISTORY

<b>Application Number</b>	PCT/US 19/65070
<b>Search Conducted By</b>	NH
<b>Search Approved By</b>	SCL

<b>CPC/IPC Classifications Searched</b>	IPC(8): F16K 37/00 (2020.01) CPC: F16K 37/0008
<b>Date Conducted</b>	22 January 2020 (22.01.2020)

<b>Documentation Searched</b>	IPC(8): G01D 5/04 (2020.01) CPC: F16K 37/0016, F16K 37/0025, F16K 37/0033, F16K 37/0041, F16K 37/0075, G01D 5/04 USPC: 137/553, 137/556, 137/556.3, 137/556.6
<b>Search Terms Used</b>	valve, position, status, state, open, close, indicate, signal, gauge, dial, meter, pointer, gear, pinion, handwheel, hand, wheel, plural, several, multiple, second, third, fourth, two, three, four, support, shaft, bearing, transmission, indicator, output, sensor, detector, monitor, rotary, rotate, turn, limit, switch, switches, quarter, partial, pin, rod, flexible, pliable, position, wireless, ball, globe, gate, throttle
<b>Date Conducted</b>	22 January 2020 (22.01.2020)

<b>Electronic Database Searched</b>	PatBase
<b>Files Searched</b>	Full-text: AU BE BR CA CH CN DE DK EP ES FI FR GB IN JP KR SE TH TW US WO Bibliographic: (Europe) AT BA BE BG CH CS CY CZ DD DK EE ES FI GE GR HR HU IE IS IT LT LU LV MC MD MT NL NO PL PT RO RS SE SI SK SM TR UA YU (Asia) EA GC HK ID IL IN KZ MN MY PH RU SG SU TH TJ TW UZ VN (North America) CA CR CU DO GT HN MX NI PA SV TT (South America) AR BR CL CO EC PE UY (Australasia) AU NZ (Africa) AP DZ EG KE MA MW OA ZA ZM ZW
<b>Date Conducted</b>	22 January 2020 (22.01.2020)

<b>Search Logic:</b>
----------------------

Search 1: IC=(F16K37/00 OR G01D5/04) (Results 23256)

Search 2: CPC=(F16K37/0008 OR F16K37/0016 OR F16K37/0025 OR F16K37/0033 OR F16K37/0041 OR F16K37/0075 OR G01D5/04) (Results 5160)

Search 3: UC=(137/553 OR 137/556 OR 137/556.3 OR 137/556.6) (Results 1548)

Search 4: 1 OR 2 OR 3 (Results 25260)

Search 5: 4 AND FT=(valve\*) (Results 19768)

Search 6: 5 AND FT=(valve\* w5 (position\* OR status\* OR state\* OR open\* OR close\*)) (Results 10963)

Search 7: 6 AND FT=((indicat\* OR signal\* OR gauge\* OR dial\* OR meter\* OR pointer\*) w5 (position\* OR status\* OR state\* OR open\* OR close\*)) (Results 4505)

Search 8: 7 AND FT=(gear\* OR pinion\*) (Results 882)

Search 9: 8 AND FT=((gear\* OR pinion\*) w5 (valve\* OR handwheel\* OR (hand wheel\*))) (Results 315)

Search 10: 9 AND FT=((plural\* OR several\* OR multi\* OR second\* OR third\* OR fourth\* OR two\* OR three\* OR four\*) w5 (gear\* OR pinion\*)) (Results 117)

Search 11: 9 AND FT=((gear\* OR pinion\*) w5 (support\* OR shaft\* OR bearing\*)) (Results 168)

Search 12: 11 NOT 10 (Results 83)

Search 13: 9 NOT (10 OR 11) (Results 115)

Search 14: 7 AND FT=(transmission\* w5 (valve\* OR handwheel\* OR (hand wheel\*))) (Results 180)

Search 15: 14 NOT 9 (Results 145)

Search 16: 7 AND FT=(gear\* OR pinion\* OR transmission\*) (Results 1458)

Search 17: 16 AND FT=((indicator\* OR output\*) w5 (sensor\* OR detector\* OR monitor\*)) (Results 308)

Search 18: 17 AND FT=((sensor\* OR detector\* OR monitor\*) w3 (rotar\* OR rotat\*)) (Results 57)

Search 19: 18 AND FT=((sensor\* OR detector\* OR monitor\* OR rotar\* OR rotat\*) w5 turn\*) (Results 22)

Search 20: 18 NOT 19 (Results 35)

Search 21: 17 AND FT=((sensor\* OR detector\* OR monitor\*) w3 ("limit switch" OR "limit switches")) (Results 6)

Search 22: 21 NOT 18 (Results 4)

Search 23: 17 AND FT=((indicator\* OR sensor\* OR detector\* OR monitor\*) w3 (quarter\* OR partial\*)) (Results 10)

Search 24: 23 NOT 18 (Results 7)

Search 25: 16 AND FT=((shaft% OR pin% OR rod%) w3 (output\* OR second\* OR gear\* OR pinion\* OR transmission\*)) (Results 420)

Search 26: 25 AND FT=((shaft% OR pin% OR rod%) w3 (flex\* OR pliab\*)) (Results 14)

Search 27: 16 AND FT=(handwheel\* OR (hand w1 wheel\*)) (Results 184)

Search 28: 17 AND FT=(position\* w3 (indicator\* OR sensor\* OR detector\* OR monitor\*)) (Results 232)

Search 29: 28 AND FT=(wireless\* w5 (position\* OR indicator\* OR sensor\* OR detector\* OR monitor\*)) (Results 33)

Search 30: FT=((ball\* OR globe\* OR gate\* OR rotar\* OR rotat\* OR throttle\*) w2 valve\*) (Results 433385)

Search 31: 30 NOT 4 (Results 429656)

Search 32: 31 AND FT=(valve\* w5 (position\* OR status\* OR state\* OR open\* OR close\*)) (Results 265202)

- Search 33: 32 AND FT=((indicat\* OR signal\* OR gauge\* OR dial\* OR meter\* OR pointer\*) w5 (position\* OR status\* OR state\* OR open\* OR close\*)) (Results 57830)
- Search 34: 33 AND FT=(gear\* OR pinion\* OR transmission\*) (Results 27536)
- Search 35: 34 AND FT=((gear\* OR pinion\*) w5 (valve\* OR handwheel\* OR (hand wheel\*))) (Results 4072)
- Search 36: 35 AND FT=((gear\* OR pinion\* OR transmission\*) w5 (indicat\* OR signal\* OR gauge\* OR dial\* OR meter\* OR pointer\*)) (Results 1252)
- Search 37: 36 AND FT=((plural\* OR several\* OR multi\* OR second\* OR third\* OR fourth\* OR two\* OR three\* OR four\*) w5 (gear\* OR pinion\*)) (Results 907)
- Search 38: 37 AND FT=((gear\* OR pinion\*) w5 (support\* OR shaft\* OR bearing\*)) (Results 670)
- Search 39: 38 AND FT=((indicator\* OR output\*) w5 (sensor\* OR detector\* OR monitor\*)) (Results 196)
- Search 40: 39 AND FT=((sensor\* OR detector\* OR monitor\*) w3 (rotar\* OR rotat\*)) (Results 76)
- Search 41: 40 AND FT=((sensor\* OR detector\* OR monitor\* OR rotar\* OR rotat\*) w5 turn\*) (Results 30)
- Search 42: 39 AND FT=((sensor\* OR detector\* OR monitor\*) w3 ("limit switch" OR "limit switches")) (Results 0)
- Search 43: 39 AND FT=((indicator\* OR sensor\* OR detector\* OR monitor\*) w3 (quarter\* OR partial\*)) (Results 0)
- Search 44: 38 AND FT=((shaft% OR pin% OR rod%) w3 (output\* OR second\* OR gear\* OR pinion\* OR transmission\*)) (Results 637)
- Search 45: 44 AND FT=((shaft% OR pin% OR rod%) w3 (flex\* OR pliab\*)) (Results 15)
- Search 46: 39 AND FT=(position\* w3 (indicator\* OR sensor\* OR detector\* OR monitor\*)) (Results 144)
- Search 47: 46 AND FT=(wireless\* w5 (position\* OR indicator\* OR sensor\* OR detector\* OR monitor\*)) (Results 0)
- Search 48: CPC=(F16K37/0008) (Results 949)
- Search 49: 48 AND FT=(gear\* OR pinion\* OR transmission\*) (Results 200)
- Search 50: PN=(GB446582 OR GB429686 OR CN104265989 OR JP2008303902 OR US3239616 OR US6471182 OR GB172084) (Results 7)
- Search 51: CTF 50 OR CTB 50 (Results 66)
- Search 52: 9 AND FT=((orthogonal\* OR perpendicular\* OR normal\*) w3 (gear\* OR pinion\*)) (Results 9)
- Search 53: 37 AND FT=((orthogonal\* OR perpendicular\* OR normal\*) w3 (gear\* OR pinion\*)) (Results 135)

<b>Electronic Database Searched</b>	Google Patents
<b>Files Searched</b>	All Files
<b>Date Conducted</b>	22 January 2020 (22.01.2020)
<b>Search Logic:</b>	

(valve) (position indicator)  
 About 235,000 results (0.28 seconds)

(valve) (position indicator) (gear train)  
 About 17,200 results (0.34 seconds)

(valve) (handwheel) (position indicator)  
About 3,490 results (0.31 seconds)

(valve) (handwheel) (position indicator) (gear train)  
About 4,020 results (0.44 seconds)

(valve) (handwheel) (position indicator) (output position sensor)  
About 1,540 results (0.35 seconds)

(valve) (handwheel) (position indicator) (output rotary sensor)  
About 1,450 results (0.37 seconds)

(valve) (position indicator) (output limit switch)  
About 71,200 results (0.38 seconds)

(valve) (position indicator) (output quarter turn indicator)  
About 41,900 results (0.39 seconds)

(valve) (position indicator) (retrofit hand wheel)  
About 7,380 results (0.35 seconds)

<b>Electronic Database Searched</b>	Google Web
<b>Files Searched</b>	All Articles
<b>Date Conducted</b>	22 January 2020 (22.01.2020)
<b>Search Logic:</b>	
-----	

(valve) (position indicator)  
About 23,000,000 results (0.39 seconds)

(valve) (position indicator) (gear train)  
About 3,730,000 results (0.50 seconds)

(valve) (handwheel) (position indicator)  
About 306,000 results (0.50 seconds)

(valve) (handwheel) (position indicator) (gear train)  
About 280,000 results (0.50 seconds)

(valve) (handwheel) (position indicator) (output position sensor)  
About 221,000 results (0.52 seconds)

(valve) (handwheel) (position indicator) (output rotary sensor)  
About 164,000 results (0.66 seconds)

(valve) (position indicator) (output limit switch)  
About 5,580,000 results (0.50 seconds)

(valve) (position indicator) (output quarter turn indicator)  
About 8,510,000 results (0.50 seconds)

(valve) (position indicator) (retrofit hand wheel)  
About 2,970,000 results (0.50 seconds)

<b>Electronic Database Searched</b>	Google Scholar
<b>Files Searched</b>	All Articles (except patents)
<b>Date Conducted</b>	22 January 2020 (22.01.2020)
<b>Search Logic:</b>	

(valve) (position indicator)  
About 166,000 results (0.08 sec)

(valve) (position indicator) (gear train)  
About 13,200 results (0.08 sec)

(valve) (handwheel) (position indicator)  
About 1,750 results (0.10 sec)

(valve) (handwheel) (position indicator) (gear train)  
About 2,750 results (0.12 sec)

(valve) (handwheel) (position indicator) (output position sensor)  
About 931 results (0.10 sec)

(valve) (handwheel) (position indicator) (output rotary sensor)  
About 588 results (0.11 sec)

(valve) (position indicator) (output limit switch)  
About 29,400 results (0.12 sec)

(valve) (position indicator) (output quarter turn indicator)  
About 23,000 results (0.13 sec)

(valve) (position indicator) (retrofit hand wheel)  
About 4,860 results (0.07 sec)