CPC COOPERATIVE PATENT CLASSIFICATION

B PERFORMING OPERATIONS; TRANSPORTING

(NOTES omitted)

SHAPING

B25 HAND TOOLS; PORTABLE POWER-DRIVEN TOOLS; MANIPULATORS (NOTE omitted)

B25J MANIPULATORS; CHAMBERS PROVIDED WITH MANIPULATION DEVICES

({manipulators specially adapted for use in surgery A61B 34/70; manipulators used in cleaning hollow articles B08B 9/04}; manipulators associated with rolling mills B21B 39/20; manipulators associated with forging machines B21J 13/10; {manipulators associated with picking-up and placing mechanisms B23P 19/007}; means for holding wheels or parts thereof B60B 30/00; {vehicles with ground-engaging propulsion means, e.g. walking members B62D 57/02, B62D 57/032; devices for picking-up and depositing articles or materials between conveyors B65G 47/90, B65G 47/91; manipulators with gripping or holding means for transferring packages B65H 67/065}; cranes B66C; {manipulators used in the protection or supervision of pipe-line installations F17D 5/00; walking equipment adapted for nuclear steam-generators F22B 37/006}; manipulators specially adapted for, or associated with, nuclear reactors G21C; {apparatus used for handling wafers during manufacture or treatment of semiconductor H01L 21/68})

NOTE

In this subclass, the following term is used with the meaning indicated:

 "manipulator" covers handling tools, devices, or machines having a gripping or work head capable of bodily movement in space and of change of orientation, such bodily movement and change of orientation being controlled, at will, by means remote from the head.

WARNINGS

1. The following IPC groups are not in the CPC scheme. The subject matter for these IPC groups is classified in the following CPC groups:

B25J 9/18 covered by <u>B25J 9/16</u>

B25J 9/22 covered by <u>B25J 9/1656, G05B 19/42</u>

2. In this subclass non-limiting references (in the sense of paragraph 39 of the Guide to the IPC) may still be displayed in the scheme.

1/00	Manipulators positioned in space by hand (of master-slave type <u>B25J 3/00</u> ; micromanipulators <u>B25J 7/00</u>)	5/00	Manipulators mounted on wheels or on carriages (<u>B25J 1/00</u> takes precedence; programme-controlled manipulators <u>B25J 9/00</u> {; vehicle aspects <u>B60</u> ,
1/02 1/04	 articulated or flexible rigid, e.g. shelf-reachers {(without grippers A47F 13/06)} 		<u>B62</u> , e.g. remote-controlled steering for motor vehicles <u>B62D 1/24</u> ; control of position of vehicles <u>G05D 1/00</u> })
1/06 1/08 1/10 1/12	 of the lazy-tongs type movably mounted in a wall Sleeve and pivot mountings therefor having means for attachment to a support stand 	5/002 5/005 5/007 5/02 5/04	 {mounted on an air cushion} {mounted on endless tracks or belts} {mounted on wheels} travelling along a guideway wherein the guideway is also moved, e.g.
3/00 3/02	Manipulators of master-slave type, i.e. both controlling unit and controlled unit perform corresponding spatial movements involving a parallelogram coupling of the master and slave units (pantographic instruments B43L 13/00)	5/06	travelling crane bridge type Manipulators combined with a control cab for the operator
3/04	involving servo mechanisms (servo-actuated heads <u>B25J 15/02</u>)		

investigating or analysing materials GIDIN 23/22014; associated with microscopes GOUZ 11/21/22 immus for supporting or positioning the objects or the material in discharge tables H011 27/201) 9000 Programme-controlled manipulators 90000 [Lossociations in Programme controlled manipulators] 90000 [Lossociations in composition of the programme controlled manipulators] 90000 [Lossociations in composition of the programme controlled manipulators] 90010 [Inmustric construction materials of the programme controlled manipulators] 90010 [Inmustric construction materials of the programme control details, e.g. manipulators] 90011 [Plexum remembers, i.e. parts of manipulators] 90012 [Plexum remembers, i.e. parts of manipulators] 90013 [Plexum remembers, i.e. parts of manipulators] 90014 [Morator of extending the operation range] 90015 [Plexum remembers, i.e. parts of manipulators] 90016 [With immustric chains of the upper arm] 90017 [With immustric chains of the type prismatic point of the base] 90018 [With immustric chains of the type prismatic point of the base] 90019 [With immustric chains of the type prismatic spherical] [With immustric chains of the type prismatic point at the base] 90003 [With immustric chains of the type spherical-prismatic-spherical]] 90004 [With immustric chains of the type spherical-prismatic-spherical]] 90005 [With immustric chains of the type spherical-prismatic-spherical]] 90006 [With immustric chains of the type spherical-prismatic-spherical]] 90007 [With immustric chains of the type spherical-prismatic-spherical]] 90008 [With immustric chains of	7/00	Micromanipulators {(specimen supports for	9/023	• • {Cartesian coordinate type}
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9000 Programme-controlled manipulators 9041 . (Cylindrical coordinate type) 94000 . (Excokeleons, i.e. small robots for domestic use) 94042 . (comprising an articulated arm) 94069 . (Constructional details, e.g. manipulator supports, bases) 9405 . (Constructional details, e.g. manipulator supports, bases) 9406 . (with file manipulators) 9406 . (making use of synthetic construction materials, e.g. plastics, composites) 9405 . (Pleace coordinate type) . (Erecuture members, i.e. purs of manipulators having a narrowed section allowing articulation by flexion) 9406 . (Revolute coordinate type) . (Revolute c				
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South Sout		-	9/042	• • • {comprising an articulated arm}
Section Sect			9/043	{double selective compliance articulated
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9/0048 {with kinematics chains of the type rotary-rotary} 9/0051 {with kinematics chains of the type rotary-universal-universal or rotary-spherical-spherical, e.g. Delta type manipulators} 9/0052 {with kinematics chains having a spherical joint at the base} 9/0053 {with kinematics chains of the type spherical-prismatic-spherical} 9/0060 {with kinematics chains of the type spherical-prismatic-spherical} 9/0061 {with kinematics chains of the type spherical-prismatic-spherical} 9/0062 {with kinematics chains of the type spherical-prismatic-spherical} 9/0063 {with kinematics chains of the type spherical-prismatic-spherical} 9/0064 {with kinematics chains of the type universal-prismatic-spherical} 9/0065 {with kinematics chains of the type universal-prismatic-spherical} 9/0066 {with kinematics chains of the type universal-prismatic-spherical} 9/0070 {with kinematics chains of the type universal-prismatic-spherical} 9/0071 {with kinematics chains of the type universal-prismatic-spherical} 9/0070 {with kinematics chains of the type universal-prismatic-spherical} 9/0070 {with kinematics chains of the type universal-prismatic-universal} 9/0071 {with kinematics chains of the type universal-prismatic-spherical} 9/0071 {with kinematics chains of the type universal-prismatic-universal} 9/0071 {with kinematics chains of the type universal-prismatic-spherical} 9/0071 {with kinematics chains of the type universal-prismatic-spherical} 9/0071 {with kinematics chains of the type unive	9/0045	• • {with kinematics chains having a rotary joint at	9/1035	
Protary-rotary Protary	9/0048	,	9/104	
9/0051 {with kinematics chains of the type rotary-universal-universal or rotary-spherical-spherical, e.g. Delta type manipulators} 9/0054 . {with kinematics chains having a spherical joint at the base} 9/0057 {with kinematics chains of the type spherical-prismatic-spherical} 9/006 {with kinematics chains of the type spherical-prismatic-spherical} 9/006 {with kinematics chains of the type spherical-prismatic-universal} 9/006 {with kinematics chains of the type spherical-prismatic-universal} 9/006 {with kinematics chains of the type universal-prismatic-universal} 9/006 {with kinematics chains of the type universal-prismatic-universal} 9/006 {with kinematics chains of the type universal-prismatic-universal} 9/007 {with kinematics chains of the type universal-prismatic-universal} 9/008 {with parallelograms} 9/108 . {Bearings specially adapted therefor (bearings in general Fi6Cs) 9/108 . {positioning by means of shape-memory actuators P03G 7/06} . {comprising mechanical programming means, e.g. cams} 9/109 . {comprising mechanical programming means, e.g. cams} 9/109 {comprising mechanical programming means, e.g. cams} 9/108 . {Linear actuators} 9/108 . {Linear	270010			
universal-universal or rotary-spherical- spherical, e.g. Delta type manipulators} 9/0054 . {with kinematics chains having a spherical joint at the base} 9/0057 . {with kinematics chains of the type spherical- prismatic-spherical} 9/006 . {with kinematics chains of the type spherical- prismatic-universal} 9/006 . {with kinematics chains of the type spherical- prismatic-universal} 9/006 . {with kinematics chains of the type spherical- prismatic-universal} 9/006 . {with kinematics chains of the type universal- prismatic-spherical} 9/006 . {with kinematics chains of the type universal- prismatic-spherical} 9/006 . {with kinematics chains of the type universal- prismatic-spherical} 9/007 . {with kinematics chains of the type universal- prismatic-universal} 9/008 . {with kinematics chains of the type universal- prismatic-universal} 9/007 . {with kinematics chains of the type universal- prismatic-universal} 9/007 . {with kinematics chains of the type universal- prismatic-universal} 9/007 . {for hybrid type, i.e. having different kinematics chains} 9/007 . {for hybrid type, i.e. having different kinematics chains} 9/007 . {for hybrid type, i.e. having different kinematics chains} 9/008 . {catuated by cables} 9/008 . {catuated by cables} 9/008 . {for hybrid type, i.e. having different kinematics chains} 9/008 . {for hybrid type, i.e. having different kinematics chains} 9/008 . {for hybrid type, i.e. having different kinematics chains} 9/008 . {for hybrid type, i.e. having different kinematics chains} 9/12 . {for hybrid type, i.e. having different kinematics chains} 9/12 . {for hybrid type, i.e. having different kinematics chains} 9/12 . {for hybrid type, i.e. having different kinematics chains of the type universal- prismatic-universal} 9/109 . {for hybrid type, i.e. having different kinematics chains of the type universal- prismatic-universal} 9/109 . {for hybrid type, i.e. having different kinematics chains of the type universal- prismatic-universal} 9/108 . {for hybrid type, i.e. having dif	9/0051			
spherical, e.g. Delta type manipulators} 9/0054				
at the base} 9/0057 {with kinematics chains of the type spherical-prismatic-spherical} 9/006 {with kinematics chains of the type spherical-prismatic-universal} 9/006 {with kinematics chains of the type spherical-prismatic-universal} 9/0063 . {with kinematics chains having an universal joint at the base} 9/0064 {with kinematics chains of the type universal-prismatic-spherical} 9/0065 {with kinematics chains of the type universal-prismatic-spherical} 9/0066 {with kinematics chains of the type universal-prismatic-spherical} 9/0070 {with kinematics chains of the type universal-prismatic-universal} 9/0070 {of the hroglegs type} 9/108 {Bearings specially adapted therefor (bearings in general F16C)} 9/108 {positioning by means of shape-memory materials (shape memory actuators F03G 7/06)} 9/109 {with kinematics chains of the type universal-prismatic-universal} 9/109 {otherwically actuated programming means, e.g. cag. cams} 9/109 {otherwically actuated} 9/109 {chemically actuated} 9/109 {linear actuators} 9/109 {Rotary actuators} 9/109 {comprising inflatable bodies} 9/109 {with master teach-in means} 9/109 {comprising a plurality of manipulators} 9/109 {with master teach-in means} 9/109 {comprising a plurality of manipulators} 9/109 {being mechanically linked with one another at their distal ends} 9/109 {being mechanically linked with one another at their distal ends} 9/109 {being mechanically linked with one another at their distal ends} 9/109 {cooperating with conveyor means} 9/109 {cooperating with a working support, e.g. work-table} 9/109 {characterised by movement of the arms, e.g. cartesian coordinate type (B25J 9/06 takes} 9/160 {characterised by the control system, structure, architecture} 9/160 {characterised by the control system, structure, architecture}			9/1055	• • {by gravity}
9/0057 {with kinematics chains of the type spherical-prismatic-spherical} 9/006 {with kinematics chains of the type spherical-prismatic-universal} 9/0063 {with kinematics chains having an universal joint at the base} 9/0064 {with kinematics chains having an universal joint at the base} 9/0065 {with kinematics chains of the type universal-prismatic-spherical} 9/0066 {with kinematics chains of the type universal-prismatic-spherical} 9/0069 {with kinematics chains of the type universal-prismatic-universal} 9/0070 {of the hybrid type, i.e. having different kinematics chains} 9/0072 {of the hybrid type, i.e. having different kinematics chains} 9/0073 {Truss} 9/0074 {actuated by cables} 9/0075 {Truss} 9/0076 {actuated by cables} 9/0077 {omprising a plurality of manipulators} 9/0084 . {comprising a plurality of manipulators} 9/0087 {Dual arms (double SCARA arms B251 9/043)} 9/0080 . {being mechanically linked with one another at their distal ends} 9/0090 . {co-operating with conveyor means} 9/0090 . {co-operating with conveyor means} 9/0090 . {characterised by movement of the arms, e.g. cartesian coordinate type (B251 9/06 takes	9/0054	{with kinematics chains having a spherical joint	9/106	• • {with articulated links}
prismatic-spherical} 9/006 • {with kinematics chains of the type spherical-prismatic-universal} 9/0063 • {with kinematics chains having an universal joint at the base} 9/0066 • • {with kinematics chains of the type universal-prismatic-spherical} 9/0069 • • {with kinematics chains of the type universal-prismatic-spherical} 9/0072 • • {of the hybrid type, i.e. having different kinematics chains} 9/0075 • • {Truss} 9/0078 • • {actuated by cables} 9/0081 • {with master teach-in means} 9/0084 • {comprising a plurality of manipulators} 9/00909 • • {being mechanically linked with one another at their distal ends} 9/0093 • {co-operating with conveyor means} 9/0096 • • characterised by movement of the arms, e.g. cartsian coordinate type (B251 9/06 takes		at the base}	9/1065	• • • {with parallelograms}
9/006 • • {with kinematics chains of the type spherical-prismatic-universal} 9/0063 • {with kinematics chains having an universal joint at the base} 9/0066 • • {with kinematics chains of the type universal-prismatic-spherical} 9/0069 • • {with kinematics chains of the type universal-prismatic-universal} 9/0070 • { (of the hybrid type, i.e. having different kinematics chains} 9/0072 • { (of the hybrid type, i.e. having different kinematics chains} 9/0073 • { (Truss} 9/0074 • { (actuated by cables} 9/0075 • { (Truss} 9/0076 • { (actuated by cables} 9/0081 • { (actuated by cables} 9/0084 • { (comprising a plurality of manipulators} 9/0087 • { (Dual arms (double SCARA arms B25J 9/043)} 9/0088 • { (being mechanically linked with one another at their distal ends} 9/0096 • { (co-operating with conveyor means} 9/0096 • { (co-operating with a working support, e.g. work-table} 9/009 • { (characterised by movement of the arms, e.g. cartesian coordinate type (B25J 9/06 takes) 9/1602 • { (characterised by the control system, structure, architecture} 9/1080 • { (oshing a plurality of manipulators and the same control system, structure, architecture} 9/1090 • { (oshing a plurality of manipulators} (oshing a plurality of manipulators) 9/0096 • { (oo-operating with conveyor means} 9/0096 • { (oo-operating with a working support, e.g. work-table} 9/0096 • { (oracterised by movement of the arms, e.g. cartesian coordinate type (B25J 9/06 takes) 9/1602 • { (characterised by the control system, structure, architecture} 9/1609 • { (other interior of specially adapted therefor (bearings in general F15b 15/12) (other interior of special system) 9/1097 • { (other interior of special populations of shape-memory materials (shape memory actuators F03G 7/06)} 9/1099 • { (other interior of special programming means, e.g. of the occilation of special programmin	9/0057		9/107	• • • {of the froglegs type}
prismatic-universal} 9/0063 . {with kinematics chains having an universal joint at the base} 9/0066 . {with kinematics chains of the type universal-prismatic-spherical} 9/0069 . {with kinematics chains of the type universal-prismatic-spherical} 9/0070 . {with kinematics chains of the type universal-prismatic-universal} 9/0072 . {of the hybrid type, i.e. having different kinematics chains} 9/0075 . {Truss} 9/0076 . {actuated by cables} 9/0078 . {actuated by cables} 9/0084 . {comprising a plurality of manipulators} 9/0087 . {Dual arms (double SCARA arms B25J 9/043)} 9/0087 . {being mechanically linked with one another at their distal ends} 9/0090 . {co-operating with conveyor means} 9/0090 . {characterised by movement of the arms, e.g. cartesian coordinate type (B25J 9/06 takes 9/160			9/1075	• • {with muscles or tendons}
at the base} 9/0066 {with kinematics chains of the type universal-prismatic-spherical} 9/0069 {with kinematics chains of the type universal-prismatic-universal} 9/0072 . {of the hybrid type, i.e. having different kinematics chains} 9/0075 . {Truss} 9/0076 . {actuated by cables} 9/0078 . {actuated by cables} 9/0081 . {with master teach-in means} 9/0084 . {comprising a plurality of manipulators} 9/0087 . {Dual arms (double SCARA arms B25J 9/043)} 9/0098 . {being mechanically linked with one another at their distal ends} 9/0098 - {co-operating with conveyor means} 9/0099 - {characterised by movement of the arms, e.g. cartesian coordinate type (B25J 9/06 takes - (Batalactics (Shape memory actuators F03G 7/06) - (comprising mechanical programming means, e.g. cyllog . {comprising mechanical programming means, e.g. cyllog . {characterised by the control system, structure, architecture} - (comprising mechanical programming means, e.g. cyllog . {characterised by the control system, structure, architecture} - (comprising mechanical programming means, e.g. cyllog . {characterised by the control system, structure, architecture}	9/006	prismatic-universal}	9/108	
prismatic-spherical } 9/0069	9/0063	at the base}	9/1085	
prismatic-universal} 9/0072		prismatic-spherical}	9/109	
9/0072 . {of the hybrid type, i.e. having different kinematics chains} 9/123 . {Linear actuators} 9/125 . {Rotary actuators} 9/126 . {Rotary actuators} 9/127 . {fluid 9/128 . {comprising inflatable bodies} 9/129 . {comprising a plurality of manipulators} 9/129 . {Dual arms (double SCARA arms B25J 9/043)} 9/120 . {being mechanically linked with one another at their distal ends} 9/121 . {co-operating with conveyor means} 9/122 . {comprising inflatable bodies} 9/123 . {Linear actuators} 9/125 . {Rotary actuators} 9/126 . {Rotary actuators} 9/127 . {Comprising inflatable bodies} 9/129 . {Rotary actuators} 9/120 . {Rotary actuators} 9/120 . {of the oscillating vane-type (in general F15B 15/12)} 9/120 . Programme controls (programme controls in general G05B 19/00, e.g. numerical pogramme controls G05B 19/18; {recording or playback systems G05B 19/12}) 9/120 . {characterised by movement of the arms, e.g. cartesian coordinate type (B25J 9/06 takes	9/0069		9/1095	• • {chemically actuated}
kinematics chains} 9/0075 • {Truss} 9/0078 • {actuated by cables} 9/0081 • {with master teach-in means} 9/0084 • {comprising a plurality of manipulators} 9/0087 • {Dual arms (double SCARA arms B25J 9/043)} 9/009 • {being mechanically linked with one another at their distal ends} 9/0093 • {co-operating with conveyor means} 9/0096 • {co-operating with a working support, e.g. work-table} 9/02 • characterised by movement of the arms, e.g. cartesian coordinate type (B25J 9/06 takes) 9/1602 • {Rotary actuators} 9/144 • • {Rotary actuators} 9/145 • • {Rotary actuators} 9/146 • • • {Rotary actuators} 9/146 • • • {Rotary actuators} 9/146 • • • • • • • • • • • • • • • • • • •		- · · · · · · · · · · · · · · · · · · ·	9/12	electric
9/0075 • {Truss} 9/0078 • {actuated by cables} 9/0081 • {with master teach-in means} 9/0084 • {comprising a plurality of manipulators} 9/0087 • {being mechanically linked with one another at their distal ends} 9/0093 • {co-operating with conveyor means} 9/0096 • {co-operating with a working support, e.g. work-table} 9/02 • characterised by movement of the arms, e.g. cartesian coordinate type (B25J 9/06 takes) 9/140 • fluid 9/142 • . {comprising inflatable bodies} 9/144 • . {Linear actuators} 9/146 • . {Rotary actuators} 9/148 • . • {of the oscillating vane-type (in general F15B 15/12)} 9/148 • . • {of the oscillating vane-type (in general G05B 19/00, e.g. numerical pogramme controls in general G05B 19/00, e.g. numerical pogramme controls G05B 19/18; {recording or playback systems G05B 19/42}) 9/1602 • . • {characterised by the control system, structure, architecture}	9/0072		9/123	• • • {Linear actuators}
9/0078 • • {actuated by cables} 9/0081 • {with master teach-in means} 9/0084 • {comprising a plurality of manipulators} 9/0087 • • {Dual arms (double SCARA arms B25J 9/043)} 9/009 • • {being mechanically linked with one another at their distal ends} 9/0093 • {co-operating with conveyor means} 9/0096 • {co-operating with a working support, e.g. work-table} 9/02 • characterised by movement of the arms, e.g. cartesian coordinate type (B25J 9/06 takes 9/142 • • {comprising inflatable bodies} 9/144 • • {Linear actuators} 9/145 • • {Rotary actuators} 9/148 • • • {of the oscillating vane-type (in general F15B 15/12)} 9/16 • Programme controls (programme controls in general G05B 19/00, e.g. numerical pogramme controls G05B 19/18; {recording or playback systems G05B 19/42}) 9/160 • • • {characterised by the control system, structure, architecture}	0/0055		9/126	
9/0081 • {with master teach-in means} 9/0084 • {comprising a plurality of manipulators} 9/0087 • {Dual arms (double SCARA arms B25J 9/043)} 9/009 • {being mechanically linked with one another at their distal ends} 9/1093 • {co-operating with conveyor means} 9/0096 • {co-operating with a working support, e.g. work-table} 9/02 • characterised by movement of the arms, e.g. cartesian coordinate type (B25J 9/06 takes) 9/144 • • {Linear actuators} 9/145 • • {Rotary actuators} 9/148 • • • {of the oscillating vane-type (in general F15B 15/12)} 9/16 • Programme controls (programme controls in general G05B 19/00, e.g. numerical pogramme controls G05B 19/18; {recording or playback systems G05B 19/42}) 9/1602 • • {characterised by the control system, structure, architecture}			9/14	
9/0084 • {comprising a plurality of manipulators} 9/0087 • {Dual arms (double SCARA arms B25J 9/043)} 9/009 • {being mechanically linked with one another at their distal ends} 9/0093 • {co-operating with conveyor means} 9/0096 • {co-operating with a working support, e.g. work-table} 9/02 • characterised by movement of the arms, e.g. cartesian coordinate type (B25J 9/06 takes 9/146 • . • {Rotary actuators} 9/148 • . • {of the oscillating vane-type (in general F15B 15/12)} 9/16 • Programme controls (programme controls in general G05B 19/00, e.g. numerical pogramme controls G05B 19/18; {recording or playback systems G05B 19/42}) 9/1602 • . • {characterised by the control system, structure, architecture}			9/142	• • • {comprising inflatable bodies}
9/0087 • {Dual arms (double SCARA arms B25J 9/043)} 9/009 • {being mechanically linked with one another at their distal ends} 9/0093 • {co-operating with conveyor means} 9/0096 • {co-operating with a working support, e.g. work-table} 9/02 • characterised by movement of the arms, e.g. cartesian coordinate type (B25J 9/06 takes) 9/148 • • • {Rotary actuators} 9/148 • • • • • • • • • • • • • • • • • • •			9/144	
9/009 • {being mechanically linked with one another at their distal ends} 9/0093 • {co-operating with conveyor means} 9/0096 • {co-operating with a working support, e.g. work-table} 9/02 • characterised by movement of the arms, e.g. cartesian coordinate type (B25J 9/06 takes 9/16 9/16 • Programme controls (programme controls in general G05B 19/00, e.g. numerical pogramme controls G05B 19/18; {recording or playback systems G05B 19/42}) 9/1602 • {characterised by the control system, structure, architecture}				
their distal ends} 9/0093 • {co-operating with conveyor means} 9/0096 • {co-operating with a working support, e.g. work-table} 9/02 • characterised by movement of the arms, e.g. cartesian coordinate type (B25J 9/06 takes 9/16 • Programme controls (programme controls in general G05B 19/00, e.g. numerical pogramme controls G05B 19/18; {recording or playback systems G05B 19/42}) • (characterised by the control system, structure, architecture}			9/148	
9/0093 • {co-operating with conveyor means} 9/0096 • {co-operating with a working support, e.g. work-table} 9/02 • characterised by movement of the arms, e.g. cartesian coordinate type (B25J 9/06 takes G05B 19/00, e.g. numerical pogramme controls G05B 19/18; {recording or playback systems G05B 19/42}) • (characterised by the control system, structure, architecture}		their distal ends}	9/16	
table} 9/02 • characterised by movement of the arms, e.g. cartesian coordinate type (B25J 9/06 takes G05B 19/42}) • (characterised by the control system, structure, architecture)				
cartesian coordinate type (B25J 9/06 takes architecture)		table}		
	9/02	cartesian coordinate type (B25J 9/06 takes	9/1602	

9/1605	 • { Simulation of manipulator lay-out, design, modelling of manipulator} 	9/1694	• • {characterised by use of sensors other than normal servo-feedback from position, speed or
9/1607	• • {Calculation of inertia, jacobian matrixes and inverses}		acceleration sensors, perception control, multi- sensor controlled systems, sensor fusion}
9/161	{Hardware, e.g. neural networks, fuzzy logic,	9/1697	{Vision controlled systems}
	interfaces, processor}	9/20	fluidic
9/1612	• • {characterised by the hand, wrist, grip control}	11/00	Manipulators not athornise provided for
9/1615	• • {characterised by special kind of manipulator,	11/00	Manipulators not otherwise provided for • {Manipulators having means for high-level
	e.g. planar, scara, gantry, cantilever, space, closed chain, passive/active joints and tendon driven manipulators}	11/0003	communication with users, e.g. speech generator, face recognition means}
9/1617	• • • {Cellular, reconfigurable manipulator, e.g.	11/001	• • { with emotions simulating means }
	cebot}	11/0015	• • {Face robots, animated artificial faces for imitating human expressions}
9/162	 • {Mobile manipulator, movable base with manipulator arm mounted on it} 	11/002	• {Manipulators for defensive or military tasks}
9/1623	• • • {Parallel manipulator, Stewart platform,	11/0025	• • {handling explosives, bombs or hazardous
J, 1020	links are attached to a common base and to		objects}
	a common platform, plate which is moved	11/003	• {Manipulators for entertainment}
	parallel to the base}	11/0035	• • {Dancing, executing a choreography}
9/1625	{Truss-manipulator for snake-like motion}	11/004	• • {Playing a music instrument}
9/1628	• • {characterised by the control loop}	11/0045	• {Manipulators used in the food industry}
9/163	{learning, adaptive, model based, rule based	11/005	• {Manipulators for mechanical processing tasks}
	expert control}	11/0055	• • {Cutting}
9/1633	{compliant, force, torque control, e.g.	11/006	• • {Deburring or trimming}
	combined with position control}	11/0065	• • {Polishing or grinding}
9/1635	• • • {flexible-arm control}	11/007	• • {Riveting}
9/1638	• • • {compensation for arm bending/inertia, pay	11/0075	• {Manipulators for painting or coating}
	load weight/inertia}	11/008	• {Manipulators for service tasks}
9/1641	• • • {compensation for backlash, friction,	11/0085	• • {Cleaning}
	compliance, elasticity in the joints}	11/009	• • {Nursing, e.g. carrying sick persons, pushing
9/1643	• • {redundant control}		wheelchairs, distributing drugs}
9/1646	• • {variable structure system, sliding mode	11/0095	• {Manipulators transporting wafers}
9/1648	control \\ \{non-linear control combined or not with linear control \}	13/00	Controls for manipulators (programme controls B25J 9/16; control in general G05)
	• • {non-linear control combined or not with linear control}		B25J 9/16; control in general G05)
9/1651	 {non-linear control combined or not with linear control} {acceleration, rate control}	13/00 13/003	B25J 9/16; control in general G05) • {by means of an audio-responsive input (audible}
	 {non-linear control combined or not with linear control} {acceleration, rate control} {parameters identification, estimation, stiffness, 		 <u>B25J 9/16</u>; control in general <u>G05</u>) {by means of an audio-responsive input (audible safety signals <u>B25J 19/061</u>)}
9/1651 9/1653	 {non-linear control combined or not with linear control} {acceleration, rate control} {parameters identification, estimation, stiffness, accuracy, error analysis} 	13/003	B25J 9/16; control in general G05) • {by means of an audio-responsive input (audible}
9/1651	 {non-linear control combined or not with linear control} {acceleration, rate control} {parameters identification, estimation, stiffness, accuracy, error analysis} . {characterised by programming, planning systems 	13/003	 B25J 9/16; control in general G05) {by means of an audio-responsive input (audible safety signals B25J 19/061)} {by means of a wireless system for controlling one
9/1651 9/1653 9/1656	 {non-linear control combined or not with linear control} {acceleration, rate control} {parameters identification, estimation, stiffness, accuracy, error analysis} . {characterised by programming, planning systems for manipulators} 	13/003 13/006	 B25J 9/16; control in general G05) {by means of an audio-responsive input (audible safety signals B25J 19/061)} {by means of a wireless system for controlling one or several manipulators} Hand grip control means {(handles or pedals for crane control B66C 13/56; for measuring the force
9/1651 9/1653 9/1656 9/1658	 {non-linear control combined or not with linear control} {acceleration, rate control} {parameters identification, estimation, stiffness, accuracy, error analysis} . {characterised by programming, planning systems for manipulators} {characterised by programming language} 	13/003 13/006	 B25J 9/16; control in general G05) {by means of an audio-responsive input (audible safety signals B25J 19/061)} {by means of a wireless system for controlling one or several manipulators} Hand grip control means {(handles or pedals for crane control B66C 13/56; for measuring the force applied to control members G01L 5/22; hand-
9/1651 9/1653 9/1656	 {non-linear control combined or not with linear control} {acceleration, rate control} {parameters identification, estimation, stiffness, accuracy, error analysis} . {characterised by programming, planning systems for manipulators} {characterised by programming language} {characterised by task planning, object-oriented 	13/003 13/006	 B25J 9/16; control in general G05) {by means of an audio-responsive input (audible safety signals B25J 19/061)} {by means of a wireless system for controlling one or several manipulators} Hand grip control means {(handles or pedals for crane control B66C 13/56; for measuring the force applied to control members G01L 5/22; handheld casings for switching devices, e.g. joy-sticks
9/1651 9/1653 9/1656 9/1658 9/1661	 {non-linear control combined or not with linear control} {acceleration, rate control} {parameters identification, estimation, stiffness, accuracy, error analysis} . {characterised by programming, planning systems for manipulators} {characterised by programming language} {characterised by task planning, object-oriented languages} 	13/003 13/006 13/02	 B25J 9/16; control in general G05) {by means of an audio-responsive input (audible safety signals B25J 19/061)} {by means of a wireless system for controlling one or several manipulators} Hand grip control means {(handles or pedals for crane control B66C 13/56; for measuring the force applied to control members G01L 5/22; handheld casings for switching devices, e.g. joy-sticks H01H 9/0214)}
9/1651 9/1653 9/1656 9/1658	 {non-linear control combined or not with linear control} {acceleration, rate control} {parameters identification, estimation, stiffness, accuracy, error analysis} . {characterised by programming, planning systems for manipulators} {characterised by programming language} {characterised by task planning, object-oriented 	13/003 13/006 13/02	 B25J 9/16; control in general G05) {by means of an audio-responsive input (audible safety signals B25J 19/061)} {by means of a wireless system for controlling one or several manipulators} Hand grip control means {(handles or pedals for crane control B66C 13/56; for measuring the force applied to control members G01L 5/22; handheld casings for switching devices, e.g. joy-sticks H01H 9/0214)} {comprising haptic means}
9/1651 9/1653 9/1656 9/1658 9/1661	 {non-linear control combined or not with linear control} {acceleration, rate control} {parameters identification, estimation, stiffness, accuracy, error analysis} . {characterised by programming, planning systems for manipulators} {characterised by programming language} {characterised by task planning, object-oriented languages} {characterised by motion, path, trajectory planning} 	13/003 13/006 13/02 13/025 13/04	 B25J 9/16; control in general G05) {by means of an audio-responsive input (audible safety signals B25J 19/061)} {by means of a wireless system for controlling one or several manipulators} Hand grip control means {(handles or pedals for crane control B66C 13/56; for measuring the force applied to control members G01L 5/22; handheld casings for switching devices, e.g. joy-sticks H01H 9/0214)} {comprising haptic means} Foot-operated control means
9/1651 9/1653 9/1656 9/1658 9/1661 9/1664	 {non-linear control combined or not with linear control} {acceleration, rate control} {parameters identification, estimation, stiffness, accuracy, error analysis} . {characterised by programming, planning systems for manipulators} {characterised by programming language} {characterised by task planning, object-oriented languages} {characterised by motion, path, trajectory 	13/003 13/006 13/02 13/025 13/04 13/06	 B25J 9/16; control in general G05) {by means of an audio-responsive input (audible safety signals B25J 19/061)} {by means of a wireless system for controlling one or several manipulators} Hand grip control means {(handles or pedals for crane control B66C 13/56; for measuring the force applied to control members G01L 5/22; handheld casings for switching devices, e.g. joy-sticks H01H 9/0214)} {comprising haptic means} Foot-operated control means Control stands, e.g. consoles, switchboards
9/1651 9/1653 9/1656 9/1658 9/1661 9/1664	 {non-linear control combined or not with linear control} {acceleration, rate control} {parameters identification, estimation, stiffness, accuracy, error analysis} . {characterised by programming, planning systems for manipulators} {characterised by programming language} {characterised by task planning, object-oriented languages} {characterised by motion, path, trajectory planning} {Avoiding collision or forbidden zones} 	13/003 13/006 13/02 13/025 13/04 13/06 13/065	 B25J 9/16; control in general G05) {by means of an audio-responsive input (audible safety signals B25J 19/061)} {by means of a wireless system for controlling one or several manipulators} Hand grip control means {(handles or pedals for crane control B66C 13/56; for measuring the force applied to control members G01L 5/22; handheld casings for switching devices, e.g. joy-sticks H01H 9/0214)} {comprising haptic means} Foot-operated control means Control stands, e.g. consoles, switchboards {comprising joy-sticks}
9/1651 9/1653 9/1656 9/1658 9/1661 9/1664	 {non-linear control combined or not with linear control} {acceleration, rate control} {parameters identification, estimation, stiffness, accuracy, error analysis} . {characterised by programming, planning systems for manipulators} {characterised by programming language} {characterised by task planning, object-oriented languages} {characterised by motion, path, trajectory planning} {Avoiding collision or forbidden zones} {characterised by special application, e.g. multi-arm co-operation, assembly, grasping} {characterised by simulation, either to verify 	13/003 13/006 13/02 13/025 13/04 13/06	 B25J 9/16; control in general G05) {by means of an audio-responsive input (audible safety signals B25J 19/061)} {by means of a wireless system for controlling one or several manipulators} Hand grip control means {(handles or pedals for crane control B66C 13/56; for measuring the force applied to control members G01L 5/22; handheld casings for switching devices, e.g. joy-sticks H01H 9/0214)} {comprising haptic means} Foot-operated control means Control stands, e.g. consoles, switchboards {comprising joy-sticks} by means of sensing devices, e.g. viewing or touching devices
9/1651 9/1653 9/1656 9/1658 9/1661 9/1664 9/1666 9/1669	 . • {non-linear control combined or not with linear control} . • {acceleration, rate control} . • {parameters identification, estimation, stiffness, accuracy, error analysis} . • {characterised by programming, planning systems for manipulators} . • {characterised by programming language} . • {characterised by task planning, object-oriented languages} . • {characterised by motion, path, trajectory planning} . • {Avoiding collision or forbidden zones} . • {characterised by special application, e.g. multi-arm co-operation, assembly, grasping} . • {characterised by simulation, either to verify existing program or to create and verify new 	13/003 13/006 13/02 13/025 13/04 13/06 13/065	 B25J 9/16; control in general G05) {by means of an audio-responsive input (audible safety signals B25J 19/061)} {by means of a wireless system for controlling one or several manipulators} Hand grip control means {(handles or pedals for crane control B66C 13/56; for measuring the force applied to control members G01L 5/22; handheld casings for switching devices, e.g. joy-sticks H01H 9/0214)} {comprising haptic means} Foot-operated control means Control stands, e.g. consoles, switchboards {comprising joy-sticks} by means of sensing devices, e.g. viewing or touching devices {Touching devices, e.g. pressure-sensitive}
9/1651 9/1653 9/1656 9/1658 9/1661 9/1664 9/1666 9/1669	 {non-linear control combined or not with linear control} {acceleration, rate control} {parameters identification, estimation, stiffness, accuracy, error analysis} . {characterised by programming, planning systems for manipulators} {characterised by programming language} {characterised by task planning, object-oriented languages} {characterised by motion, path, trajectory planning} {Avoiding collision or forbidden zones} {characterised by special application, e.g. multi-arm co-operation, assembly, grasping} {characterised by simulation, either to verify 	13/003 13/006 13/02 13/025 13/04 13/065 13/08	 B25J 9/16; control in general G05) {by means of an audio-responsive input (audible safety signals B25J 19/061)} {by means of a wireless system for controlling one or several manipulators} Hand grip control means {(handles or pedals for crane control B66C 13/56; for measuring the force applied to control members G01L 5/22; handheld casings for switching devices, e.g. joy-sticks H01H 9/0214)} {comprising haptic means} Foot-operated control means Control stands, e.g. consoles, switchboards {comprising joy-sticks} by means of sensing devices, e.g. viewing or touching devices {Touching devices, e.g. pressure-sensitive} {Grasping-force detectors (in general
9/1651 9/1653 9/1656 9/1658 9/1661 9/1664 9/1666 9/1669	 (non-linear control combined or not with linear control) {acceleration, rate control} {parameters identification, estimation, stiffness, accuracy, error analysis} {characterised by programming, planning systems for manipulators} {characterised by programming language} {characterised by task planning, object-oriented languages} {characterised by motion, path, trajectory planning} {Avoiding collision or forbidden zones} {characterised by special application, e.g. multi-arm co-operation, assembly, grasping} {characterised by simulation, either to verify existing program or to create and verify new program, CAD/CAM oriented, graphic oriented 	13/003 13/006 13/02 13/025 13/04 13/06 13/065 13/08 13/081 13/082	 B25J 9/16; control in general G05) {by means of an audio-responsive input (audible safety signals B25J 19/061)} {by means of a wireless system for controlling one or several manipulators} Hand grip control means {(handles or pedals for crane control B66C 13/56; for measuring the force applied to control members G01L 5/22; handheld casings for switching devices, e.g. joy-sticks H01H 9/0214)} {comprising haptic means} Foot-operated control means Control stands, e.g. consoles, switchboards {comprising joy-sticks} by means of sensing devices, e.g. viewing or touching devices {Touching devices, e.g. pressure-sensitive} {Grasping-force detectors (in general G01L 5/16, G01L 5/22)}
9/1651 9/1653 9/1656 9/1658 9/1661 9/1664 9/1666 9/1669	 (non-linear control combined or not with linear control) {acceleration, rate control} {parameters identification, estimation, stiffness, accuracy, error analysis} {characterised by programming, planning systems for manipulators} {characterised by programming language} {characterised by task planning, object-oriented languages} {characterised by motion, path, trajectory planning} {Avoiding collision or forbidden zones} {characterised by special application, e.g. multi-arm co-operation, assembly, grasping} {characterised by simulation, either to verify existing program or to create and verify new program, CAD/CAM oriented, graphic oriented programming systems} 	13/003 13/006 13/02 13/025 13/04 13/065 13/085 13/081 13/082 13/083	B25J 9/16; control in general G05) • {by means of an audio-responsive input (audible safety signals B25J 19/061)} • {by means of a wireless system for controlling one or several manipulators} • Hand grip control means {(handles or pedals for crane control B66C 13/56; for measuring the force applied to control members G01L 5/22; handheld casings for switching devices, e.g. joy-sticks H01H 9/0214)} • • {comprising haptic means} • Foot-operated control means • Control stands, e.g. consoles, switchboards • • {comprising joy-sticks} • by means of sensing devices, e.g. viewing or touching devices • • {Touching devices, e.g. pressure-sensitive} • • • {Grasping-force detectors (in general G01L 5/16, G01L 5/22)} • • • {fitted with slippage detectors}
9/1651 9/1653 9/1656 9/1658 9/1661 9/1664 9/1666 9/1669 9/1671	 • {non-linear control combined or not with linear control} • {acceleration, rate control} • {parameters identification, estimation, stiffness, accuracy, error analysis} • {characterised by programming, planning systems for manipulators} • {characterised by programming language} • {characterised by task planning, object-oriented languages} • {characterised by motion, path, trajectory planning} • {Avoiding collision or forbidden zones} • {characterised by special application, e.g. multi-arm co-operation, assembly, grasping} • {characterised by simulation, either to verify existing program or to create and verify new program, CAD/CAM oriented, graphic oriented programming systems} • {characterised by safety, monitoring, diagnostic} 	13/003 13/006 13/02 13/025 13/04 13/06 13/065 13/08 13/081 13/082	 B25J 9/16; control in general G05) {by means of an audio-responsive input (audible safety signals B25J 19/061)} {by means of a wireless system for controlling one or several manipulators} Hand grip control means {(handles or pedals for crane control B66C 13/56; for measuring the force applied to control members G01L 5/22; handheld casings for switching devices, e.g. joy-sticks H01H 9/0214)} {comprising haptic means} Foot-operated control means Control stands, e.g. consoles, switchboards {comprising joy-sticks} by means of sensing devices, e.g. viewing or touching devices {Touching devices, e.g. pressure-sensitive} {Grasping-force detectors (in general G01L 5/16, G01L 5/22)} {fitted with slippage detectors} {Tactile sensors (in general G01L 5/16,
9/1651 9/1653 9/1656 9/1658 9/1661 9/1664 9/1666 9/1671 9/1671	 . • {non-linear control combined or not with linear control} . • {acceleration, rate control} . • {parameters identification, estimation, stiffness, accuracy, error analysis} . • {characterised by programming, planning systems for manipulators} . • {characterised by programming language} . • {characterised by task planning, object-oriented languages} . • {characterised by motion, path, trajectory planning} . • {Avoiding collision or forbidden zones} . • {characterised by special application, e.g. multi-arm co-operation, assembly, grasping} . • {characterised by simulation, either to verify existing program or to create and verify new program, CAD/CAM oriented, graphic oriented programming systems} . {characterised by safety, monitoring, diagnostic} . • {Avoiding collision or forbidden zones} 	13/003 13/006 13/025 13/04 13/06 13/065 13/088 13/081 13/082 13/083 13/084	 B25J 9/16; control in general G05) {by means of an audio-responsive input (audible safety signals B25J 19/061)} {by means of a wireless system for controlling one or several manipulators} Hand grip control means {(handles or pedals for crane control B66C 13/56; for measuring the force applied to control members G01L 5/22; handheld casings for switching devices, e.g. joy-sticks H01H 9/0214)} {comprising haptic means} Foot-operated control means Control stands, e.g. consoles, switchboards {comprising joy-sticks} by means of sensing devices, e.g. viewing or touching devices {Touching devices, e.g. pressure-sensitive} {Grasping-force detectors (in general G01L 5/16, G01L 5/22)} {fitted with slippage detectors} {Tactile sensors (in general G01L 5/16, G01L 5/22)}
9/1651 9/1653 9/1656 9/1658 9/1661 9/1664 9/1669 9/1671	 \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	13/003 13/006 13/02 13/025 13/04 13/065 13/085 13/081 13/082 13/083	 B25J 9/16; control in general G05) {by means of an audio-responsive input (audible safety signals B25J 19/061)} {by means of a wireless system for controlling one or several manipulators} Hand grip control means {(handles or pedals for crane control B66C 13/56; for measuring the force applied to control members G01L 5/22; handheld casings for switching devices, e.g. joy-sticks H01H 9/0214)} {comprising haptic means} Foot-operated control means Control stands, e.g. consoles, switchboards {comprising joy-sticks} by means of sensing devices, e.g. viewing or touching devices {Touching devices, e.g. pressure-sensitive} {Grasping-force detectors (in general G01L 5/16, G01L 5/22)} {fitted with slippage detectors} {Tactile sensors (in general G01L 5/16, G01L 5/22)} {Force or torque sensors (B25J 13/082,
9/1651 9/1653 9/1656 9/1658 9/1661 9/1664 9/1669 9/1671	 \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	13/003 13/006 13/02 13/025 13/04 13/065 13/085 13/081 13/082 13/083 13/084 13/085	 B25J 9/16; control in general G05) {by means of an audio-responsive input (audible safety signals B25J 19/061)} {by means of a wireless system for controlling one or several manipulators} Hand grip control means {(handles or pedals for crane control B66C 13/56; for measuring the force applied to control members G01L 5/22; handheld casings for switching devices, e.g. joy-sticks H01H 9/0214)} {comprising haptic means} Foot-operated control means Control stands, e.g. consoles, switchboards {comprising joy-sticks} by means of sensing devices, e.g. viewing or touching devices {Touching devices, e.g. pressure-sensitive} {Grasping-force detectors (in general G01L 5/16, G01L 5/22)} {fitted with slippage detectors} {Tactile sensors (in general G01L 5/16, G01L 5/22)} {Force or torque sensors (B25J 13/082, B25J 13/084 take precedence)}
9/1651 9/1653 9/1656 9/1658 9/1661 9/1664 9/1669 9/1671 9/1674 9/1676 9/1679 9/1682	 \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	13/003 13/006 13/025 13/04 13/065 13/085 13/081 13/082 13/083 13/084 13/085 13/086	 B25J 9/16; control in general G05) {by means of an audio-responsive input (audible safety signals B25J 19/061)} {by means of a wireless system for controlling one or several manipulators} Hand grip control means {(handles or pedals for crane control B66C 13/56; for measuring the force applied to control members G01L 5/22; handheld casings for switching devices, e.g. joy-sticks H01H 9/0214)} {comprising haptic means} Foot-operated control means Control stands, e.g. consoles, switchboards {comprising joy-sticks} by means of sensing devices, e.g. viewing or touching devices {Touching devices, e.g. pressure-sensitive} {Grasping-force detectors (in general G01L 5/16, G01L 5/22)} {fitted with slippage detectors} {Tactile sensors (in general G01L 5/16, G01L 5/22)} {Force or torque sensors (B25J 13/082, B25J 13/084 take precedence)} {Proximity sensors}
9/1651 9/1653 9/1656 9/1658 9/1661 9/1664 9/1666 9/1669 9/1671	 \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	13/003 13/006 13/025 13/04 13/065 13/088 13/081 13/082 13/083 13/084 13/085 13/086 13/087	 B25J 9/16; control in general G05) {by means of an audio-responsive input (audible safety signals B25J 19/061)} {by means of a wireless system for controlling one or several manipulators} Hand grip control means {(handles or pedals for crane control B66C 13/56; for measuring the force applied to control members G01L 5/22; handheld casings for switching devices, e.g. joy-sticks H01H 9/0214)} {comprising haptic means} Foot-operated control means Control stands, e.g. consoles, switchboards {comprising joy-sticks} by means of sensing devices, e.g. viewing or touching devices {Touching devices, e.g. pressure-sensitive} {Grasping-force detectors (in general G01L 5/16, G01L 5/22)} {fitted with slippage detectors} {Tactile sensors (in general G01L 5/16, G01L 5/22)} {Force or torque sensors (B25J 13/082, B25J 13/084 take precedence)} {for sensing other physical parameters, e.g. electrical or chemical properties}
9/1651 9/1653 9/1656 9/1658 9/1661 9/1664 9/1669 9/1671 9/1674 9/1676 9/1679 9/1682	 {non-linear control combined or not with linear control} {acceleration, rate control} {parameters identification, estimation, stiffness, accuracy, error analysis} {characterised by programming, planning systems for manipulators} {characterised by programming language} {characterised by task planning, object-oriented languages} {characterised by motion, path, trajectory planning} {Avoiding collision or forbidden zones} {characterised by special application, e.g. multi-arm co-operation, assembly, grasping} {characterised by simulation, either to verify existing program or to create and verify new program, CAD/CAM oriented, graphic oriented programming systems} . {characterised by safety, monitoring, diagnostic} {Avoiding collision or forbidden zones} . {characterised by the tasks executed} {Dual arm manipulator; Coordination of several manipulators} {Tracking a line or surface by means of sensors} {Assembly, peg and hole, palletising, straight 	13/003 13/006 13/025 13/04 13/065 13/085 13/081 13/082 13/083 13/084 13/085 13/086	B25J 9/16; control in general G05) • {by means of an audio-responsive input (audible safety signals B25J 19/061)} • {by means of a wireless system for controlling one or several manipulators} • Hand grip control means {(handles or pedals for crane control B66C 13/56; for measuring the force applied to control members G01L 5/22; handheld casings for switching devices, e.g. joy-sticks H01H 9/0214)} • • {comprising haptic means} • Foot-operated control means • Control stands, e.g. consoles, switchboards • • {comprising joy-sticks} • by means of sensing devices, e.g. viewing or touching devices • • {Touching devices, e.g. pressure-sensitive} • • • {Grasping-force detectors (in general G01L 5/16, G01L 5/22)} • • • • {fitted with slippage detectors} • • • {Tactile sensors (in general G01L 5/16, G01L 5/22)} • • • {Force or torque sensors (B25J 13/082, B25J 13/084 take precedence)} • • {For sensing other physical parameters, e.g.
9/1651 9/1653 9/1656 9/1658 9/1661 9/1664 9/1666 9/1669 9/1671 9/1674 9/1676 9/1679 9/1682 9/1684 9/1687	 . • {non-linear control combined or not with linear control} . • {acceleration, rate control} . • {parameters identification, estimation, stiffness, accuracy, error analysis} . • {characterised by programming, planning systems for manipulators} . • {characterised by programming language} . • {characterised by task planning, object-oriented languages} . • {characterised by motion, path, trajectory planning} . • {Avoiding collision or forbidden zones} . • {characterised by special application, e.g. multi-arm co-operation, assembly, grasping} . • {characterised by simulation, either to verify existing program or to create and verify new program, CAD/CAM oriented, graphic oriented programming systems} . • {characterised by safety, monitoring, diagnostic} . • {Avoiding collision or forbidden zones} . • {Avoiding collision or forbidden zones} . • {Dual arm manipulator; Coordination of several manipulators} . • {Tracking a line or surface by means of sensors} . • {Assembly, peg and hole, palletising, straight line, weaving pattern movement} 	13/003 13/006 13/025 13/04 13/065 13/088 13/081 13/082 13/083 13/084 13/085 13/086 13/087	 B25J 9/16; control in general G05) {by means of an audio-responsive input (audible safety signals B25J 19/061)} {by means of a wireless system for controlling one or several manipulators} Hand grip control means {(handles or pedals for crane control B66C 13/56; for measuring the force applied to control members G01L 5/22; handheld casings for switching devices, e.g. joy-sticks H01H 9/0214)} {comprising haptic means} Foot-operated control means Control stands, e.g. consoles, switchboards {comprising joy-sticks} by means of sensing devices, e.g. viewing or touching devices {Touching devices, e.g. pressure-sensitive} {Grasping-force detectors (in general G01L 5/16, G01L 5/22)} {fitted with slippage detectors} {Tactile sensors (in general G01L 5/16, G01L 5/22)} {Force or torque sensors (B25J 13/082, B25J 13/084 take precedence)} {for sensing other physical parameters, e.g. electrical or chemical properties}

13/089	• • • {Determining the position of the robot with	15/0433 {having gripping members}
	reference to its environment}	15/0441 {having vacuum or magnetic means}
15/00	Gripping heads {and other end effectors (grippers	15/045 {having screw means}
10,00	used in machine tools <u>B23Q 7/04</u> ; gripping members	15/0458 • • • {having a frustroconical member}
	fitted on cranes <u>B66C 1/42</u> , <u>B66C 1/44</u> ; gripping	15/0466 • • { with means for checking exchange completion}
	means used in the manufacture of semiconductors	15/0475 • • {Exchangeable fingers}
	H01L 21/68707; gripping means used for mounting	15/0483 • • { with head identification means }
	electrical components H05K 13/04)}	15/0491 {comprising end-effector racks}
15/0004	• {with provision for adjusting the gripped object in	15/06 • with vacuum or magnetic holding means
10,000.	the hand}	15/0608 • • { with magnetic holding means }
15/0009	• {comprising multi-articulated fingers, e.g.	15/0616 • • {with vacuum}
15,000)	resembling a human hand}	15/0625 {provided with a valve}
15/0014	• {having fork, comb or plate shaped means for	15/0633 {Air-flow-actuated valves}
15,0011	engaging the lower surface on a object to be	15/0641 {Object-actuated valves}
	transported}	
15/0019	• {End effectors other than grippers}	
15/0023	• (End effectors other than grippers) • (Gripper surfaces directly activated by a fluid	the gripped object after suction}
13/0023	(flexible fingers B25J 15/12)}	15/0658 {Pneumatic type, e.g. air blast or overpressure}
15/0028	• {with movable, e.g. pivoting gripping jaw surfaces}	* *
15/0033	 {with movable, e.g. prvotting gripping jaw surfaces} {with gripping surfaces having special shapes}	15/0666 {Other types, e.g. pins or springs}
15/0038	. {With gripping surfaces having special shapes}. {Cylindrical gripping surfaces}	15/0675 {of the ejector type}
		15/0683 {Details of suction cup structure, e.g. grooves
15/0042	• {V-shaped gripping surfaces}	or ridges}
15/0047	• {for internally gripping hollow or recessed objects}	15/0691 {Suction pad made out of porous material, e.g.
15/0052	• {multiple gripper units or multiple end effectors}	sponge or foam}
15/0057	• • {mounted on a turret}	15/08 • having finger members (<u>B25J 15/02</u> , <u>B25J 15/04</u>
15/0061	• • {mounted on a modular gripping structure}	take precedence)
15/0066	• • {with different types of end effectors, e.g.	15/083 {with means for locking the fingers in an open or
	gripper and welding gun (B25J 15/0057 and	closed position}
	<u>B25J 15/0061</u> take precedence)}	15/086 {with means for synchronizing the movements of
15/0071	• {with needles engaging into objects to be gripped}	the fingers}
15/0076	• {with means, e.g. Pelletier elements, for freezing	15/10 with three or more finger members
	a fluid interface between the gripping head and an	$\{(\underline{B25J}\ 15/0009\ takes\ precedence)\}$
	object to be gripped}	15/103 • • • {for gripping the object in three contact points}
15/008	• {with sticking, gluing or adhesive means}	15/106 • • • {moving in parallel relationship}
15/0085	• {with means for applying an electrostatic force on	15/12 • • with flexible finger members
15/0085	 {with means for applying an electrostatic force on the object to be gripped} 	·
15/0085 15/009	the object to be gripped} • {with pins for accurately positioning the object on	17/00 Joints
	the object to be gripped}{with pins for accurately positioning the object on the gripping head}	17/00 Joints 17/02 . Wrist joints
	the object to be gripped} • {with pins for accurately positioning the object on	17/00 Joints 17/02 • Wrist joints 17/0208 • • {Compliance devices}
15/009	 the object to be gripped} {with pins for accurately positioning the object on the gripping head} {with an external support, i.e. a support which does not belong to the manipulator or the object to be 	17/00 Joints 17/02 • Wrist joints 17/0208 • • {Compliance devices} 17/0216 • • {comprising a stewart mechanism}
15/009	 the object to be gripped} {with pins for accurately positioning the object on the gripping head} {with an external support, i.e. a support which does not belong to the manipulator or the object to be gripped, e.g. for maintaining the gripping head 	17/00 Joints 17/02 • Wrist joints 17/0208 • • {Compliance devices} 17/0216 • • • {comprising a stewart mechanism} 17/0225 • • • {with axial compliance, i.e. parallel to the
15/009	 the object to be gripped} {with pins for accurately positioning the object on the gripping head} {with an external support, i.e. a support which does not belong to the manipulator or the object to be 	 17/00 Joints 17/02 . Wrist joints 17/0208 {Compliance devices} 17/0216 {comprising a stewart mechanism} 17/0225 {with axial compliance, i.e. parallel to the longitudinal wrist axis}
15/009	 the object to be gripped} {with pins for accurately positioning the object on the gripping head} {with an external support, i.e. a support which does not belong to the manipulator or the object to be gripped, e.g. for maintaining the gripping head 	 17/00 Joints 17/02 . Wrist joints 17/0208 {Compliance devices} 17/0216 {comprising a stewart mechanism} 17/0225 {with axial compliance, i.e. parallel to the longitudinal wrist axis} 17/0233 {with radial compliance, i.e. perpendicular to
15/009	 the object to be gripped} {with pins for accurately positioning the object on the gripping head} {with an external support, i.e. a support which does not belong to the manipulator or the object to be gripped, e.g. for maintaining the gripping head in an accurate position, guiding it or preventing 	 17/00 Joints 17/02 . Wrist joints 17/0208 . {Compliance devices} 17/0216 {comprising a stewart mechanism} 17/0225 {with axial compliance, i.e. parallel to the longitudinal wrist axis} 17/0233 {with radial compliance, i.e. perpendicular to the longitudinal wrist axis}
15/009 15/0095	 the object to be gripped} {with pins for accurately positioning the object on the gripping head} {with an external support, i.e. a support which does not belong to the manipulator or the object to be gripped, e.g. for maintaining the gripping head in an accurate position, guiding it or preventing vibrations} 	 17/00 Joints 17/02 . Wrist joints 17/0208 . {Compliance devices} 17/0216 {comprising a stewart mechanism} 17/0225 {with axial compliance, i.e. parallel to the longitudinal wrist axis} 17/0233 {with radial compliance, i.e. perpendicular to the longitudinal wrist axis} 17/0241 {One-dimensional joints}
15/009 15/0095	 the object to be gripped} {with pins for accurately positioning the object on the gripping head} {with an external support, i.e. a support which does not belong to the manipulator or the object to be gripped, e.g. for maintaining the gripping head in an accurate position, guiding it or preventing vibrations} servo-actuated 	 17/00 Joints 17/02 . Wrist joints 17/0208 . {Compliance devices} 17/0216 {comprising a stewart mechanism} 17/0225 {with axial compliance, i.e. parallel to the longitudinal wrist axis} 17/0233 {with radial compliance, i.e. perpendicular to the longitudinal wrist axis} 17/0241 {One-dimensional joints} 17/025 {mounted in series}
15/009 15/0095 15/02 15/0206	 the object to be gripped} {with pins for accurately positioning the object on the gripping head} {with an external support, i.e. a support which does not belong to the manipulator or the object to be gripped, e.g. for maintaining the gripping head in an accurate position, guiding it or preventing vibrations} servo-actuated {comprising articulated grippers} 	 17/00 Joints 17/02 . Wrist joints 17/0208 . {Compliance devices} 17/0216 {comprising a stewart mechanism} 17/0225 {with axial compliance, i.e. parallel to the longitudinal wrist axis} 17/0233 {with radial compliance, i.e. perpendicular to the longitudinal wrist axis} 17/0241 {One-dimensional joints}
15/009 15/0095 15/029 15/0206 15/0213 15/022	 the object to be gripped} {with pins for accurately positioning the object on the gripping head} {with an external support, i.e. a support which does not belong to the manipulator or the object to be gripped, e.g. for maintaining the gripping head in an accurate position, guiding it or preventing vibrations} servo-actuated {comprising articulated grippers} {actuated by gears} {actuated by articulated links} 	 17/00 Joints 17/02 . Wrist joints 17/0208 . {Compliance devices} 17/0216 {comprising a stewart mechanism} 17/0225 {with axial compliance, i.e. parallel to the longitudinal wrist axis} 17/0233 {with radial compliance, i.e. perpendicular to the longitudinal wrist axis} 17/0241 {One-dimensional joints} 17/025 {mounted in series}
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15/009 15/0095 15/029 15/0206 15/0213 15/022 15/0226 15/0233	 the object to be gripped} {with pins for accurately positioning the object on the gripping head} {with an external support, i.e. a support which does not belong to the manipulator or the object to be gripped, e.g. for maintaining the gripping head in an accurate position, guiding it or preventing vibrations} servo-actuated {comprising articulated grippers} {actuated by gears} {actuated by articulated links} {actuated by cams} {actuated by chains, cables or ribbons} 	 17/00 Joints 17/02 . Wrist joints 17/0208 {Compliance devices} 17/0216 {comprising a stewart mechanism} 17/0225 {with axial compliance, i.e. parallel to the longitudinal wrist axis} 17/0233 {with radial compliance, i.e. perpendicular to the longitudinal wrist axis} 17/0241 {One-dimensional joints} 17/025 {mounted in series} 17/0258 {Two-dimensional joints} 17/0266 {comprising more than two actuating or
15/009 15/0095 15/0295 15/0206 15/0213 15/022 15/0226 15/0233 15/024	the object to be gripped } • {with pins for accurately positioning the object on the gripping head } • {with an external support, i.e. a support which does not belong to the manipulator or the object to be gripped, e.g. for maintaining the gripping head in an accurate position, guiding it or preventing vibrations } • servo-actuated • {comprising articulated grippers} • • {actuated by gears} • • {actuated by articulated links} • • {actuated by cams} • • {actuated by chains, cables or ribbons} • • {having fingers directly connected to actuator}	 17/00 Joints 17/02 . Wrist joints 17/0208 . {Compliance devices} 17/0216 {comprising a stewart mechanism} 17/0225 {with axial compliance, i.e. parallel to the longitudinal wrist axis} 17/0233 {with radial compliance, i.e. perpendicular to the longitudinal wrist axis} 17/0241 . {One-dimensional joints} 17/025 {mounted in series} 17/0258 {Two-dimensional joints} 17/0266 {comprising more than two actuating or connecting rods}
15/009 15/0095 15/0295 15/0206 15/0213 15/022 15/0226 15/0233 15/024 15/0246	the object to be gripped} • {with pins for accurately positioning the object on the gripping head} • {with an external support, i.e. a support which does not belong to the manipulator or the object to be gripped, e.g. for maintaining the gripping head in an accurate position, guiding it or preventing vibrations} • servo-actuated • {comprising articulated grippers} • • {actuated by gears} • • {actuated by articulated links} • • {actuated by cams} • • {actuated by chains, cables or ribbons} • • {having fingers directly connected to actuator} • {actuated by an electromagnet}	 17/00 Joints 17/02 . Wrist joints 17/0208 . {Compliance devices} 17/0216 {comprising a stewart mechanism} 17/0225 {with axial compliance, i.e. parallel to the longitudinal wrist axis} 17/0233 {with radial compliance, i.e. perpendicular to the longitudinal wrist axis} 17/0241 . {One-dimensional joints} 17/025 {mounted in series} 17/0266 {comprising more than two actuating or connecting rods} 17/0275 {Universal joints, e.g. Hooke, Cardan, ball
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15/009 15/0095 15/0095 15/0206 15/0213 15/022 15/0226 15/0233 15/024 15/0246 15/0253 15/026 15/0266 15/0273 15/028	the object to be gripped } • {with pins for accurately positioning the object on the gripping head } • {with an external support, i.e. a support which does not belong to the manipulator or the object to be gripped, e.g. for maintaining the gripping head in an accurate position, guiding it or preventing vibrations } • servo-actuated • {comprising articulated grippers} • • {actuated by gears} • • {actuated by articulated links} • • {actuated by cams} • • {actuated by chains, cables or ribbons} • • {having fingers directly connected to actuator} • {actuated by an electromagnet} • {comprising parallel grippers} • • {actuated by gears} • • {actuated by articulated links} • • {comprising parallel grippers} • • {actuated by cams}	 17/00 Joints 17/02 . Wrist joints 17/0208 . {Compliance devices} 17/0216 {comprising a stewart mechanism} 17/0225 {with axial compliance, i.e. parallel to the longitudinal wrist axis} 17/0233 {with radial compliance, i.e. perpendicular to the longitudinal wrist axis} 17/0241 . {One-dimensional joints} 17/025 {mounted in series} 17/0258 . {Two-dimensional joints} 17/0266 {comprising more than two actuating or connecting rods} 17/0275 {Universal joints, e.g. Hooke, Cardan, ball joints} 17/0283 . {Three-dimensional joints} 17/0291 {having axes crossing at an oblique angle, i.e. other than 90 degrees} 18/00 Arms 18/002 . {comprising beam bending compensation means} 18/005 . {having a curved shape}
15/009 15/0095 15/0095 15/0206 15/0213 15/022 15/0226 15/0233 15/024 15/0246 15/0253 15/026 15/0266 15/0273 15/028 15/0286 15/0293	the object to be gripped } • {with pins for accurately positioning the object on the gripping head } • {with an external support, i.e. a support which does not belong to the manipulator or the object to be gripped, e.g. for maintaining the gripping head in an accurate position, guiding it or preventing vibrations } • servo-actuated • • {comprising articulated grippers} • • • {actuated by gears } • • • {actuated by articulated links } • • • {actuated by cams } • • • {actuated by chains, cables or ribbons } • • • {actuated by an electromagnet } • • {comprising parallel grippers } • • • {actuated by articulated links } • • • {actuated by an electromagnet } • • {comprising parallel grippers } • • • {actuated by articulated links } • • • • {actuated by cams }	 17/00 Joints 17/02 . Wrist joints 17/0208 . {Compliance devices} 17/0216 {comprising a stewart mechanism} 17/0225 {with axial compliance, i.e. parallel to the longitudinal wrist axis} 17/0233 {with radial compliance, i.e. perpendicular to the longitudinal wrist axis} 17/0241 . {One-dimensional joints} 17/025 {mounted in series} 17/0258 . {Two-dimensional joints} 17/0266 {comprising more than two actuating or connecting rods} 17/0275 {Universal joints, e.g. Hooke, Cardan, ball joints} 17/0283 . {Three-dimensional joints} 17/0291 {having axes crossing at an oblique angle, i.e. other than 90 degrees} 18/00 Arms 18/002 . {comprising beam bending compensation means} 18/005 . {having a curved shape} 18/007 . {the end effector rotating around a fixed point}
15/009 15/0095 15/0095 15/0206 15/0213 15/022 15/0226 15/0233 15/024 15/0246 15/0253 15/026 15/0266 15/0273 15/028	the object to be gripped} { with pins for accurately positioning the object on the gripping head} { with an external support, i.e. a support which does not belong to the manipulator or the object to be gripped, e.g. for maintaining the gripping head in an accurate position, guiding it or preventing vibrations} servo-actuated { comprising articulated grippers} { actuated by gears} { actuated by articulated links} { actuated by cams} { actuated by chains, cables or ribbons} { actuated by an electromagnet} { actuated by an electromagnet} { actuated by gears} { actuated by articulated links} { actuated by an electromagnet} { actuated by an electromagnet} { actuated by gears} { actuated by articulated links} { actuated by articulated links} { actuated by cams} { actuated by cams} { actuated by cams} { having fingers directly connected to actuator} Actuated by cams} { actuated by cams} Actuated by cams} Actuated by cams} Actuated by cams Actuated by	 17/00 Joints 17/02 . Wrist joints 17/0208 . {Compliance devices} 17/0216 {comprising a stewart mechanism} 17/0225 {with axial compliance, i.e. parallel to the longitudinal wrist axis} 17/0233 {with radial compliance, i.e. perpendicular to the longitudinal wrist axis} 17/0241 . {One-dimensional joints} 17/025 {mounted in series} 17/0258 . {Two-dimensional joints} 17/0266 {comprising more than two actuating or connecting rods} 17/0275 {Universal joints, e.g. Hooke, Cardan, ball joints} 17/0283 . {Three-dimensional joints} 17/0291 {having axes crossing at an oblique angle, i.e. other than 90 degrees} 18/00 Arms 18/002 . {comprising beam bending compensation means} 18/005 . {having a curved shape} 18/007 . {the end effector rotating around a fixed point} 18/02 . extensible
15/009 15/0095 15/0095 15/0206 15/0213 15/022 15/0226 15/0233 15/024 15/0253 15/026 15/0266 15/0273 15/028 15/0288 15/0293 15/04	the object to be gripped} { with pins for accurately positioning the object on the gripping head} { with an external support, i.e. a support which does not belong to the manipulator or the object to be gripped, e.g. for maintaining the gripping head in an accurate position, guiding it or preventing vibrations} servo-actuated { comprising articulated grippers} { actuated by gears} { actuated by articulated links} { actuated by cams} { actuated by chains, cables or ribbons} { factuated by an electromagnet} { actuated by an electromagnet} { actuated by gears} { actuated by articulated links} { actuated by an electromagnet} { actuated by an electromagnet} { actuated by articulated links} { actuated by articulated links} { actuated by cams} { actuated by cams} { actuated by cams} { actuated by cams} { having fingers directly connected to actuator} with provision for the remote detachment or exchange of the head or parts thereof	 17/00 Joints 17/02 . Wrist joints 17/0208 . {Compliance devices} 17/0216 {comprising a stewart mechanism} 17/0225 {with axial compliance, i.e. parallel to the longitudinal wrist axis} 17/0233 {with radial compliance, i.e. perpendicular to the longitudinal wrist axis} 17/0241 . {One-dimensional joints} 17/025 {mounted in series} 17/0258 . {Two-dimensional joints} 17/0266 {comprising more than two actuating or connecting rods} 17/0275 {Universal joints, e.g. Hooke, Cardan, ball joints} 17/0283 . {Three-dimensional joints} 17/0291 {having axes crossing at an oblique angle, i.e. other than 90 degrees} 18/00 Arms 18/002 . {comprising beam bending compensation means} 18/005 . {having a curved shape} 18/007 . {the end effector rotating around a fixed point}
15/009 15/0095 15/0095 15/0206 15/0213 15/022 15/0226 15/0233 15/024 15/0253 15/026 15/0266 15/0273 15/028 15/0293 15/04	the object to be gripped} { with pins for accurately positioning the object on the gripping head} { with an external support, i.e. a support which does not belong to the manipulator or the object to be gripped, e.g. for maintaining the gripping head in an accurate position, guiding it or preventing vibrations} servo-actuated { comprising articulated grippers} { actuated by gears} { actuated by articulated links} { actuated by cams} { actuated by chains, cables or ribbons} { factuated by an electromagnet} { actuated by araillel grippers} { actuated by gears} { actuated by articulated links} { actuated by an electromagnet} { actuated by an electromagnet} { actuated by gears} { actuated by articulated links} { actuated by cams} { actuated by chains, cables or ribbons} { having fingers directly connected to actuator} with provision for the remote detachment or exchange of the head or parts thereof { Connections means}	17/00 Joints 17/02 . Wrist joints 17/0208 . {Compliance devices} 17/0216 {comprising a stewart mechanism} 17/0225 {with axial compliance, i.e. parallel to the longitudinal wrist axis} 17/0233 {with radial compliance, i.e. perpendicular to the longitudinal wrist axis} 17/0241 . {One-dimensional joints} 17/025 {mounted in series} 17/0258 . {Two-dimensional joints} 17/0266 {comprising more than two actuating or connecting rods} 17/0275 {Universal joints, e.g. Hooke, Cardan, ball joints} 17/0283 . {Three-dimensional joints} 17/0291 {having axes crossing at an oblique angle, i.e. other than 90 degrees} 18/00 Arms 18/002 . {comprising beam bending compensation means} 18/005 . {having a curved shape} 18/007 . {the end effector rotating around a fixed point} 18/02 . extensible 18/025 . {telescopic} 18/04 . rotatable
15/009 15/0095 15/0095 15/0206 15/0213 15/0226 15/0226 15/0224 15/0246 15/0253 15/026 15/0266 15/0273 15/028 15/0286 15/0293 15/0408 15/0408 15/0416	the object to be gripped} { with pins for accurately positioning the object on the gripping head} { with an external support, i.e. a support which does not belong to the manipulator or the object to be gripped, e.g. for maintaining the gripping head in an accurate position, guiding it or preventing vibrations} servo-actuated { comprising articulated grippers} { actuated by gears} { actuated by articulated links} { actuated by cams} { actuated by chains, cables or ribbons} { actuated by an electromagnet} { actuated by an electromagnet} { actuated by gears} { actuated by articulated links} { actuated by an electromagnet} { actuated by an electromagnet} { actuated by gears} { actuated by articulated links} { actuated by cams} { actuated by chains, cables or ribbons}	17/00 Joints 17/02 . Wrist joints 17/0208 . {Compliance devices} 17/0216 {comprising a stewart mechanism} 17/0225 {with axial compliance, i.e. parallel to the longitudinal wrist axis} 17/0233 {with radial compliance, i.e. perpendicular to the longitudinal wrist axis} 17/0241 . {One-dimensional joints} 17/025 {mounted in series} 17/0258 . {Two-dimensional joints} 17/0266 {comprising more than two actuating or connecting rods} 17/0275 {Universal joints, e.g. Hooke, Cardan, ball joints} 17/0283 . {Three-dimensional joints} 17/0291 {having axes crossing at an oblique angle, i.e. other than 90 degrees} 18/00 Arms 18/002 . {comprising beam bending compensation means} 18/005 . {having a curved shape} 18/007 . {the end effector rotating around a fixed point} 18/02 . extensible 18/025 . {telescopic}
15/009 15/0095 15/0095 15/0206 15/0213 15/022 15/0226 15/0233 15/024 15/0253 15/026 15/0266 15/0273 15/028 15/0293 15/04	the object to be gripped} { with pins for accurately positioning the object on the gripping head} { with an external support, i.e. a support which does not belong to the manipulator or the object to be gripped, e.g. for maintaining the gripping head in an accurate position, guiding it or preventing vibrations} servo-actuated { comprising articulated grippers} { actuated by gears} { actuated by articulated links} { actuated by cams} { actuated by chains, cables or ribbons} { factuated by an electromagnet} { actuated by araillel grippers} { actuated by gears} { actuated by articulated links} { actuated by an electromagnet} { actuated by an electromagnet} { actuated by gears} { actuated by articulated links} { actuated by cams} { actuated by chains, cables or ribbons} { having fingers directly connected to actuator} with provision for the remote detachment or exchange of the head or parts thereof { Connections means}	17/00 Joints 17/02 . Wrist joints 17/0208 . {Compliance devices} 17/0216 {comprising a stewart mechanism} 17/0225 {with axial compliance, i.e. parallel to the longitudinal wrist axis} 17/0233 {with radial compliance, i.e. perpendicular to the longitudinal wrist axis} 17/0241 . {One-dimensional joints} 17/025 {mounted in series} 17/0258 . {Two-dimensional joints} 17/0266 {comprising more than two actuating or connecting rods} 17/0275 {Universal joints, e.g. Hooke, Cardan, ball joints} 17/0283 . {Three-dimensional joints} 17/0291 {having axes crossing at an oblique angle, i.e. other than 90 degrees} 18/00 Arms 18/002 . {comprising beam bending compensation means} 18/005 . {having a curved shape} 18/007 . {the end effector rotating around a fixed point} 18/02 . extensible 18/025 . {telescopic} 18/04 . rotatable

19/00	Accessories fitted to manipulators, e.g. for
15/00	monitoring, for viewing; Safety devices combined with or specially adapted for use in connection
	with manipulators (safety-devices in general <u>F16P</u> ;
10/0001	protection against radiation in general G21F)
19/0004	• {Braking devices (brakes in general <u>F16D</u>)}
19/0008	• {Balancing devices}
19/0012	• {using fluidic devices}
19/0016	 {using springs} {using counterweights}
19/002	· · · · · · · · · · · · · · · · · · ·
19/0025 19/0029	 {Means for supplying energy to the end effector} . {arranged within the different robot elements}
19/0029	. {arranged within the different robot elements} {with axial connectors in end effector flange}
19/0033	• • {comprising a light beam pathway, e.g. laser}
19/0041	 {comprising a right beam pathway, e.g. laser} {having rotary connection means}
19/0045	• • Contactless power transmission, e.g. by
19/005	magnetic induction}
19/005	 {using batteries, e.g. as a back-up power source} {Cooling means}
19/0054	• {Cooning means} • {Means for cleaning manipulators, e.g. dust
19/0038	removing means}
19/0062	• {Lubrication means}
19/0066	• {Means or methods for maintaining or repairing
	manipulators}
19/007	• {Means or methods for designing or fabricating
	manipulators}
19/0075	• {Means for protecting the manipulator from its
	environment or <u>vice versa</u> }
19/0079	• • {using an internal pressure system}
19/0083	• · {using gaiters}
19/0087	• {using an antibacterial coating}
19/0091	• {Shock absorbers (in general <u>F16F</u>)}
19/0095	• {Means or methods for testing manipulators}
19/02 19/021	Sensing devices. {Optical sensing devices}
19/021	. {Optical sensing devices} {using lasers}
19/022	· · · {using lasers} · · · {including video camera means}
19/025	{including optical fibres}
19/026	. {Acoustical sensing devices}
19/027	{Electromagnetic sensing devices}
19/028	• {Piezoresistive or piezoelectric sensing devices}
19/04	• Viewing devices
19/06	• Safety devices
19/061	• • {with audible signals (audio controls B25J 13/003)}
19/063	{working only upon contact with an outside object}
19/065	• • {Mechanical fuse}
19/066	. {Redundant equipment}
19/068	• {Actuating means with variable stiffness}
21/00	Chambers provided with manipulation devices (constructional features of the mounting of the
	manipulator in the wall <u>B25J 1/08</u> {; glove-boxes for
	nuclear applications $G21F7/04$ })
21/005	• {Clean rooms}
21/02	• Glove-boxes, i.e. chambers in which manipulations
	are performed by the human hands in gloves built
	into the chamber walls {(glove- boxes for removal
	of dirt <u>B08B 15/026</u> ; glove-boxes shielded against
	radiation $\underline{G21F7/04}$); Gloves therefor