

## 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 pipeline 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](#)})

### Definition statement

*This place 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. The group [B25J 21/00](#) moreover covers chambers provided with manipulation devices.

Most of the manipulators classified in [B25J](#) are industrial robots.

The International Organization for Standardization gives the following definition of an industrial robot in ISO 8373:

an automatically controlled, reprogrammable, multipurpose manipulator programmable in three or more axes, which may be either fixed in place or mobile for use in industrial automation applications.

This definition is used by the International Federation of Robotics, the European Robotics Research Network (EURON) and many national standards committees.

Here is a list of other types of manipulators or robots classified in [B25J](#), i.e. manipulators which are usually not industrial robots:

Manipulators positioned in space by hand	<a href="#">B25J 1/00</a>
Manipulators not otherwise provided for	<a href="#">B25J 11/00</a>
Master-slave manipulators	<a href="#">B25J 3/00</a>
Manipulators mounted on wheels or on carriages	<a href="#">B25J 5/00</a> , <a href="#">B25J 9/162</a>
Micromanipulators	<a href="#">B25J 7/00</a>
Service robots	<a href="#">B25J 9/0003</a>
Exoskeletons	<a href="#">B25J 9/0006</a>
Manipulators moved by gravity	<a href="#">B25J 9/1055</a>
Manipulators comprising mechanical "programming" means, e.g. cams	<a href="#">B25J 9/109</a>

Cellular, reconfigurable manipulators, e.g. cebot	<a href="#">B25J 9/1617</a>
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## References

### Application-oriented references

*Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:*

Manipulators for surgery	<a href="#">A61B 34/70</a>
Spray heads moved by robots or articulated arms	<a href="#">B05B 13/0431</a>
Manipulators for transferring metal sheets from / to a press	<a href="#">B21D 43/105</a>
Manipulators in machines for forging, hammering, pressing riveting	<a href="#">B21J 13/10</a>
Manipulators for moving laser head in more than two directions	<a href="#">B23K 26/0884</a>
Manipulators for moving workpieces between mould parts	<a href="#">B29C 37/0007</a>
Manipulators in machines for gluing by wetting	<a href="#">B65C 9/2226</a>
Manipulators for handling sheets	<a href="#">B65G 49/067</a>
Manipulators for stacking or de-stacking articles	<a href="#">B65G 61/00</a>
Manipulators with gripping or holding means for transferring the packages from one station to another	<a href="#">B65H 67/065</a>
Manipulators for underwater operations	<a href="#">E21B 41/04</a>
Automatic analysis systems comprising robots	<a href="#">G01N 35/0099</a>
Manipulators integrated in shielded cells	<a href="#">G21F 7/061</a>
Manipulators for transferring wafers	<a href="#">H01L 21/67742</a> , <a href="#">H01L 21/67766</a> , <a href="#">H01L 21/68707</a>
Pick and place apparatus for mounting of components	<a href="#">H05K 13/0404</a>

## B25J 1/00

**Manipulators positioned in space by hand (of master-slave type [B25J 3/00](#); micromanipulators [B25J 7/00](#))**

### Definition statement

*This place covers:*

Manipulators which are not computer controlled but controlled directly by the hand of a user.

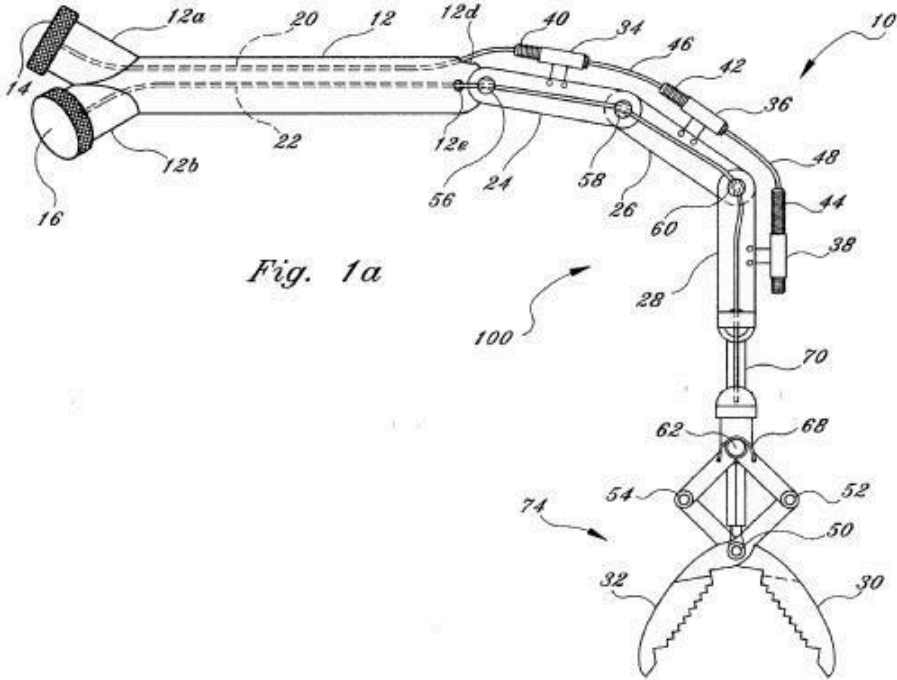
**B25J 1/02**

**articulated or flexible**

**Definition statement**

*This place covers:*

Illustrative example of subject matter classified in this group:



*Fig. 1a*

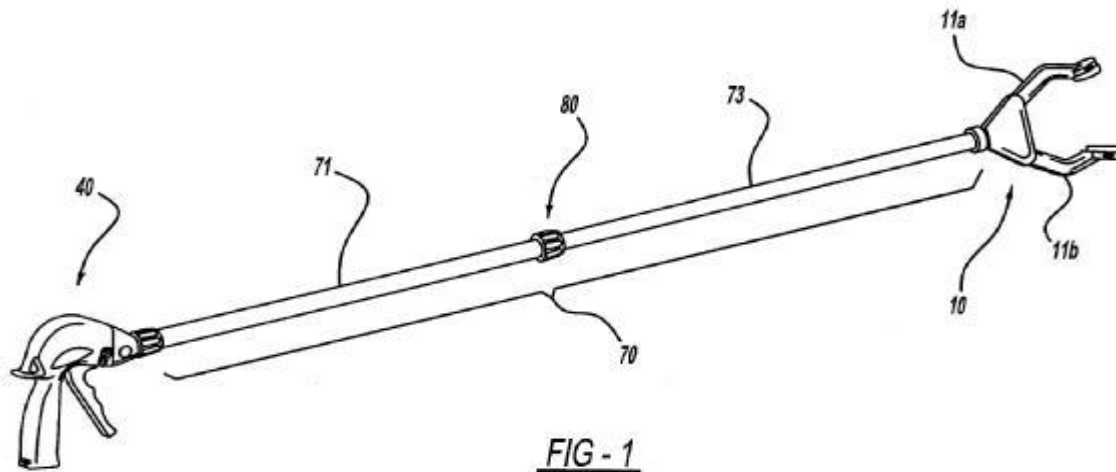
**B25J 1/04**

rigid, e.g. shelf-reachers {(without grippers [A47F 13/06](#))}

**Definition statement**

*This place covers:*

Illustrative example of subject matter classified in this group:

**References****Informative references**

Attention is drawn to the following places, which may be of interest for search:

Devices for picking apples or like fruits	<a href="#">A01D 46/24</a>
Reaching devices in a shop	<a href="#">A47F 13/06</a>
Pliers; Other hand-held gripping tools with jaws on pivoted limbs	<a href="#">B25B 7/00</a>
Hand-held gripping tools other than those covered by group <a href="#">B25B 7/00</a>	<a href="#">B25B 9/00</a>
Hand implements for removing undesirable matter, e.g. litter pickers	<a href="#">E01H 1/12</a>

Attention is drawn to the following Fterms (Japanese classification scheme), which may be of interest for search:

Tool hands	3C007/XF05
Support hands	3C007/XF06

**B25J 1/06**

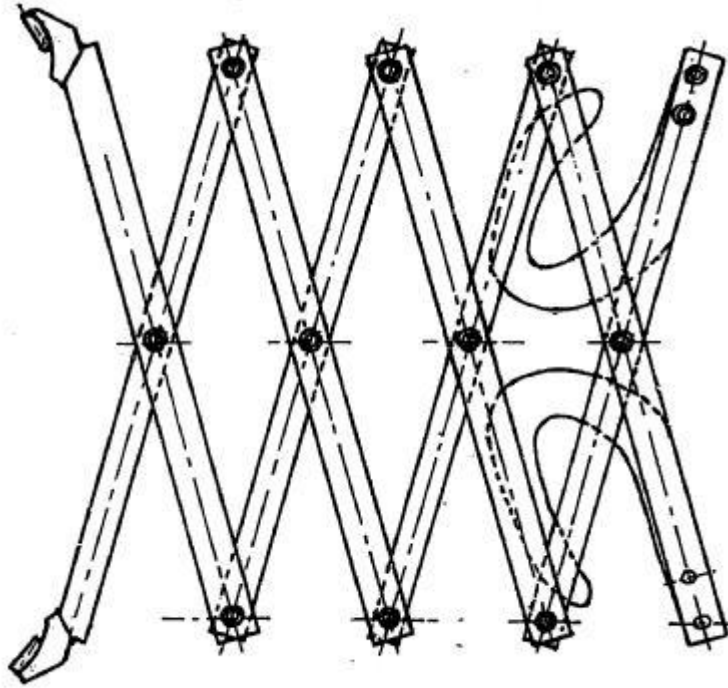
of the lazy-tongs type

**Definition statement**

*This place covers:*

Illustrative example of subject matter classified in [B25J 1/06](#)

DE 8901596 U



## **B25J 1/08**

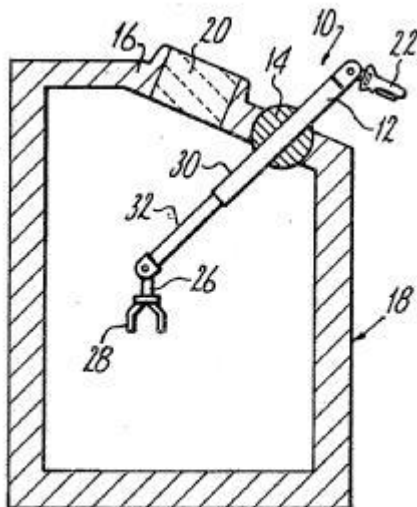
**movably mounted in a wall**

### **Definition statement**

*This place covers:*

Illustrative example of subject matter classified in [B25J 1/08](#)

FR 2542658



## References

### Informative references

Attention is drawn to the following places, which may be of interest for search:

Shielded cells or rooms in structural combination with remotely controlled apparatus, e.g. with manipulators	<a href="#">G21F 7/06</a>
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### Special rules of classification

Manipulators of master-slave type should additionally be classified in [B25J 3/02](#).

### Synonyms and Keywords

In patent documents the following expression/word "telem manipulator" is often used.

## B25J 1/10

### Sleeve and pivot mountings therefor

#### Definition statement

This place covers:

Illustrative example of subject matter classified in [B25J 1/10](#)

FR 1266572

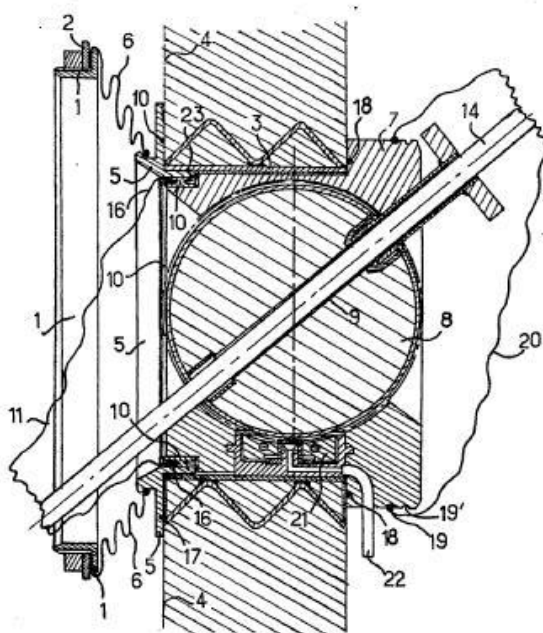


Fig. 4

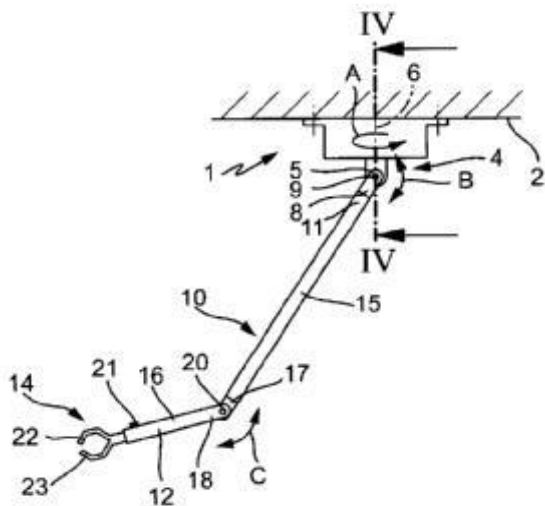
## B25J 1/12

having means for attachment to a support stand

### Definition statement

*This place covers:*

Manipulators which are moved in space by hand and which are attached to the ground or the ceiling.



## B25J 3/00

Manipulators of master-slave type, i.e. both controlling unit and controlled unit perform corresponding spatial movements

### Definition statement

*This place covers:*

Manipulators consisting of a master unit for inputting the movements of a user and a remote slave unit, connected to the master unit, for performing movements corresponding to the input movements.

## B25J 3/02

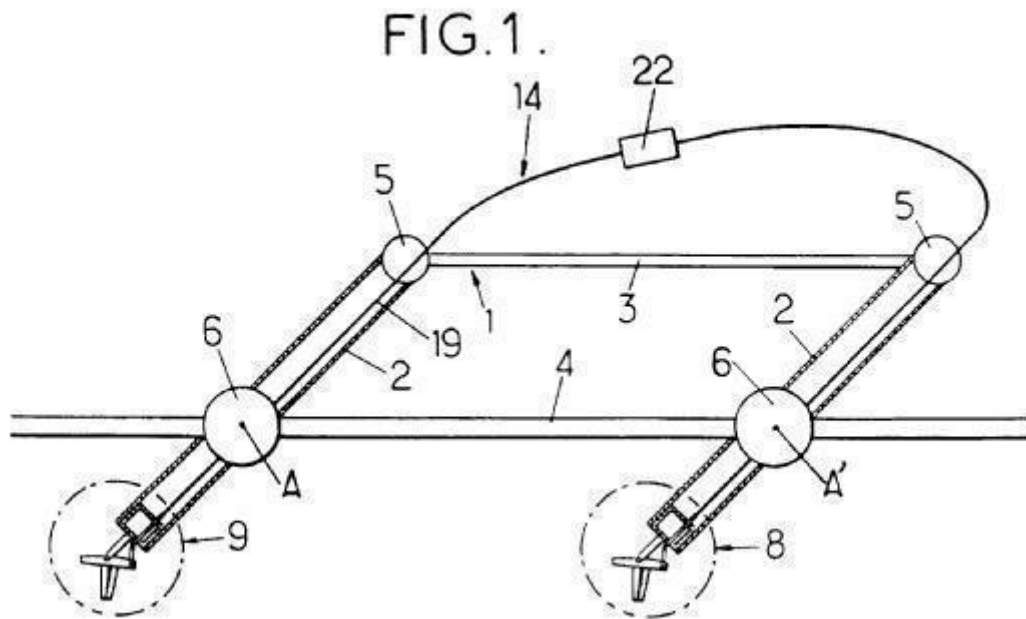
involving a parallelogram coupling of the master and slave units (pantographic instruments [B43L 13/00](#))

### Definition statement

*This place covers:*

Master-slave manipulators having a mechanical connection between the master unit and the slave unit (e.g. connection by shafts, rods, wires, etc).

Illustrative example of subject matter classified in this group:



## References

### Limiting references

*This place does not cover:*

Manual master-slave manipulators mounted in a wall	<a href="#">B25J 1/08</a>
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## B25J 3/04

involving servo mechanisms (servo-actuated heads [B25J 15/02](#))

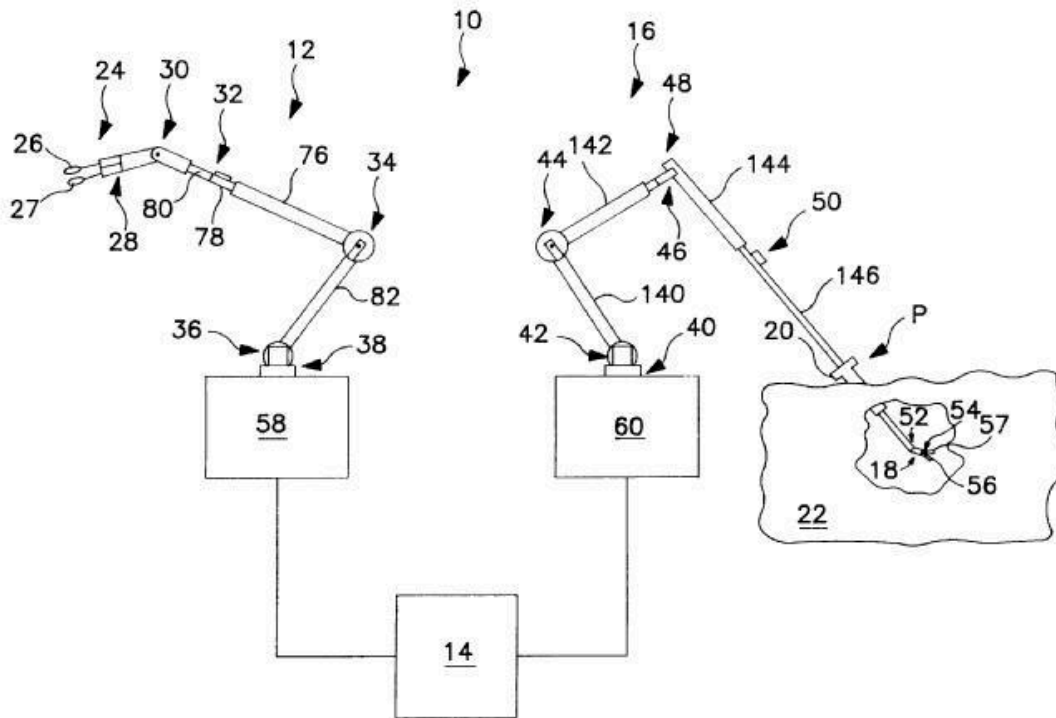
### Definition statement

*This place covers:*

Master-slave manipulators having an electrical connection between the master unit and the slave unit (i.e. the movements of the master unit are transformed into electrical signals for controlling actuators of the slave unit).



Illustrative example of subject matter classified in this group:



**References**

**Limiting references**

*This place does not cover:*

Control systems of master-slave manipulators	<a href="#">B25J 9/1689</a>
Master part in the form of hand-grip control means	<a href="#">B25J 13/02</a>

**Informative references**

*Attention is drawn to the following places, which may be of interest for search:*

Manipulators specially adapted for use in surgery	<a href="#">A61B 34/70</a>
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**B25J 5/00**

**Manipulators mounted on wheels or on carriages ([B25J 1/00](#) takes precedence; programme-controlled manipulators [B25J 9/00](#) {; vehicle aspects [B60](#), [B62](#), e.g. remote-controlled steering for motor vehicles [B62D 1/24](#); control of position of vehicles [G05D 1/00](#)})**

**Definition statement**

*This place covers:*

Mobile manipulators, meant to work at different locations.

## References

### Informative references

Attention is drawn to the following places, which may be of interest for search:

Walking robots	<a href="#">B62D 57/032</a>
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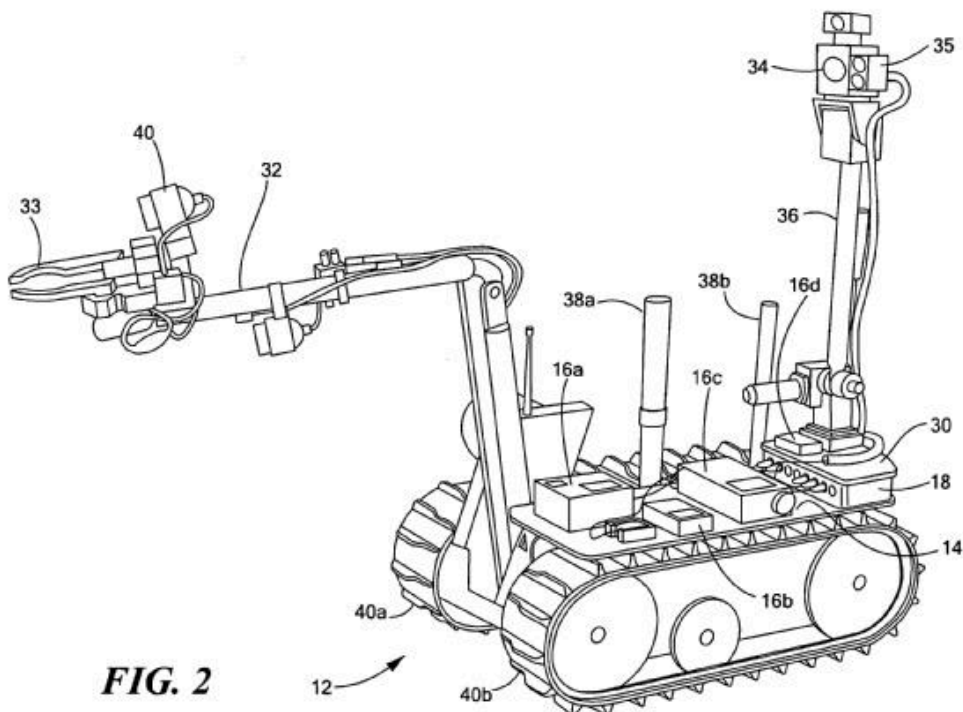
## B25J 5/005

{mounted on endless tracks or belts}

### Definition statement

This place covers:

Illustrative example of subject matter classified in this group:



## References

### Informative references

Attention is drawn to the following places, which may be of interest for search:

Endless track vehicles	<a href="#">B62D 55/00</a>
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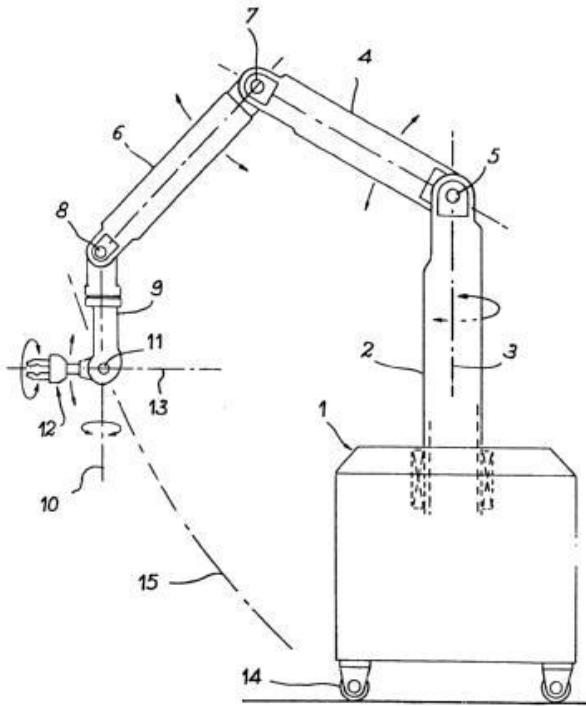
### Synonyms and Keywords

In patent documents, the following words/expressions are often used as synonyms:

- (DE)"raupenkette", "gleiskette" and (FR)"chenilles"

**B25J 5/007****{mounted on wheels}****Definition statement***This place covers:*

Illustrative example of subject matter classified in this group:

**References****Informative references***Attention is drawn to the following places, which may be of interest for search:*

Vacuum cleaners	<a href="#">A47L</a>
Control of position or course in two dimensions	<a href="#">G05D 1/43</a>

**Special rules of classification**Home robots should additionally be classified in [B25J 9/0003](#).

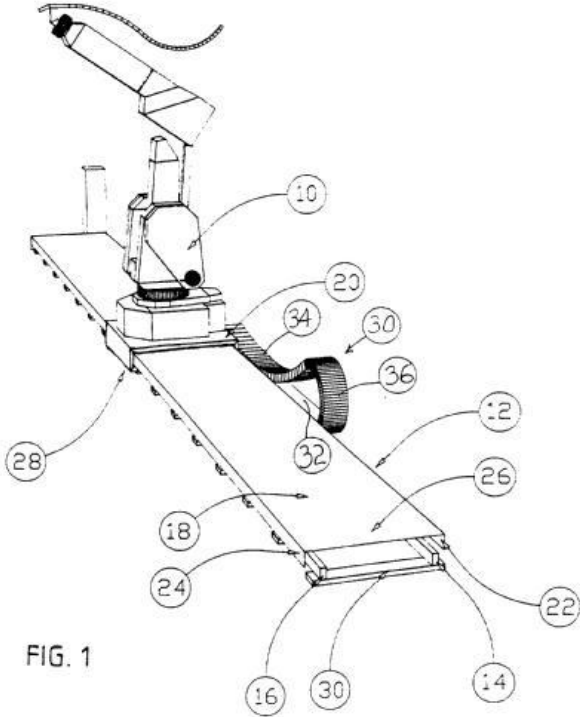
**B25J 5/02**

**travelling along a guideway**

**Definition statement**

*This place covers:*

Illustrative example of subject matter classified in this group:



**References**

**Limiting references**

*This place does not cover:*

Cartesian coordinate type manipulators	<a href="#">B25J 9/023</a>
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**B25J 5/04**

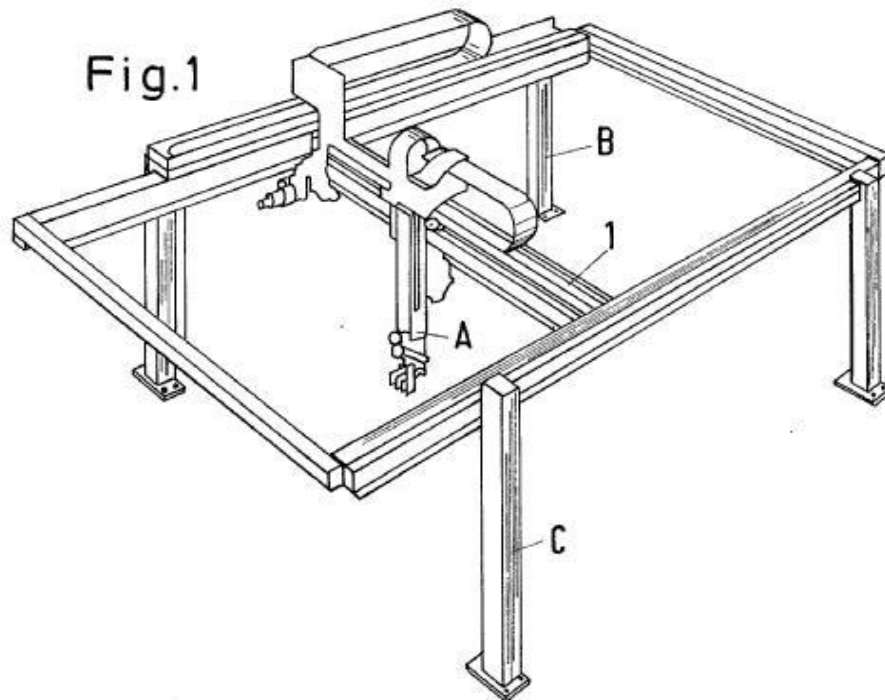
**wherein the guideway is also moved, e.g. travelling crane bridge type**

**Definition statement**

*This place covers:*

Illustrative example of subject matter classified in [B25J 5/04](#)

EP 0317491



## References

### Limiting references

*This place does not cover:*

The following group takes precedence:

Gantry type manipulators	<a href="#">B25J 9/026</a>
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## B25J 5/06

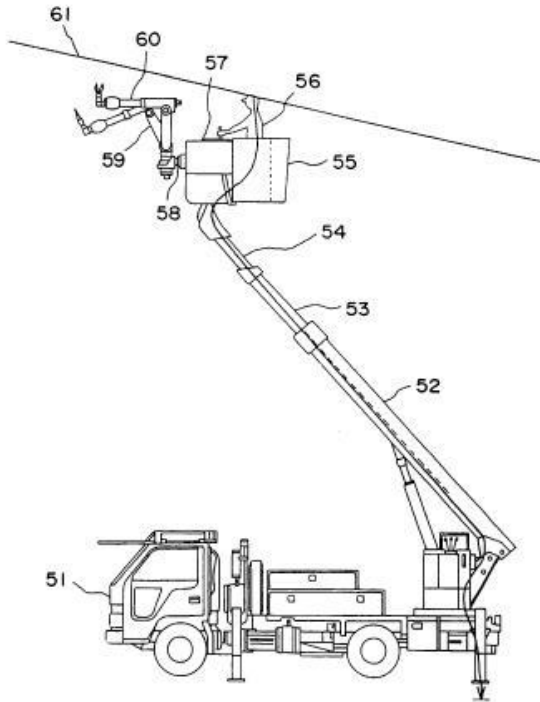
### Manipulators combined with a control cab for the operator

#### Definition statement

*This place covers:*

Illustrative example of subject matter classified in [B25J 5/06](#)

EP 0940366



### **Special rules of classification**

The cab is not necessarily part of the manipulator but can be remote from the manipulator.

### **B25J 7/00**

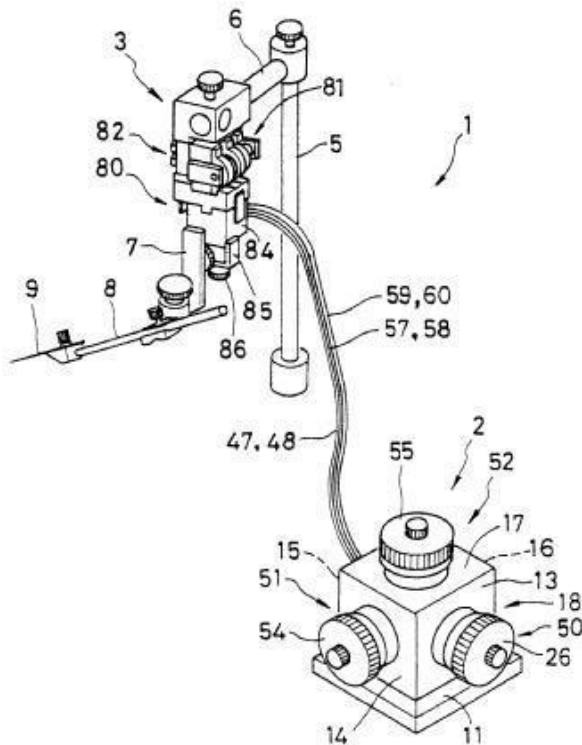
**Micromanipulators** {(specimen supports for investigating or analysing materials [G01N 23/2204](#); associated with microscopes [G02B 21/32](#); means for supporting or positioning the objects or the material in discharge tubes [H01J 37/20](#))}

### **Definition statement**

*This place covers:*

Manipulators performing tasks at a level of precision that can usually not be achieved by the unaided human hand.

Illustrative example of subject matter classified in this group:



## References

### Informative references

Attention is drawn to the following places, which may be of interest for search:

Microstructural devices or systems	<a href="#">B81B</a>
Nanostructures	<a href="#">B82B</a>
Piezoelectric devices	<a href="#">H10N 30/00</a>

## B25J 9/00

### Programme-controlled manipulators

#### Definition statement

*This place covers:*

Manipulators performing a series of actions corresponding to a list of instructions.

## B25J 9/0003

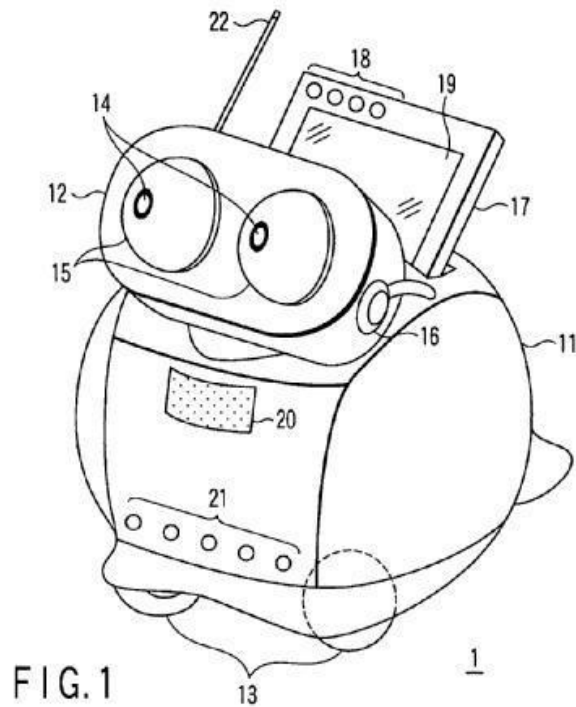
### {Home robots, i.e. small robots for domestic use}

#### Definition statement

*This place covers:*

Robots which operates semi- or fully autonomously to perform services useful to the well-being of humans and equipment, excluding manufacturing operations.

Illustrative example of subject matter classified in this group:



## References

### Informative references

Attention is drawn to the following places, which may be of interest for search:

Vacuum cleaners	<a href="#">A47L</a>
Control of position or course in two dimensions	<a href="#">G05D 1/43</a>

## Special rules of classification

Home robots mounted on wheels or tracks should additionally be classified in [B25J 5/00](#).

## Synonyms and Keywords

In patent documents, the following words/expressions are often used as synonyms:

- "service robots", and "domestic robots"

## B25J 9/0006

{Exoskeletons, i.e. resembling a human figure}

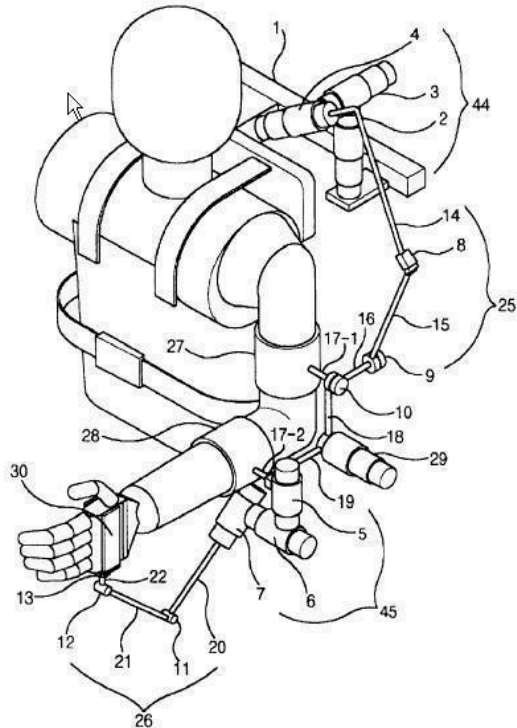
## Definition statement

This place covers:

Powered mobile machines consisting primarily of a skeleton-like framework worn by a person and a power supply that supplies at least part of the activation-energy for limb movement.



US 6301526



## References

### Informative references

Attention is drawn to the following places, which may be of interest for search:

Orthopaedic devices specially adapted for correcting deformities of the limbs or for supporting them	<a href="#">A61F 5/0102</a>
Apparatus for passive stretching or bending of the lower limbs	<a href="#">A61H 1/0237</a>
Apparatus for passive stretching or bending of the upper limbs	<a href="#">A61H 1/0274</a>
Suspension devices for supporting the body of disabled persons in an upright walking or standing position	<a href="#">A61H 3/00</a>
Walking robots	<a href="#">B62D 57/032</a>
Input/output arrangements in interaction with the human body for transferring data to be processed	<a href="#">G06F 3/015</a>

## B25J 9/0009

{Constructional details, e.g. manipulator supports, bases}

### Definition statement

*This place covers:*

Illustrative example of subject matter classified in [B25J 9/0009](#)

WO 03031125

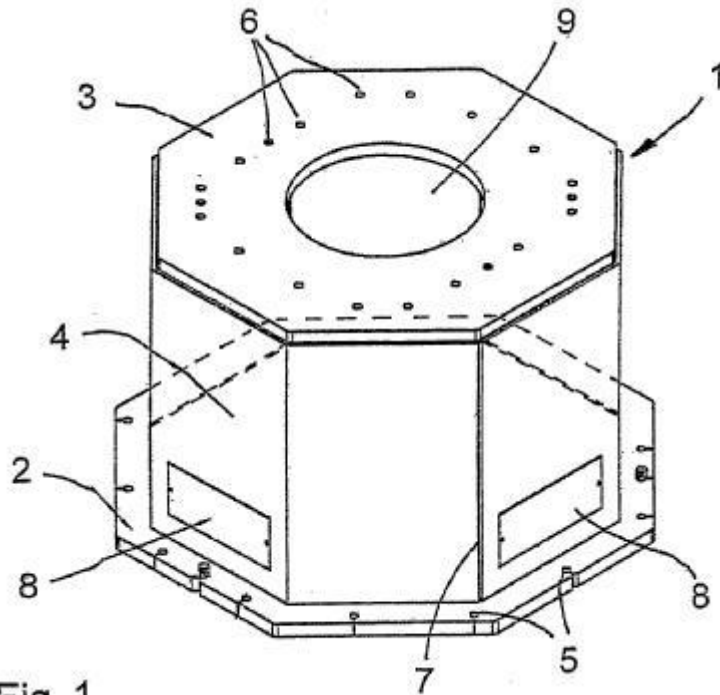


Fig. 1

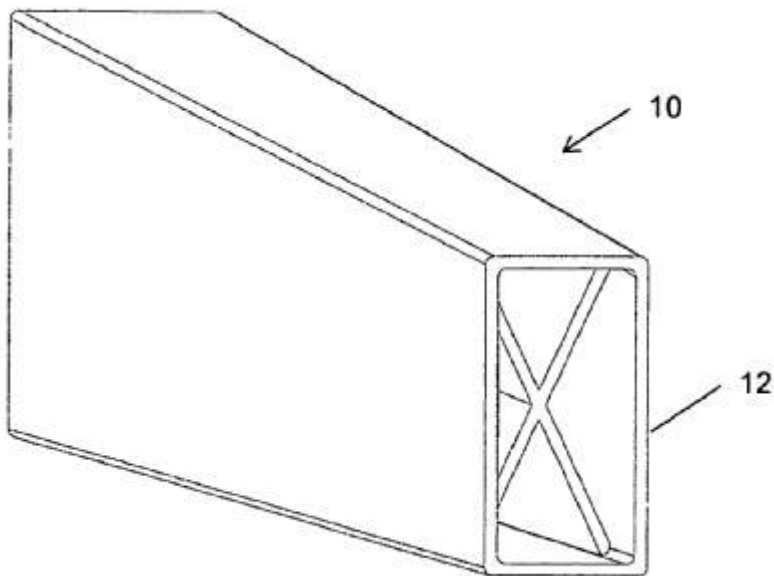
## B25J 9/0012

{making use of synthetic construction materials, e.g. plastics, composites}

### Definition statement

*This place covers:*

Illustrative example of subject matter classified in this group:



This group relates to, but is not limited to, providing a design solution that overcomes the heavy weight of robot structures that are expected to handle heavy payloads with high speeds through complex spatial trajectories at a long reach while preserving high positional accuracy and dynamic performance, by applying composite materials to robot structures.

**Glossary of terms**

*In this place, the following terms or expressions are used with the meaning indicated:*

Synthetic materials	Man-made materials made of artificial chemicals as opposed to organic ones. They include plastics (polythene, polystyrene), synthetic fibres (nylon, acrylics, polyesters), synthetic resins and synthetic rubber
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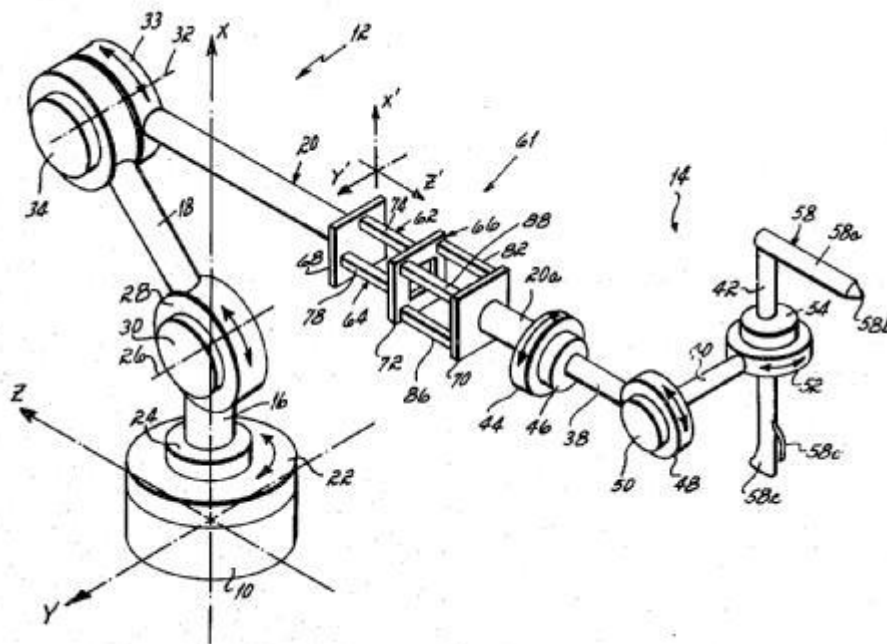
**B25J 9/0081**

{with master teach-in means}

**Definition statement**

*This place covers:*

Illustrative example of subject matter classified in this group:



**References**

**Informative references**

*Attention is drawn to the following places, which may be of interest for search:*

Teaching successive positions by walk-through, i.e. the tool head or end effector being grasped and guided directly to follow a path	<a href="#">G05B 19/423</a>
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## Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Master teach-in means	Devices manually moved in space by an operator for teaching the path of a manipulator.
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## B25J 9/0084

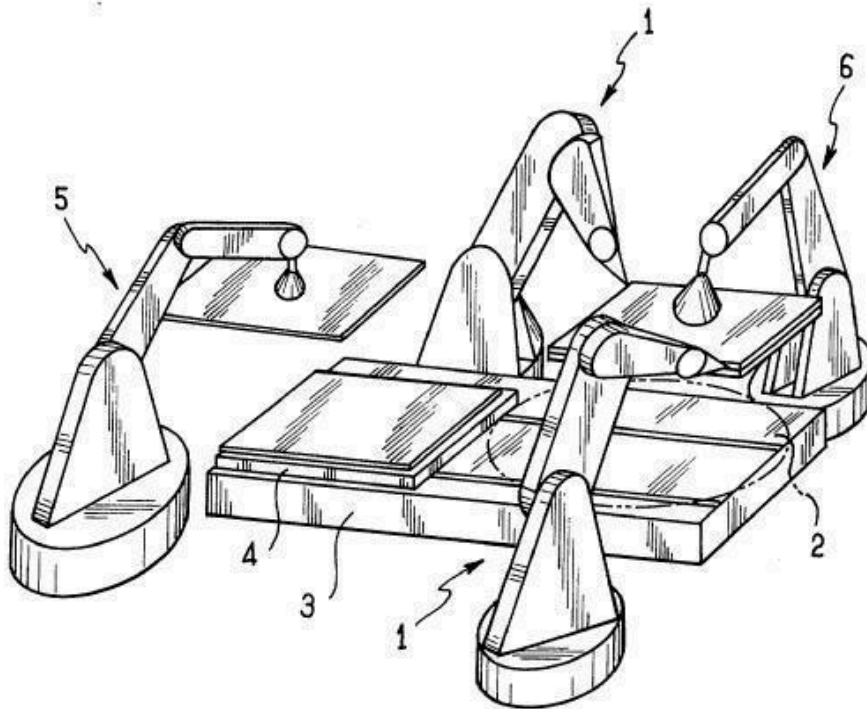
{comprising a plurality of manipulators}

### Definition statement

*This place covers:*

Both robotic installation comprising several manipulators and manipulators comprising two arms connected to a single basis.

Illustrative example of subject matter classified in this group:



## References

### Limiting references

*This place does not cover:*

Humanoid robots having two arms (mostly in)	<a href="#">B62D 57/032</a>
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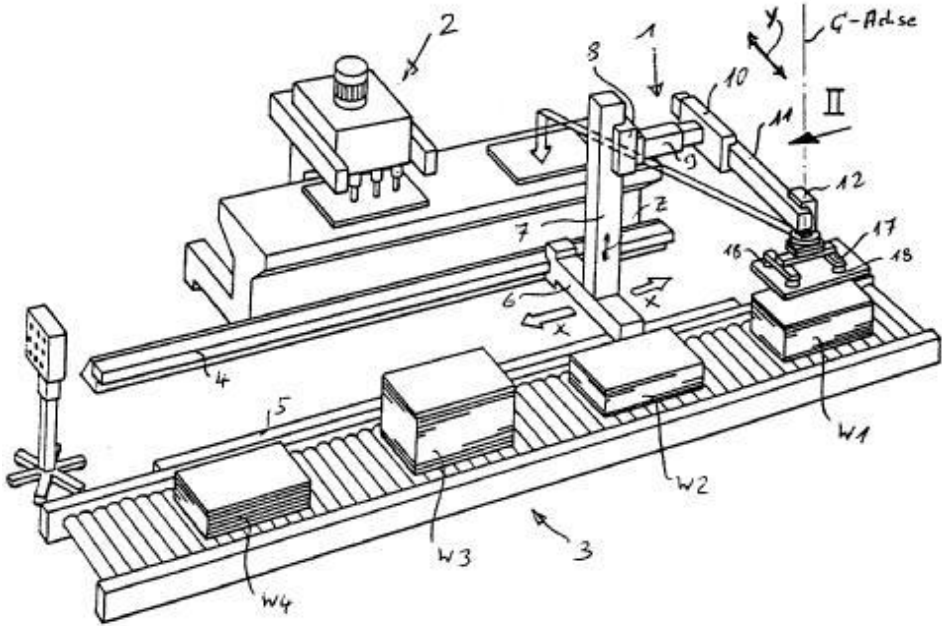
**B25J 9/0093**

{co-operating with conveyor means}

**Definition statement**

*This place covers:*

Illustrative example of subject matter classified in this group:



**References**

**Informative references**

Attention is drawn to the following places, which may be of interest for search:

Programme-control systems consisting of manipulators and conveyor only	<a href="#">G05B 19/4182</a>
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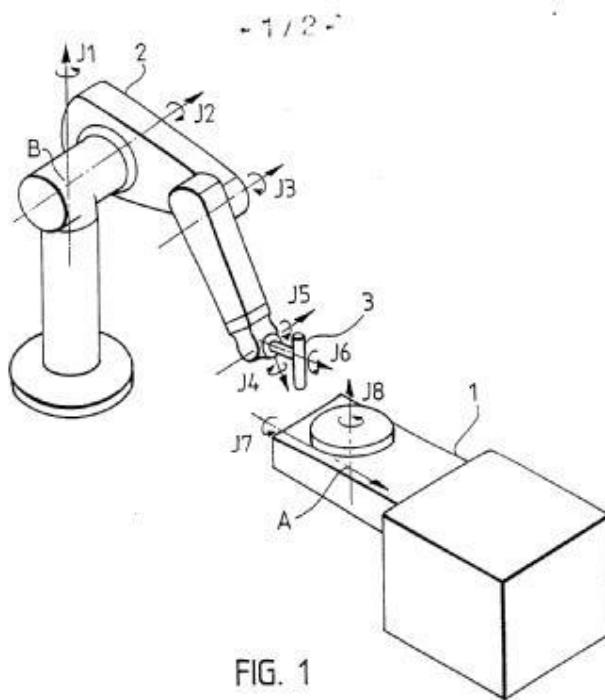
**B25J 9/0096**

{co-operating with a working support, e.g. work-table}

**Definition statement**

*This place covers:*

Illustrative example of subject matter classified in this group:

**B25J 9/02**

characterised by movement of the arms, e.g. cartesian coordinate type  
([B25J 9/06](#) takes precedence)

**Definition statement**

*This place covers:*

The main types of industrial manipulators, each type corresponding to a specific kinematic chain.

**B25J 9/023**

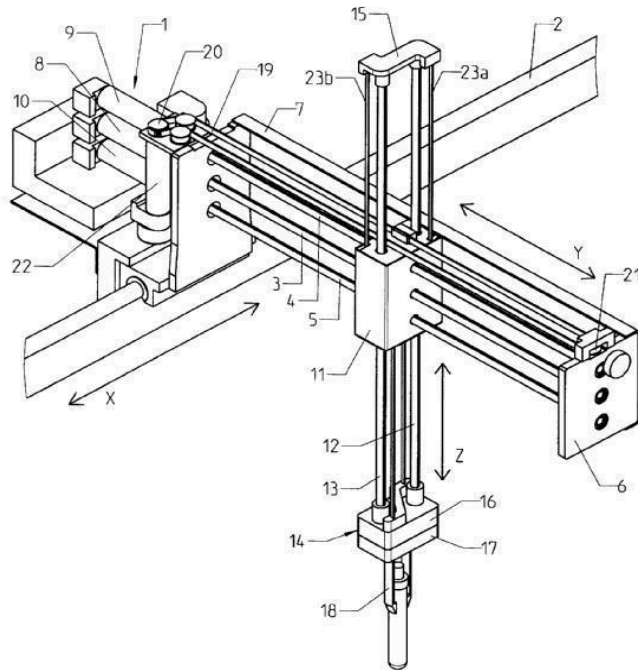
{Cartesian coordinate type}

**Definition statement**

*This place covers:*

Manipulators consisting of prismatic joints connected in series and allowing movements along perpendicular axis.

Illustrative example of subject matter classified in this group:



## References

### Informative references

Attention is drawn to the following places, which may be of interest for search:

Movable work or tool support with a single sliding pair followed perpendicularly by a single sliding pair	<a href="#">B23Q 1/621</a>
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## B25J 9/026

{Gantry-type}

### Definition statement

*This place covers:*

Cartesian coordinate type manipulators having three prismatic joints, wherein one joint is formed by a carriage running on an overhead horizontal beam supported at its two ends by other beams.



Illustrative example of subject matter classified in this group:

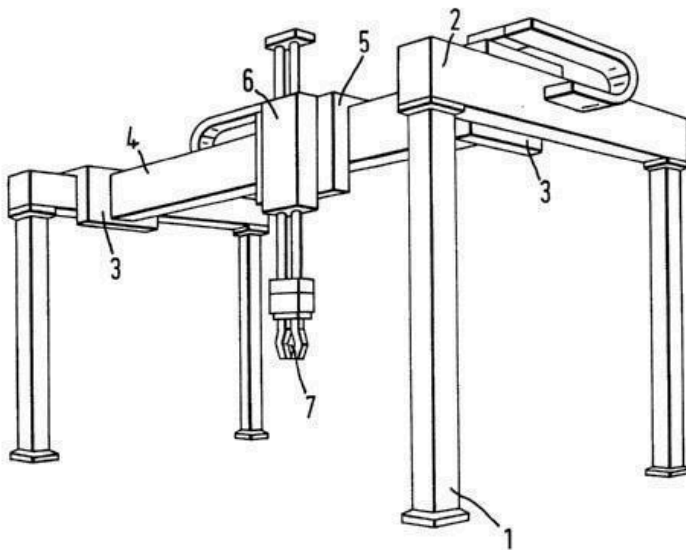


FIG. 1

## References

### Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Manipulators travelling along a guideway, wherein the guideway is also moved (details concerning the guideways/rails should also be classified here)	<a href="#">B25J 5/04</a>
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### Informative references

Attention is drawn to the following places, which may be of interest for search:

Portals	<a href="#">B23Q 1/012</a>
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## Synonyms and Keywords

In patent documents, the following words/expressions are often used as synonyms:

- (FR)"robot portique", and (DE)"portalroboter "

## B25J 9/04

by rotating at least one arm, excluding the head movement itself, e.g. cylindrical coordinate type or polar coordinate type

## Definition statement

This place covers:

Manipulators having a kinematic chain (excluding the kinematic pairs of the head itself) including at least one revolute joint.



**B25J 9/041**

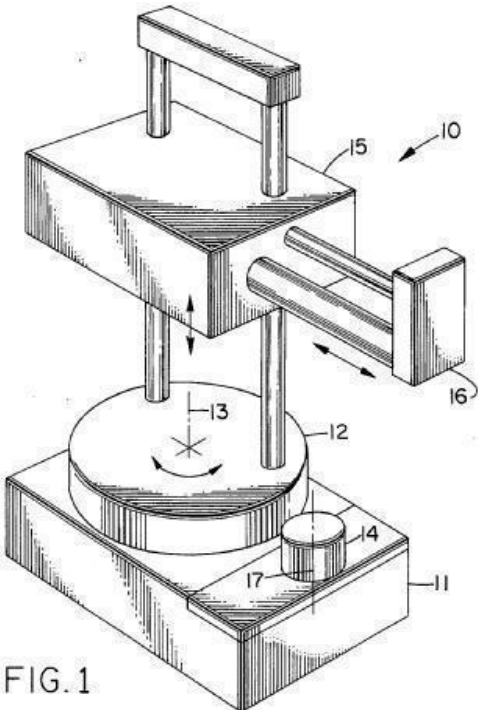
**{Cylindrical coordinate type}**

**Definition statement**

*This place covers:*

Manipulators having a kinematic chain including at least a revolute joint and arranged so that the working envelope of the manipulator is a cylinder. The kinematic chain usually includes a revolute joint having a vertical axis and two prismatic joints having respectively a vertical and a horizontal axis.

Illustrative example of subject matter classified in this group:



**B25J 9/042**

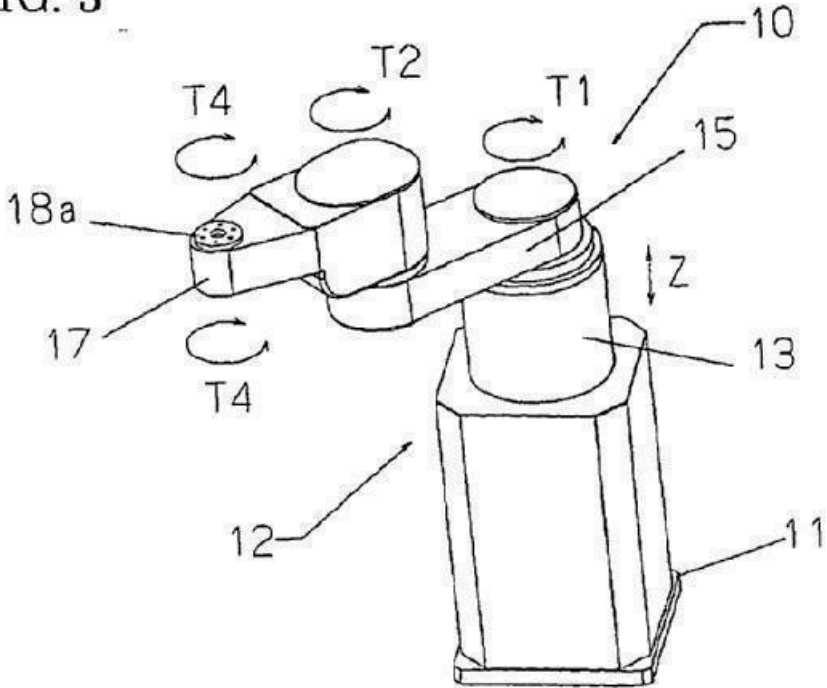
{comprising an articulated arm}

**Definition statement**

*This place covers:*

Cylindrical coordinate type manipulators having at least two subsequent revolute pairs having parallel axes.

FIG. 3



**References**

**Limiting references**

*This place does not cover:*

Transfer devices for transferring semiconductors into an out of processing chambers	<a href="#">H01L 21/67742</a>
Apparatus specially adapted for handling semiconductor, the wafer being placed on a robot blade, or gripped for conveyance	<a href="#">H01L 21/68707</a>

**Synonyms and Keywords**

*In patent documents the following abbreviations are often used:*

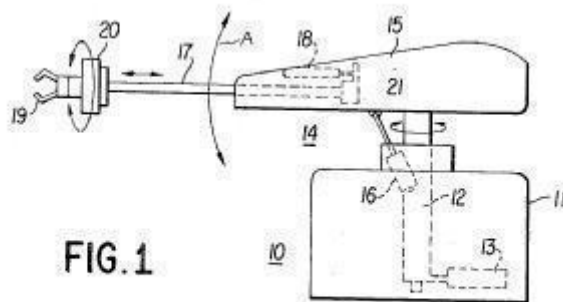
SCARA	Selective Compliance Assembly Robot Arm
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*In patent documents the following expression/word "horizontal articulated manipulator" is often used.*

**B25J 9/045****{Polar coordinate type}****Definition statement***This place covers:*

Manipulators having a kinematic chain comprising two revolute joints and a prismatic joint arranged so that the working envelope of the manipulator is a part of a sphere.

Illustrative example of subject matter classified in this group:

**Synonyms and Keywords**

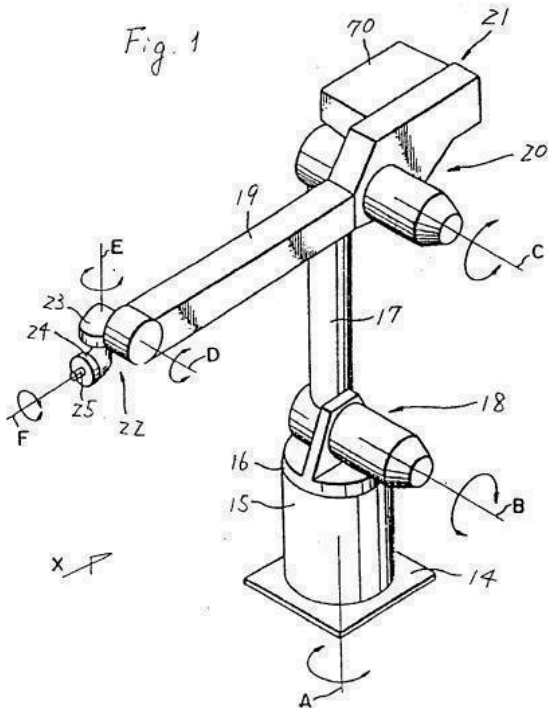
*In patent documents the following expression/word "spherical" is often used.*

**B25J 9/046****{Revolute coordinate type}****Definition statement***This place covers:*

Manipulators having a kinematic chain including at least two subsequent revolute joints having parallel horizontal axis.

The most common revolute coordinate type manipulators have six revolute joints: a first joint having a vertical axis between a basis and a carrousel, a second joint between the carrousel and a lower arm, a third joint between the lower arm and an upper arm, the second and third joint shaving parallel horizontal axis and three further joints for the wrist.

Illustrative example of subject matter classified in this group:



### Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Anthropomorphic	Designates manipulators having a kinematic chain similar to a human arm, i.e. two revolute joints for the shoulder, two revolute joints for the elbow and three revolute joints for the wrist.
-----------------	--

### Synonyms and Keywords

In patent documents, the following words/expressions are often used as synonyms:

- "articulated type", and "jointed type"

### B25J 9/047

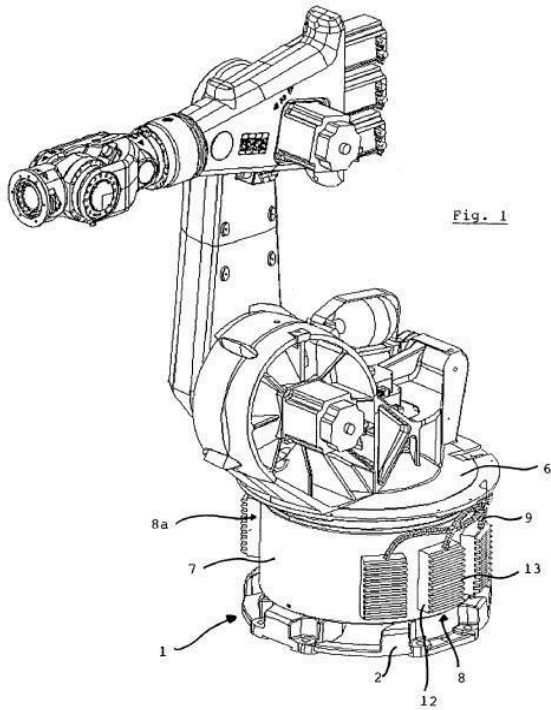
{the pivoting axis of the first arm being offset to the vertical axis}

### Definition statement

This place covers:

Revolute coordinate type manipulators having the axis of the second revolute joint between the carousel and the lower arm being offset from the vertical axis of the first revolute joint between the basis and the carousel.

Illustrative example of subject matter classified in this group:



## **B25J 9/048**

**{Pendulum type}**

### **Definition statement**

*This place covers:*

Illustrative example of subject matter classified in [B25J 9/048](#)

EP 0162392

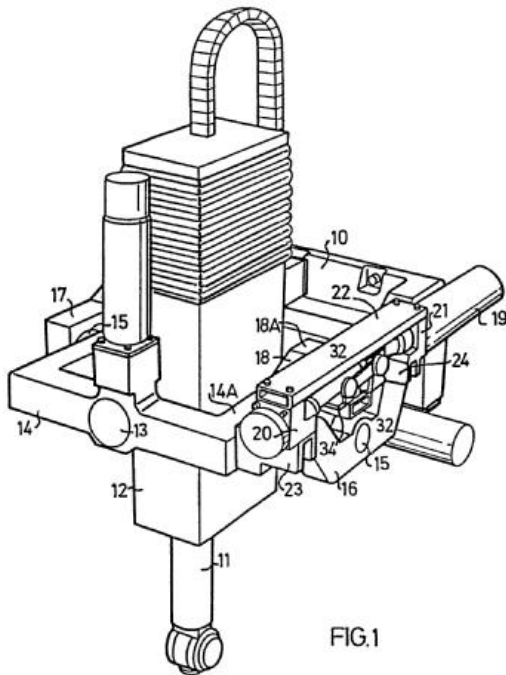


FIG.1

## B25J 9/06

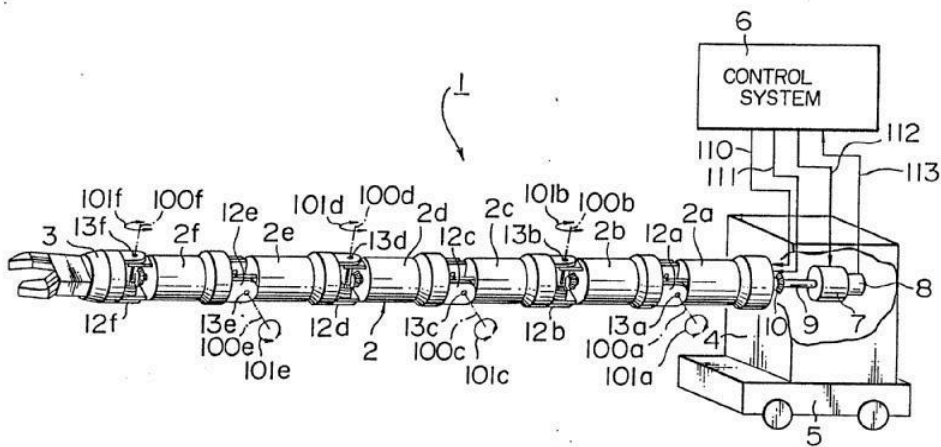
characterised by multi-articulated arms

### Definition statement

*This place covers:*

Manipulator arms having multiple articulations placed in series.

Illustrative example of subject matter classified in this group:



### Special rules of classification

Documents should additionally be classified in [B25J 18/06](#) when the number of articulations is very high and the articulations very closed to each other, because the robot arm can be considered as flexible.

## B25J 9/08

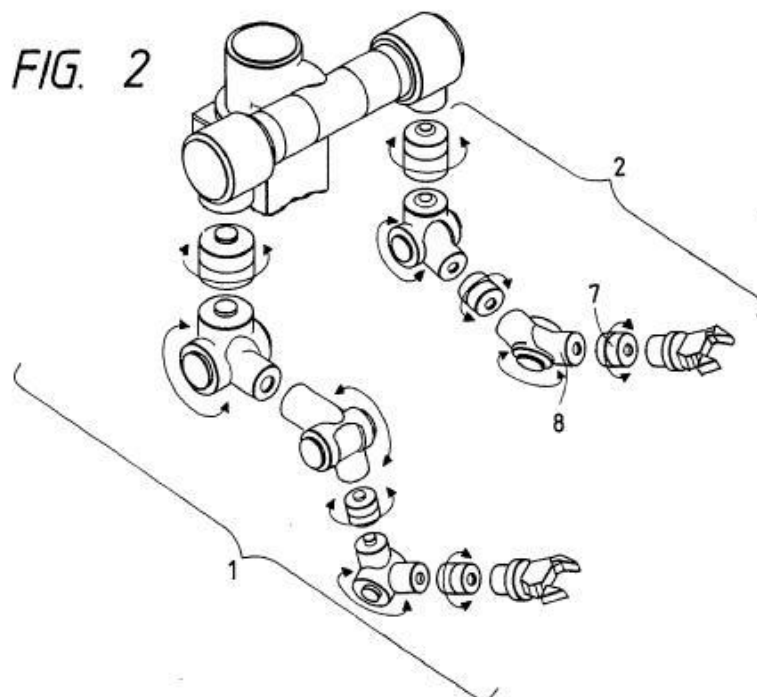
characterised by modular constructions

### Definition statement

*This place covers:*

Manipulators which can be easily and quickly mounted / dismantled so that their components can be arranged in different possible configurations.

EP0441397



## B25J 9/10

characterised by positioning means for manipulator elements

### Definition statement

*This place covers:*

Constructional elements allowing the manipulators to perform their movement.

**B25J 9/1005**

{comprising adjusting means}

**Definition statement**

*This place covers:*

Constructional elements allowing to adjust the movement of the manipulators.

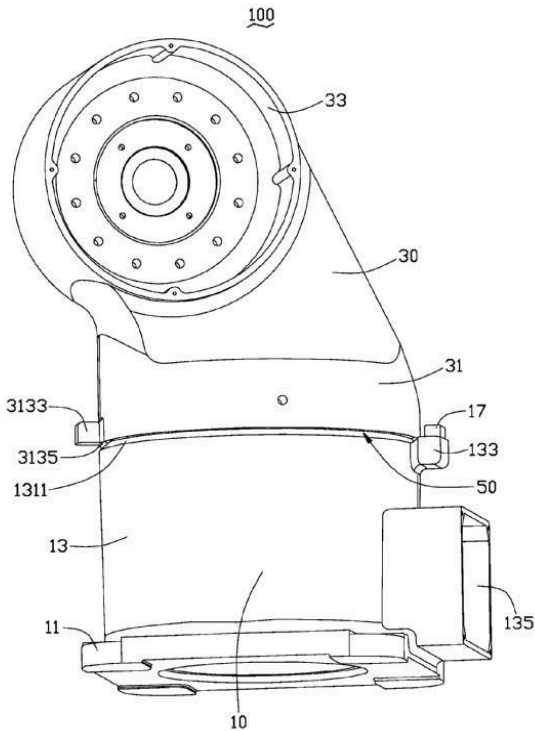
**B25J 9/101**

{using limit-switches, -stops}

**Definition statement**

*This place covers:*

Illustrative example of subject matter classified in this group:



**References**

**Informative references**

*Attention is drawn to the following places, which may be of interest for search:*

Means for preventing, limiting or returning the movements of parts of a control mechanism	<a href="#">G05G 5/04</a>
---	---------------------------

**Glossary of terms**

*In this place, the following terms or expressions are used with the meaning indicated:*

Limit stop	A mechanical device for stopping the travel of a manipulator part along or around an axis.
------------	--



Limit switch	An electromechanical device operated by the motion of a part of the manipulator to make or break an electrical connection.
--------------	--

## B25J 9/1015

{using additional, e.g. microadjustment of the end effector}

### Definition statement

*This place covers:*

Illustrative example of subject matter classified in [B25J 9/1015](#)

EP 0149806

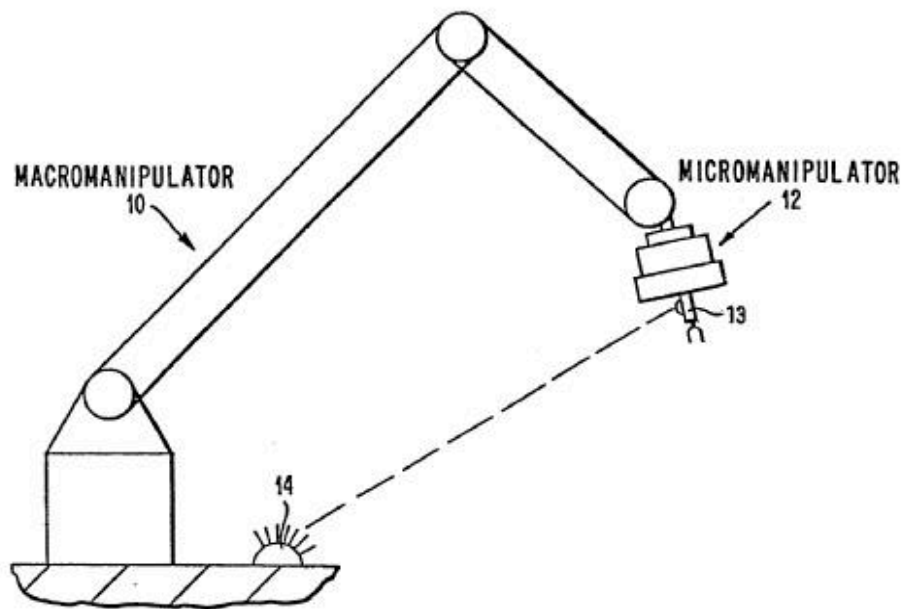


FIG. 1

## B25J 9/102

{Gears specially adapted therefor, e.g. reduction gears (gearings in general [F16H](#))}

### Definition statement

*This place covers:*

Rotating elements for transmitting a torque specially adapted for manipulators.

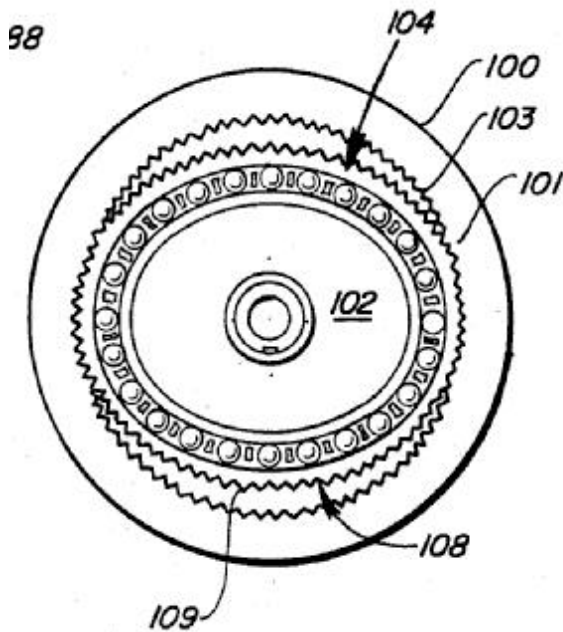
## B25J 9/1025

{Harmonic drives (in general: [F16H 49/001](#))}

### Definition statement

*This place covers:*

Illustrative example of subject matter classified in this group:



### Special rules of classification

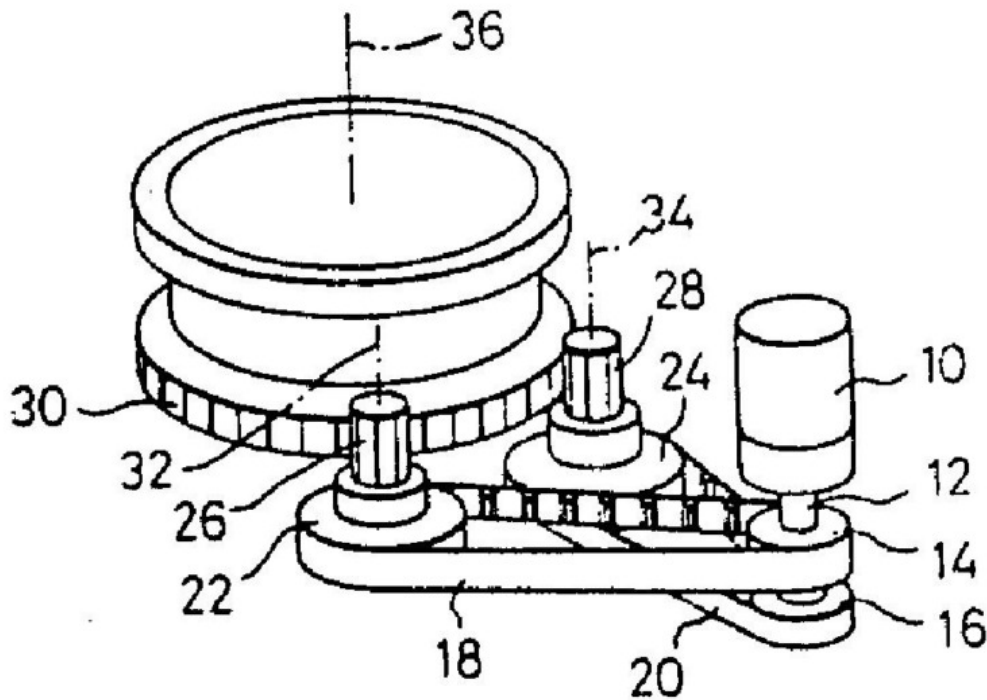
Harmonic drives consist of three basic parts:

- the circular spline which is a rigid ring with internal teeth, engaging the teeth of the flexspine across the major axis of the wave generator;
- the flexspine which is a non-rigid, thin cylindrical cup with external teeth on a slightly smaller pitch diameter than the circular spline; it fits over and is held in an elliptical shape by the wave generator; and
- the wave generator which is a thin, raced ball bearing fitted onto an elliptical plug serving as a high efficiency torque converter.

The advantages include: no backlash, compactness and light weight, high gear ratios and high torque capability.

**B25J 9/103****{with backlash-preventing means}****Definition statement***This place covers:*

Illustrative example of subject matter classified in this group:

**References****Informative references***Attention is drawn to the following places, which may be of interest for search:*

Special devices for taking up backlash in toothed wheels	<a href="#">F16H 55/18</a>
Arrangements for adjusting or for taking-up backlash not provided for elsewhere	<a href="#">F16H 57/12</a>

**Glossary of terms***In this place, the following terms or expressions are used with the meaning indicated:*

Backlash	Amount of clearance between mated gear teeth.
----------	---

**Synonyms and Keywords***In patent documents the following expression/word "play" is often used.*

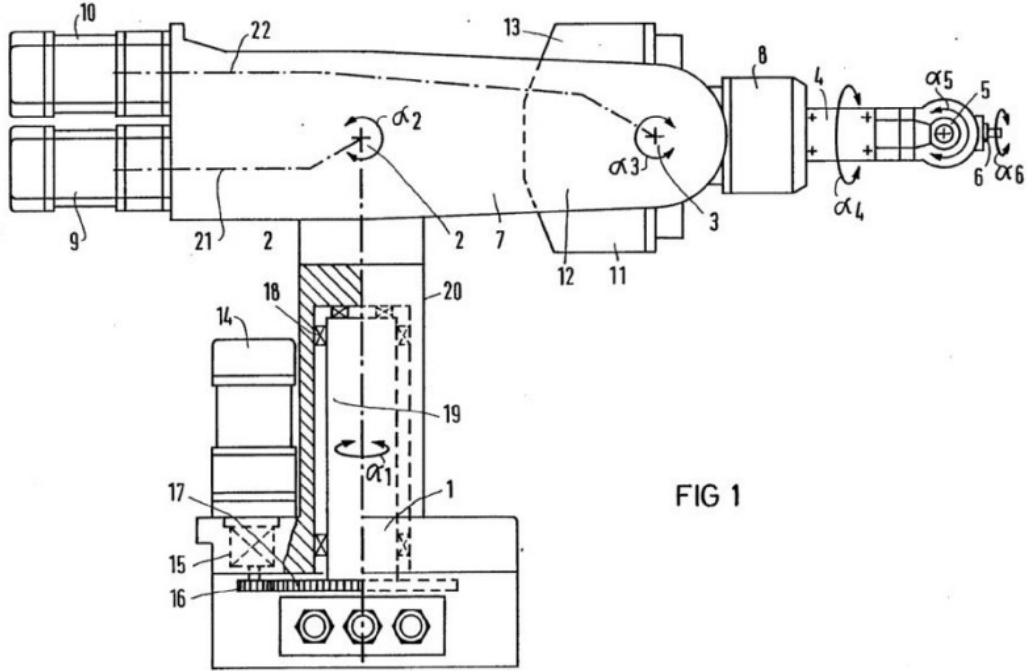
**B25J 9/1035**

{Pinion and fixed rack drivers, e.g. for rotating an upper arm support on the robot base}

**Definition statement**

*This place covers:*

Illustrative example of subject matter classified in this group:



**References**

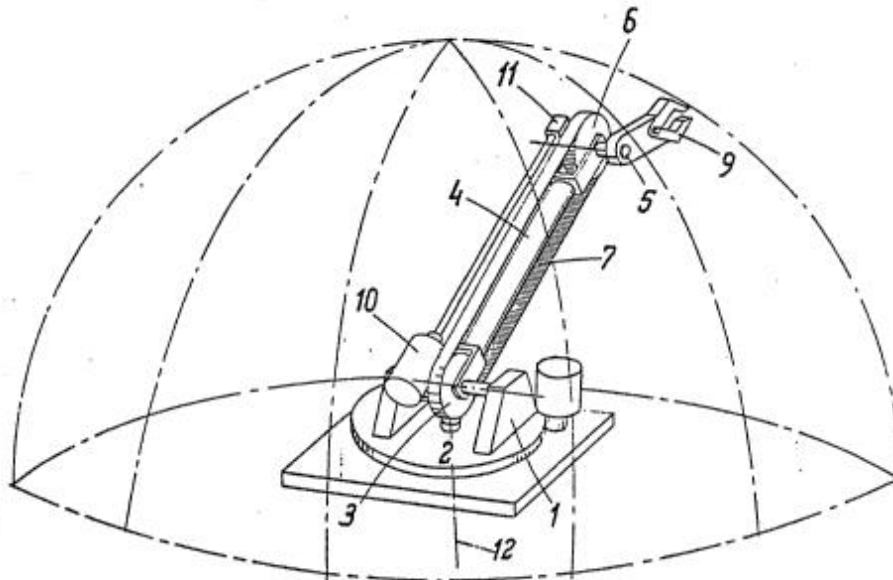
**Informative references**

Attention is drawn to the following places, which may be of interest for search:

Gearings for conveying or interconverting oscillating or reciprocating motions comprising a rack	<a href="#">F16H 19/005</a> , <a href="#">F16H 19/006</a>
Racks	<a href="#">F16H 55/26</a>

**B25J 9/104****{with cables, chains or ribbons}****Definition statement***This place covers:*

Illustrative example of subject matter classified in this group:

*Fig. 2***References****Informative references***Attention is drawn to the following places, which may be of interest for search:*

Gearings for conveying rotary motion by endless flexible members	<a href="#">F16H 7/00</a>
--	---------------------------

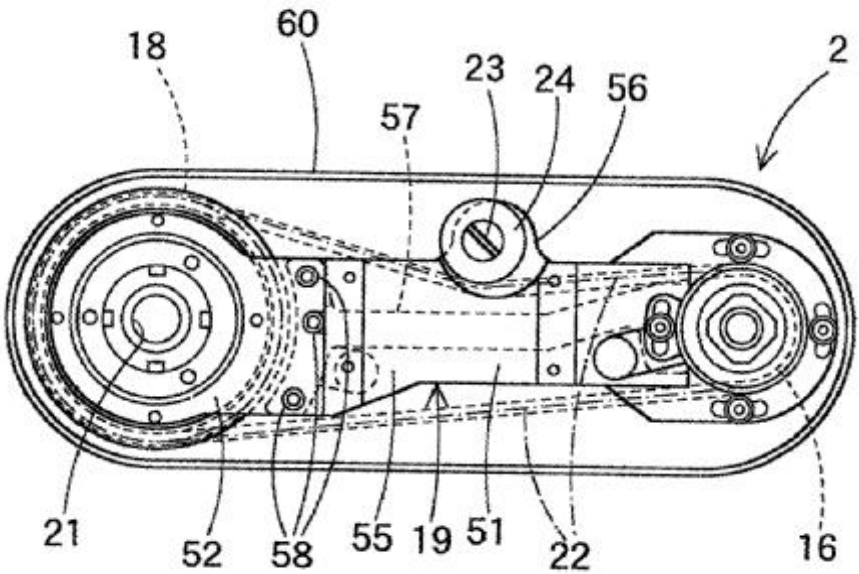
**B25J 9/1045**

{comprising tensioning means}

**Definition statement**

*This place covers:*

Illustrative example of subject matter classified in this group:



**B25J 9/105**

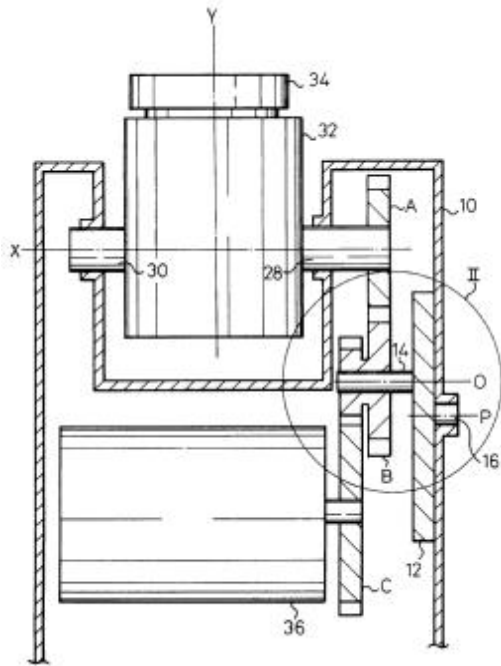
{using eccentric means ([B25J 9/109](#) takes precedence)}

**Definition statement**

*This place covers:*

Illustrative example of subject matter classified in [B25J 9/105](#)

EP 0638397



## **B25J 9/1055**

{by gravity}

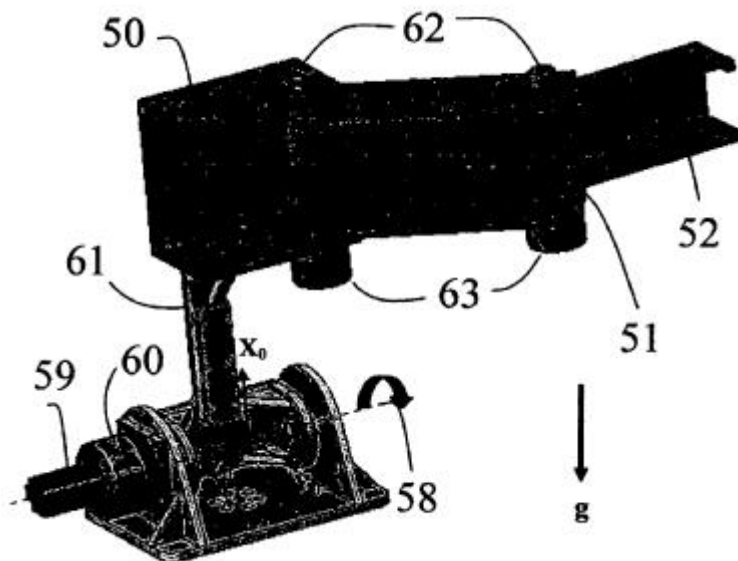
### **Definition statement**

*This place covers:*

Manipulators having at least one part set in motion by the sole force of gravity acting on this part.

Illustrative example of subject matter classified in [B25J 9/1055](#)

US 2008028880



**B25J 9/106**

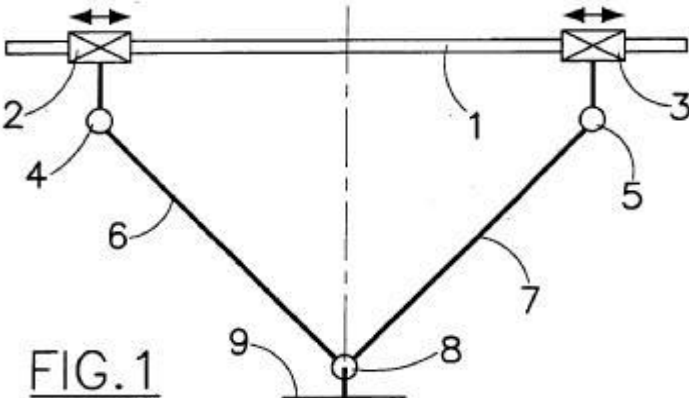
{with articulated links}

**Definition statement**

*This place covers:*

Manipulators having rods or bar for transmitting the motion from an actuator to the working head.

WO 02085580





**B25J 9/1065**

{with parallelograms}

**Definition statement**

*This place covers:*

Illustrative example of subject matter classified in this group:

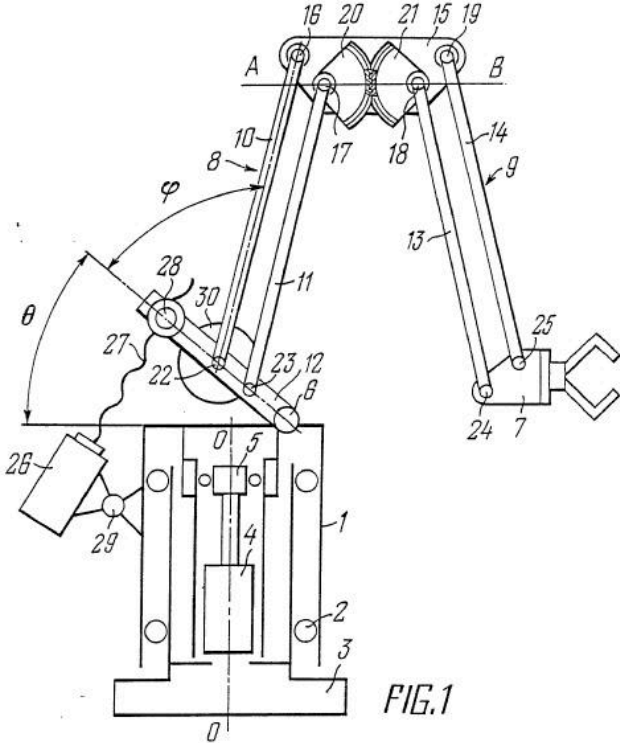


FIG.1

**Special rules of classification**

A single parallelogram is sufficient for classification in this group.

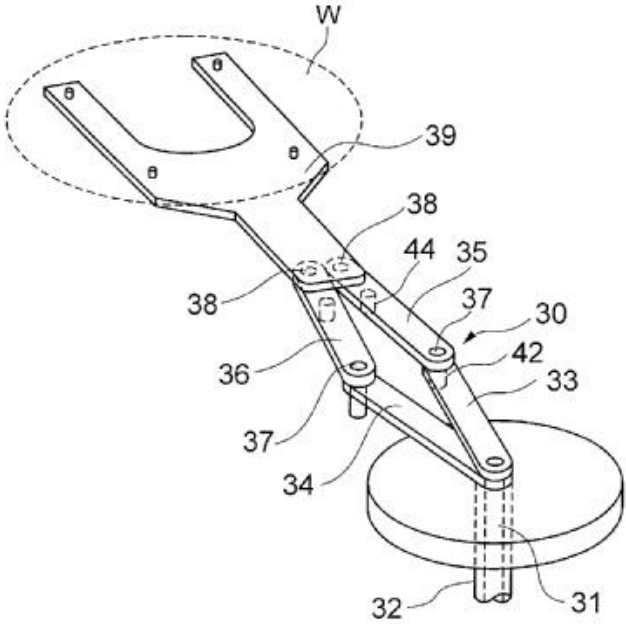
**B25J 9/107**

{of the froglegs type}

**Definition statement**

*This place covers:*

Illustrative example of subject matter classified in this group:



**References**

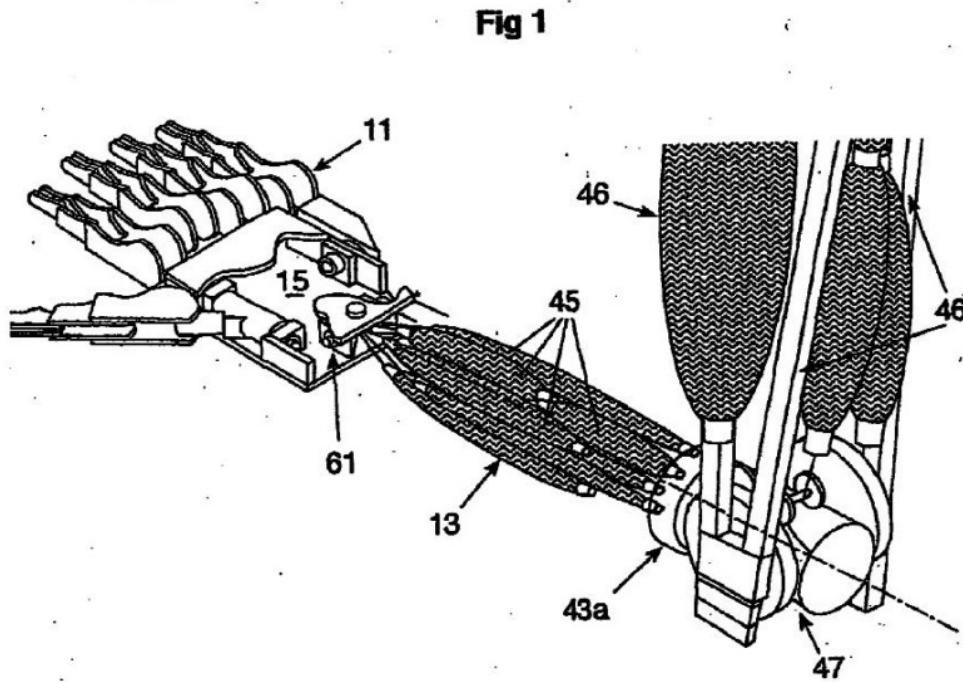
**Informative references**

*Attention is drawn to the following places, which may be of interest for search:*

Apparatus for conveying wafers into and out of processing chamber via a lock	<a href="#">H01L 21/67739</a>
Apparatus specially adapted for handling semiconductor, the wafers being placed on a robot blade, or gripped by a gripper for conveyance	<a href="#">H01L 21/68707</a>

**B25J 9/1075****{with muscles or tendons}****Definition statement***This place covers:*

Illustrative example of subject matter classified in this group:

**References****Informative references***Attention is drawn to the following places, which may be of interest for search:*

Fluid-actuated devices for displacing a member, the motor being of the muscle type	<a href="#">F15B 15/103</a>
--	-----------------------------

**Special rules of classification**Fluid activated muscles should additionally be classified in [B25J 9/142](#).**Glossary of terms***In this place, the following terms or expressions are used with the meaning indicated:*

Artificial muscle	Generic term used for materials or devices that can reversibly contract, expand, or rotate within one component due to an external stimulus (such as voltage, current, pressure or temperature). Conventional motors and pneumatic linear or rotary actuators do not qualify as artificial muscles because there is more than one component involved in the actuation.
-------------------	--

**B25J 9/108**

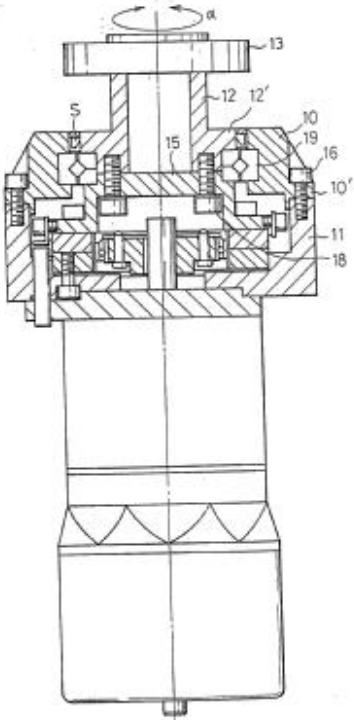
{Bearings specially adapted therefor (bearings in general [F16C](#))}

**Definition statement**

*This place covers:*

Illustrative example of subject matter classified in [B25J 9/108](#)

EP 0300050



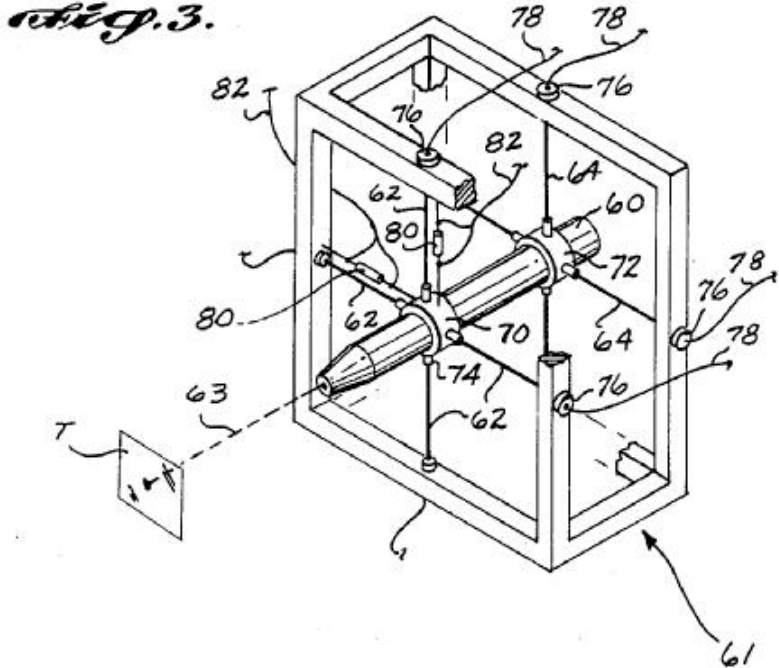
**B25J 9/1085**

{positioning by means of shape-memory materials (shape memory actuators [F03G 7/06](#))}

**Definition statement**

*This place covers:*

Illustrative example of subject matter classified in this group:



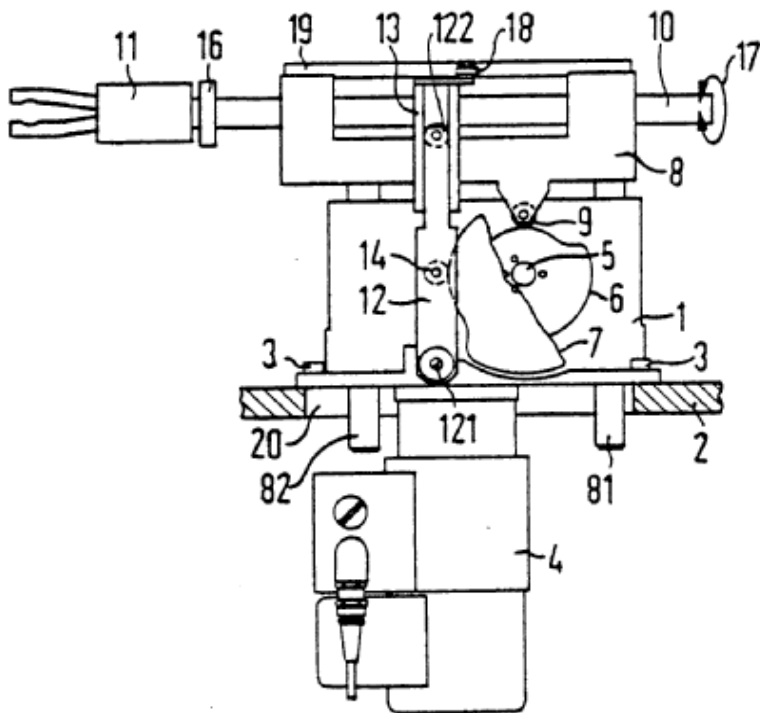
## B25J 9/109

{comprising mechanical programming means, e.g. cams}

### Definition statement

*This place covers:*

Illustrative example of subject matter classified in this group:



### Glossary of terms

*In this place, the following terms or expressions are used with the meaning indicated:*

Mechanical programming means	Mechanical parts having a specific shape which create a periodic movement so that the manipulator can execute a predetermined sequence of operations in a synchronized way.
------------------------------	---

## B25J 9/1095

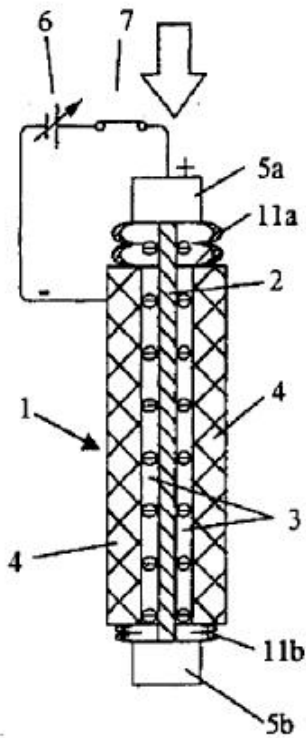
{chemically actuated}

### Definition statement

*This place covers:*

Manipulators provided with an actuator directly powered by a chemical reaction or comprising a chemically synthesized material (e.g. a polymer) able to produce mechanical energy when stimulated (e.g. by an electric current).

Illustrative example of subject matter classified in this group:



## References

### Informative references

Attention is drawn to the following places, which may be of interest for search:

Electro-chemical actuators	<a href="#">F03G 7/012</a>
----------------------------	----------------------------

## Synonyms and Keywords

In patent documents the following expression/word "polymer actuator" is often used.

## B25J 9/12

### electric

## Definition statement

This place covers:

Electric actuators specially adapted for manipulators.

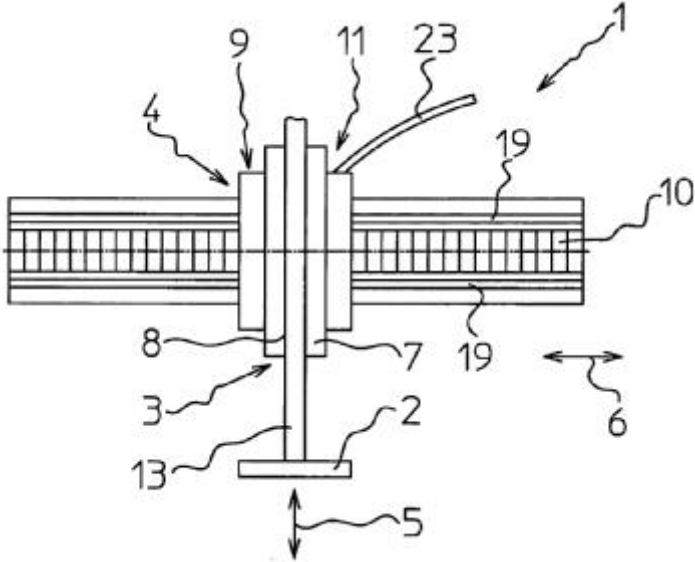
**B25J 9/123**

{Linear actuators}

**Definition statement**

*This place covers:*

Illustrative example of subject matter classified in this group:



**References**

**Informative references**

Attention is drawn to the following places, which may be of interest for search:

Linear motors	<a href="#">H02K 41/02</a>
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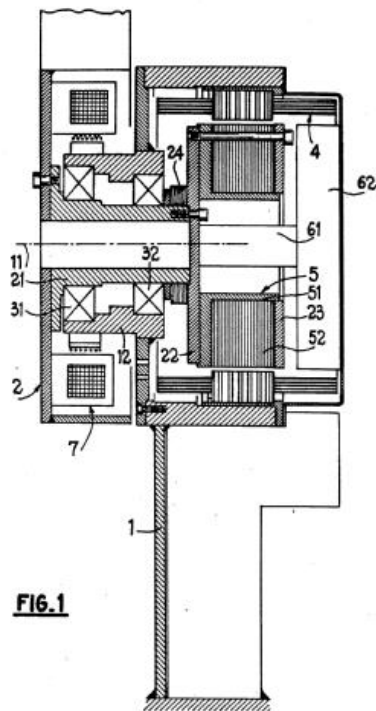
**Special rules of classification**

A manipulator having only one electric linear actuator would also be classified in this subgroup.



**B25J 9/126****{Rotary actuators}****Definition statement***This place covers:*

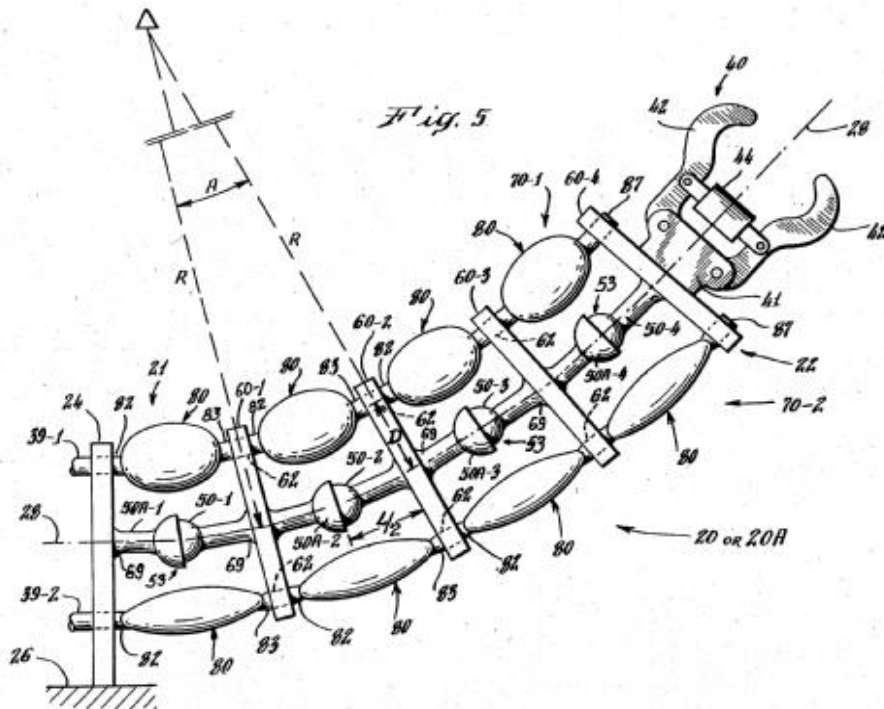
Illustrative example of subject matter classified in this group:

**B25J 9/14****fluid****Definition statement***This place covers:*

Pneumatic or hydraulic actuators specially adapted for manipulators.

**B25J 9/142****{comprising inflatable bodies}****Definition statement***This place covers:*Illustrative example of subject matter classified in [B25J 9/142](#)

US 4784042



## References

### Informative references

Attention is drawn to the following places, which may be of interest for search:

Fluid-actuated motor of the muscle type	<a href="#">F15B 15/103</a>
---	-----------------------------

### Special rules of classification

McKibben actuators should additionally be classified in [B25J 9/1075](#).

### Synonyms and Keywords

In patent documents, the following words/expressions are often used as synonyms:

- "fluidic muscle", "rubbertuator" and "McKibben actuator"

## B25J 9/144

### {Linear actuators}

### Definition statement

This place covers:

Illustrative example of subject matter classified in [B25J 9/144](#)



**B25J 9/148**

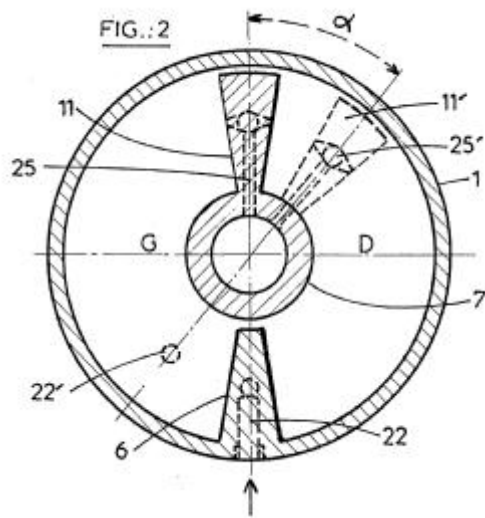
{of the oscillating vane-type (in general [F15B 15/12](#))}

**Definition statement**

*This place covers:*

Illustrative example of subject matter classified in [B25J 9/148](#)

EP 0332506

**B25J 9/16**

Programme controls (programme controls in general [G05B 19/00](#), e.g. numerical programme controls [G05B 19/18](#); {recording or playback systems [G05B 19/42](#)})

**Definition statement**

*This place covers:*

All the topics linked to the control of manipulators.

**B25J 9/1602**

{characterised by the control system, structure, architecture}

**Definition statement**

*This place covers:*

Specific types of control systems.

**B25J 9/1605**

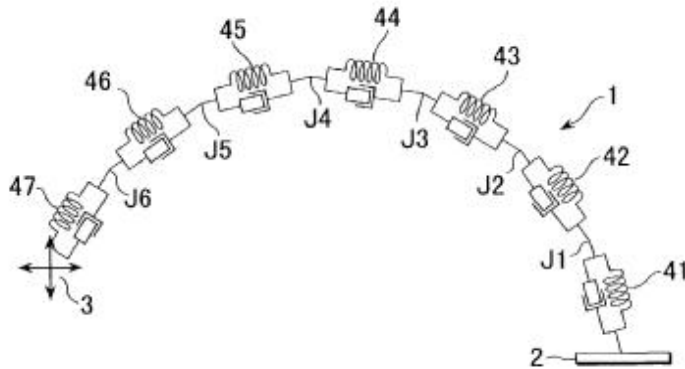
{Simulation of manipulator lay-out, design, modelling of manipulator}

**Definition statement**

*This place covers:*

Illustrative example of subject matter classified in [B25J 9/1605](#)

US 2003018412



### B25J 9/1607

{Calculation of inertia, jacobian matrixes and inverses}

#### Definition statement

This place covers:

Illustrative example of subject matter classified in [B25J 9/1607](#)

US 2006271241

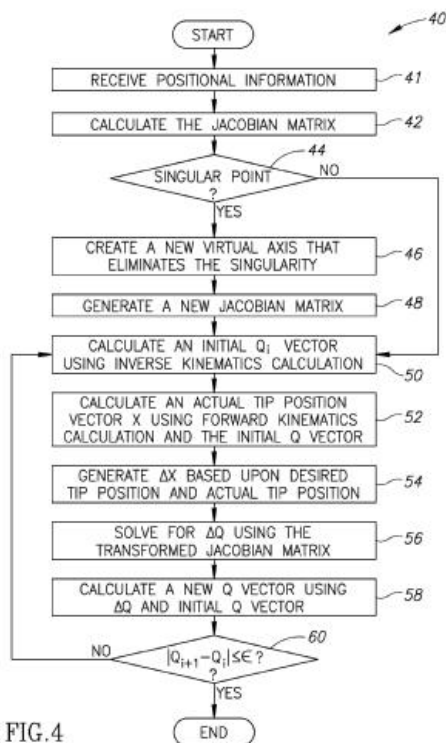


FIG. 4

**B25J 9/161**

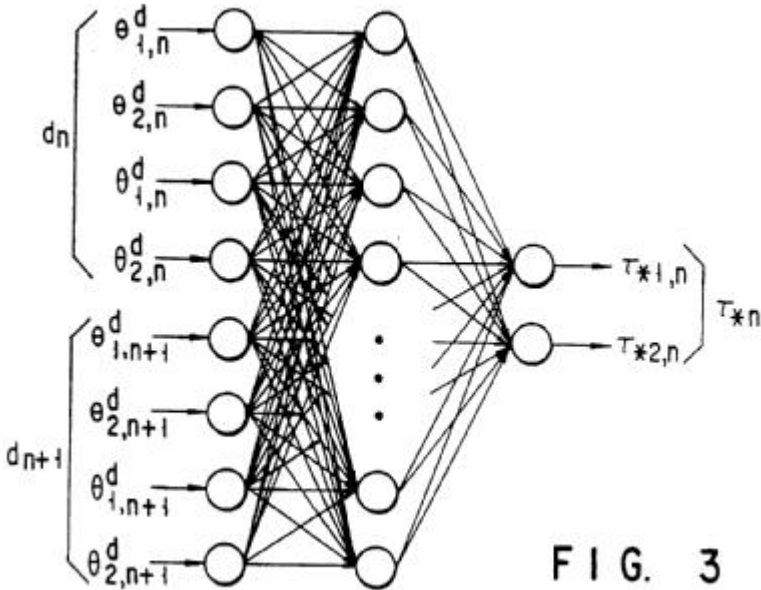
{Hardware, e.g. neural networks, fuzzy logic, interfaces, processor}

**Definition statement**

*This place covers:*

Illustrative example of subject matter classified in [B25J 9/161](#)

US 5566275



**References**

**Informative references**

Attention is drawn to the following places, which may be of interest for search:

Computer systems based on biological models	<a href="#">G06N 3/00</a>
Artificial life based on physical entities controlled by simulated intelligence so as to replicate life forms, e.g. robots replicating pets of humans in their appearance or behaviour	<a href="#">G06N 3/008</a>
Using neural network models	<a href="#">G06N 3/02</a>

**B25J 9/1612**

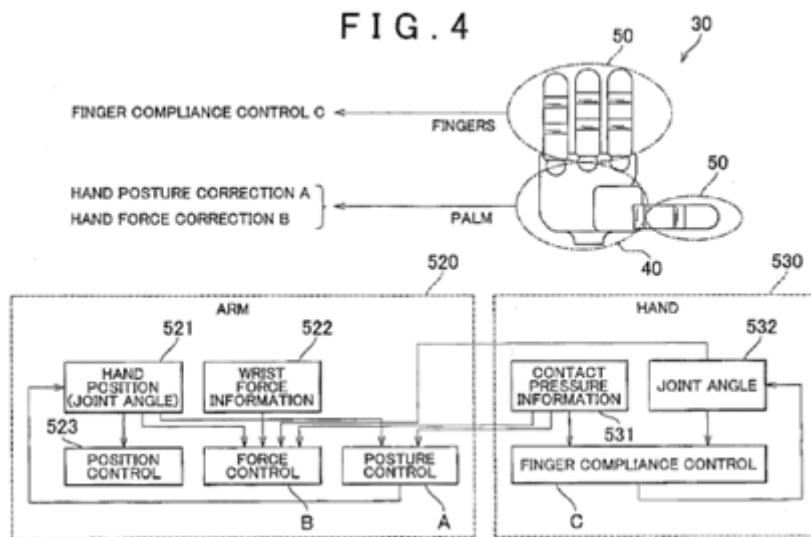
{characterised by the hand, wrist, grip control}

**Definition statement**

*This place covers:*

Illustrative example of subject matter classified in [B25J 9/1612](#)

US 2010139437



## B25J 9/1615

{characterised by special kind of manipulator, e.g. planar, scara, gantry, cantilever, space, closed chain, passive/active joints and tendon driven manipulators}

### Definition statement

*This place covers:*

Control systems dedicated to specific types of manipulators.

## B25J 9/1617

{Cellular, reconfigurable manipulator, e.g. cebot}

### Definition statement

*This place covers:*

Illustrative example of subject matter classified in [B25J 9/1617](#)



AT 507947

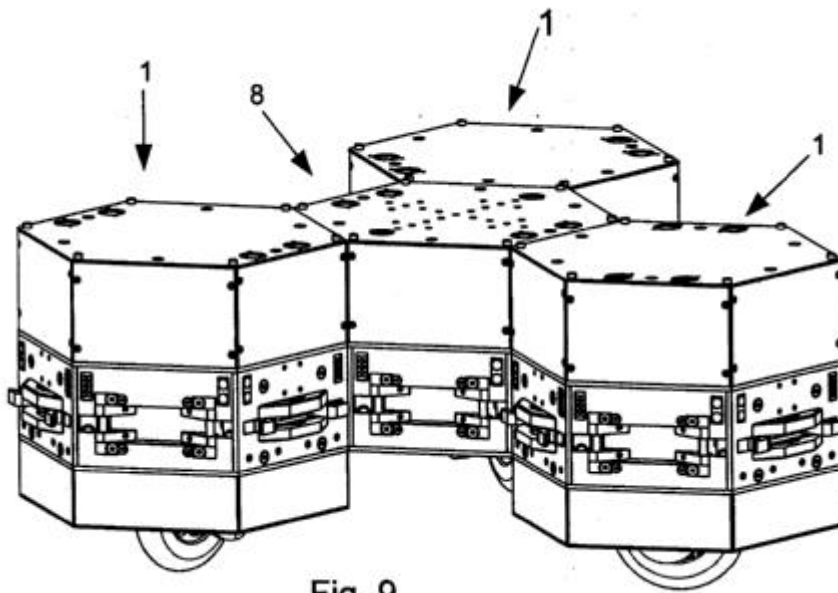


Fig. 9

## B25J 9/162

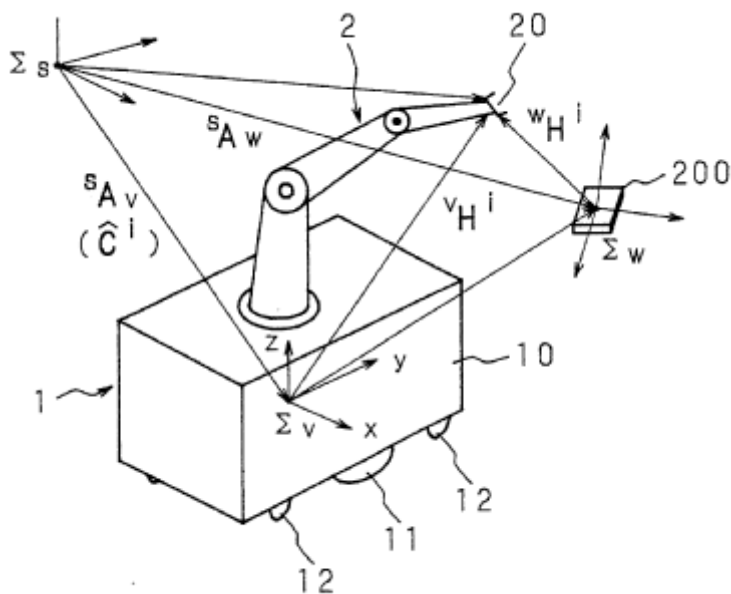
{Mobile manipulator, movable base with manipulator arm mounted on it}

### Definition statement

*This place covers:*

Illustrative example of subject matter classified in [B25J 9/162](#)

US 5542028





**B25J 9/1623**

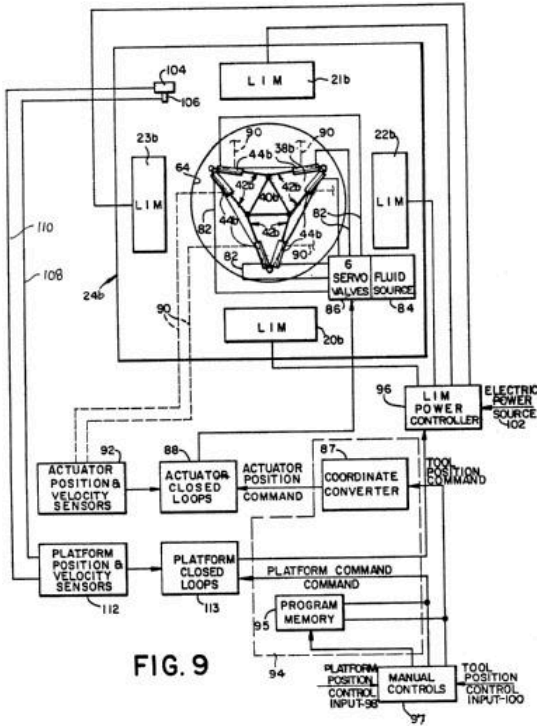
{Parallel manipulator, Stewart platform, links are attached to a common base and to a common platform, plate which is moved parallel to the base}

**Definition statement**

*This place covers:*

Illustrative example of subject matter classified in [B25J 9/1623](#)

EP 0109201



**Special rules of classification**

Parallel manipulators as such should additionally be classified in [B25J 9/106](#), [B25J 17/0216](#) or [B25J 17/0266](#).

**Glossary of terms**

*In this place, the following terms or expressions are used with the meaning indicated:*

Parallel manipulator	A mechanical system that uses several computer-controlled serial chains to support a single platform, or end-effector.
----------------------	--

**B25J 9/1625**

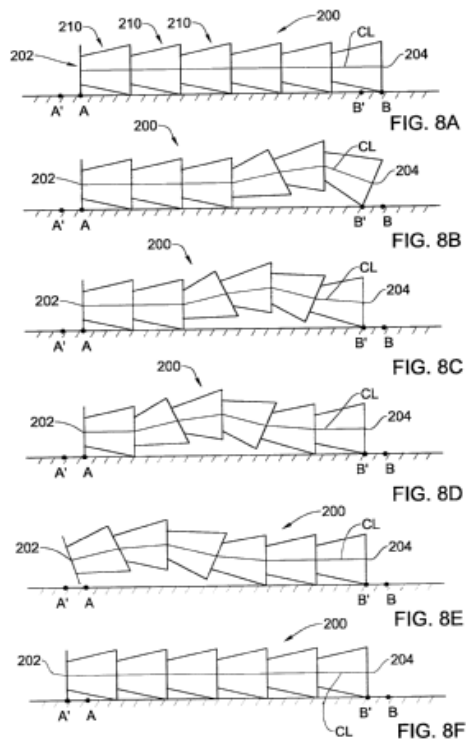
{Truss-manipulator for snake-like motion}

**Definition statement**

*This place covers:*

Illustrative example of subject matter classified in [B25J 9/1625](#)

WO 2010143192



## **B25J 9/1628**

**{characterised by the control loop}**

### **Definition statement**

*This place covers:*

Specific types of control loops.

## **B25J 9/163**

**{learning, adaptive, model based, rule based expert control}**

### **Definition statement**

*This place covers:*

Systems which emulate the decision making ability of a human expert.

An expert system is divided into two sub-systems: the inference engine and the knowledge base. The knowledge base represents facts and rules or models. The inference engine applies the rules or models to the known facts to deduce new facts.

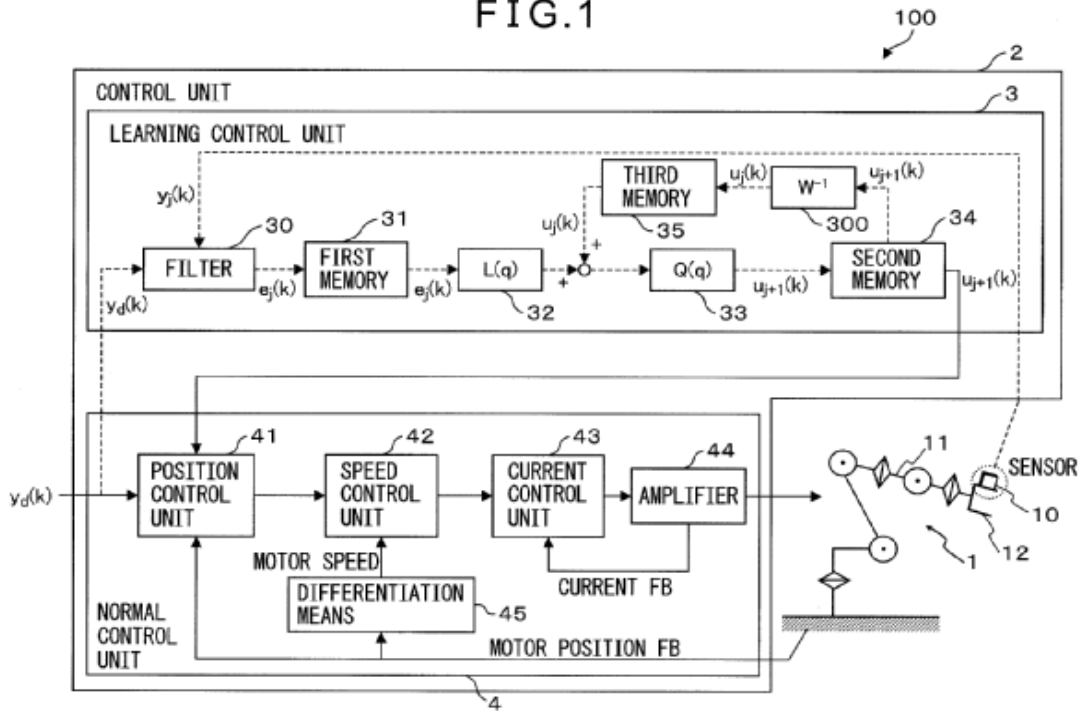
In a rule based expert system, the knowledge base is represented by an IF-THEN structure, that relates given information of fact in the IF part (so called antecedent, premise or condition) to some action in the THEN part (so called conclusion, consequence or action).

In a model based expert system, the knowledge base is represented by the design and function of the object to be controlled.

Illustrative example of subject matter classified in [B25J 9/163](#)

US 2011208356

FIG.1



**B25J 9/1633**

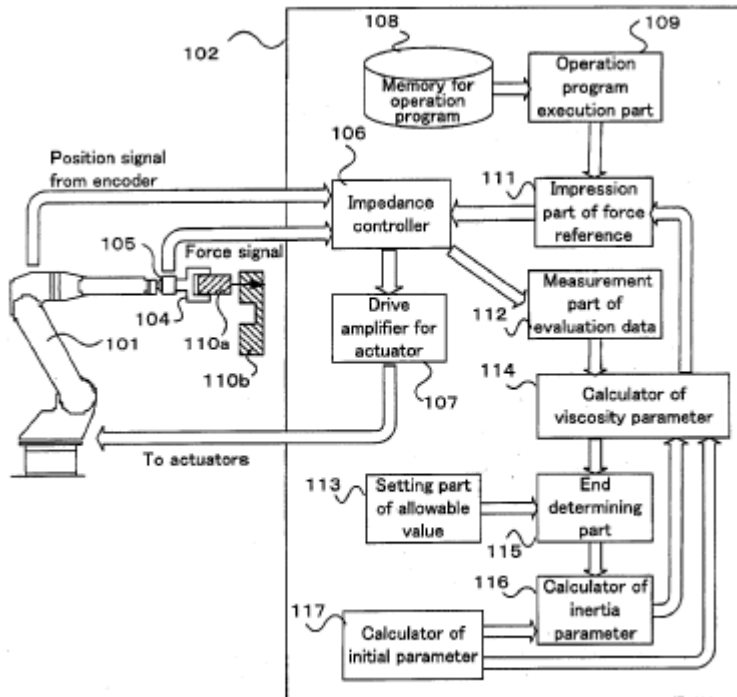
{compliant, force, torque control, e.g. combined with position control}

**Definition statement**

*This place covers:*

Illustrative example of subject matter classified in [B25J 9/1633](#)

EP 2314426



## B25J 9/1635

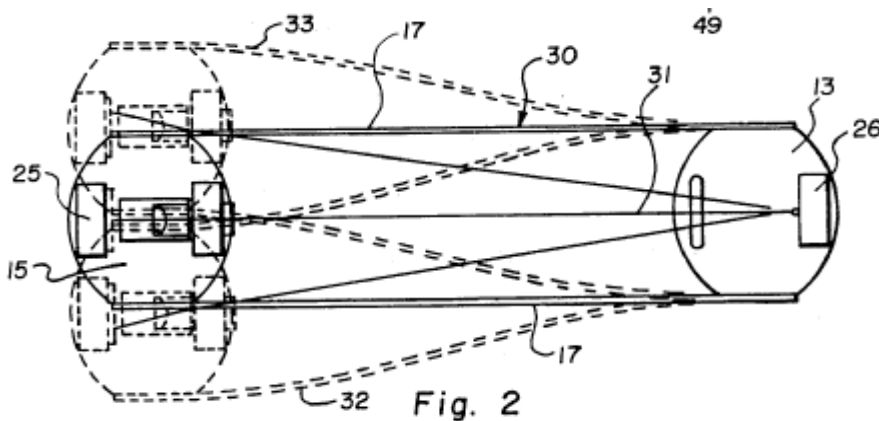
{flexible-arm control}

### Definition statement

*This place covers:*

Illustrative example of subject matter classified in [B25J 9/1635](#)

US 5049797



### B25J 9/1638

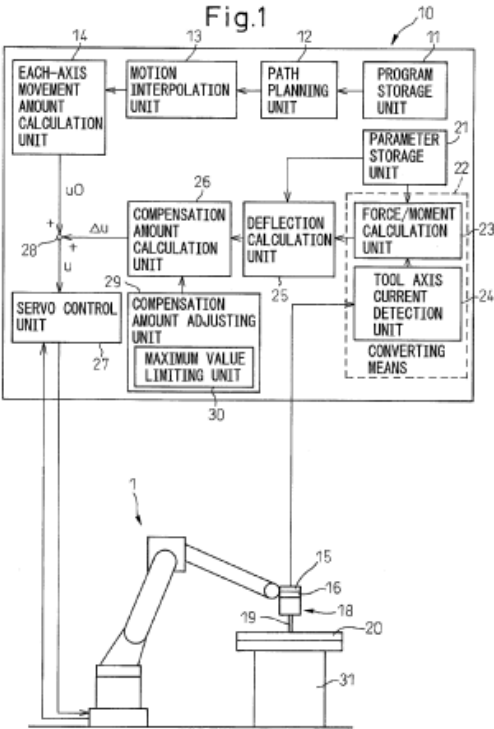
{compensation for arm bending/inertia, pay load weight/inertia}

#### Definition statement

This place covers:

Illustrative example of subject matter classified in [B25J 9/1638](#)

US 2008297092



### B25J 9/1641

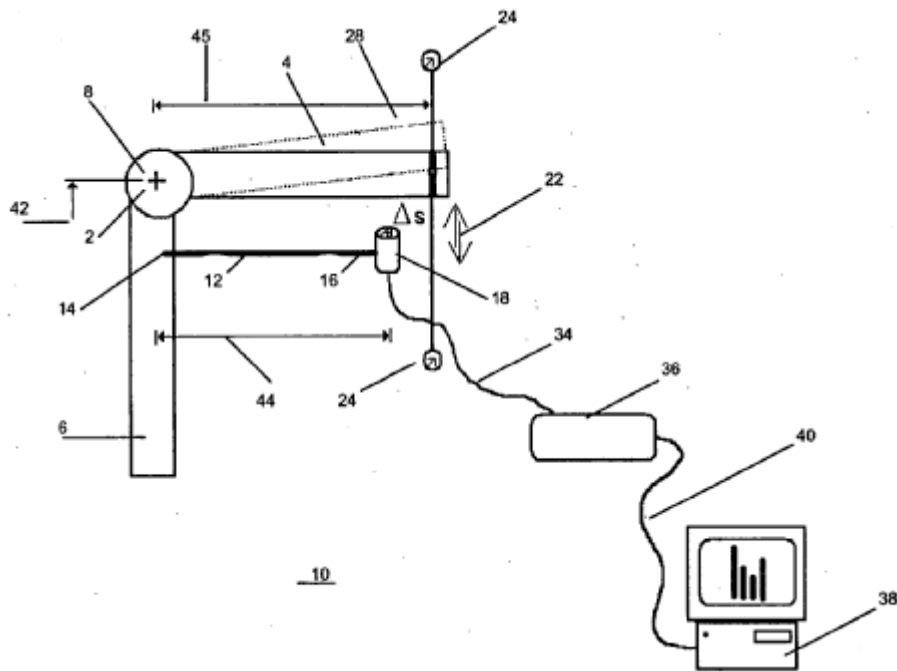
{compensation for backlash, friction, compliance, elasticity in the joints}

#### Definition statement

This place covers:

Illustrative example of subject matter classified in [B25J 9/1641](#)

EP 1607193



### B25J 9/1643

{redundant control}

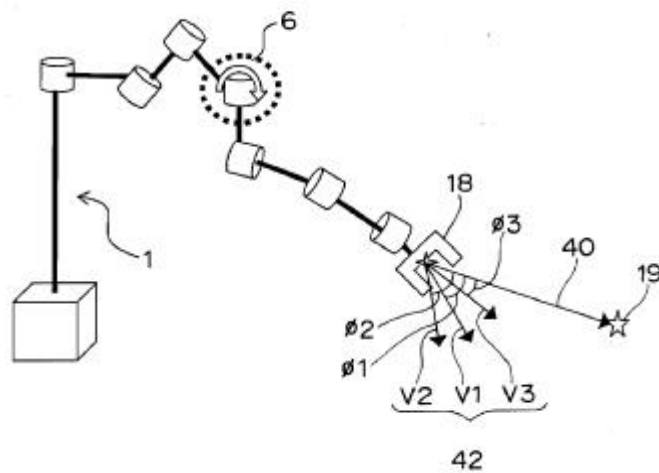
#### Definition statement

*This place covers:*

Illustrative example of subject matter classified in [B25J 9/1643](#)

US 2010168919

Fig. 5B



**Glossary of terms**

In this place, the following terms or expressions are used with the meaning indicated:

Redundant control	designates the control of a redundant manipulators, i.e. which have redundant joints (It does not mean that several control systems are used in parallel).
-------------------	--

**Synonyms and Keywords**

In patent documents the following expression/word "avoiding singularities" is often used.

**B25J 9/1646**

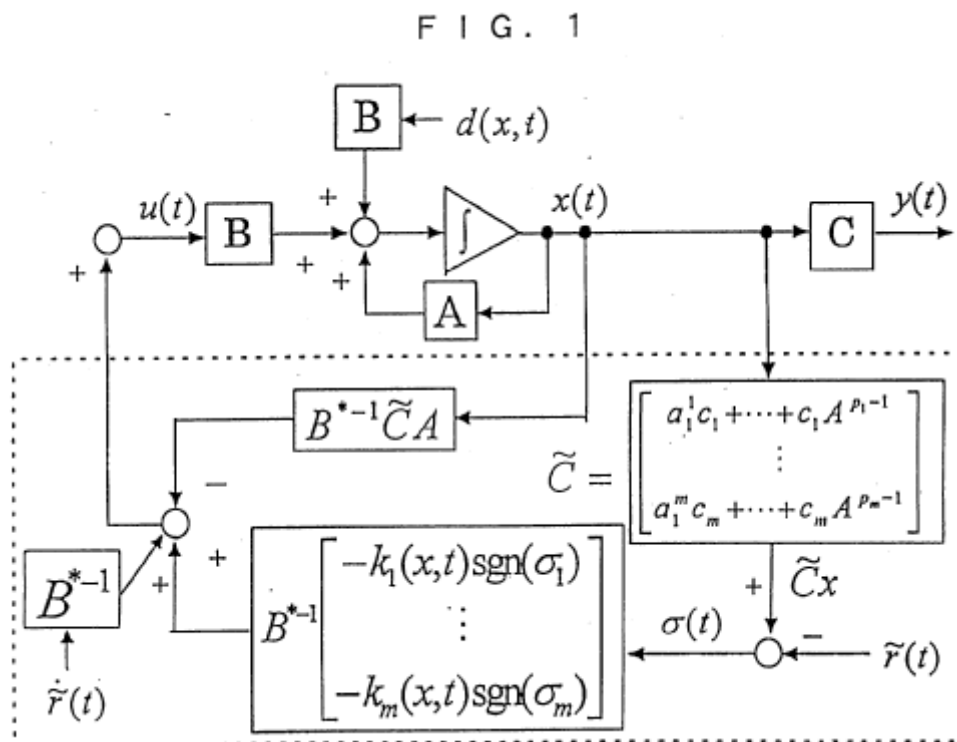
{variable structure system, sliding mode control}

**Definition statement**

This place covers:

Illustrative example of subject matter classified in [B25J 9/1646](#)

EP 0875341



**B25J 9/1648**

{non-linear control combined or not with linear control}

**Definition statement**

This place covers:

Illustrative example of subject matter classified in [B25J 9/1648](#)

EP 0128355

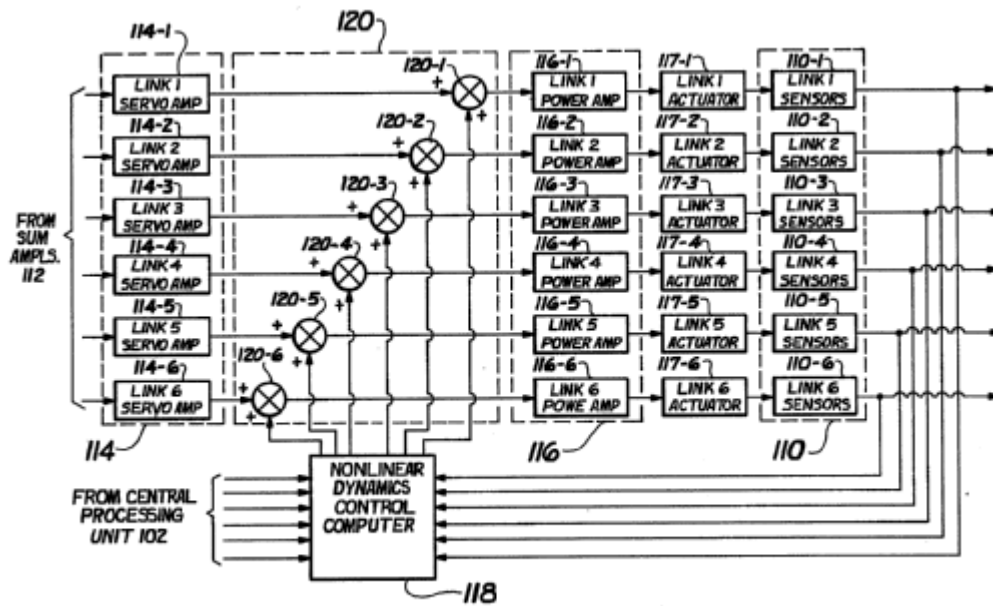


Fig-5

3/6

## B25J 9/1651

{acceleration, rate control}

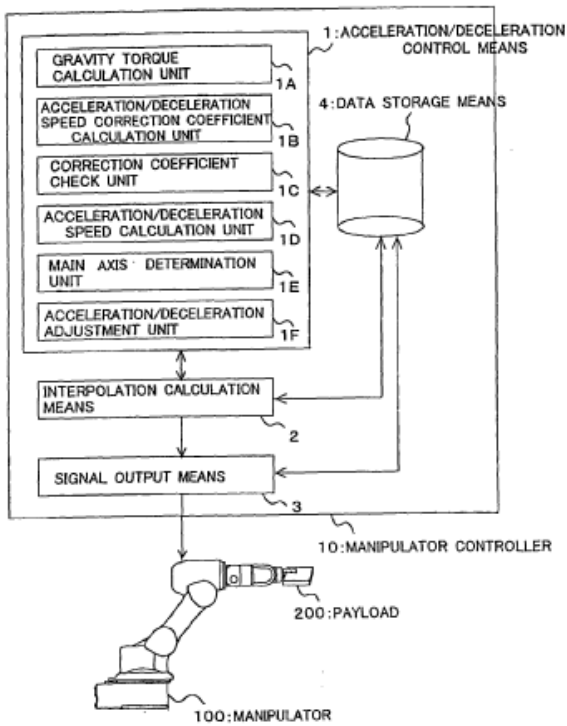
### Definition statement

*This place covers:*

Illustrative example of subject matter classified in [B25J 9/1651](#)



EP 1702726



## B25J 9/1653

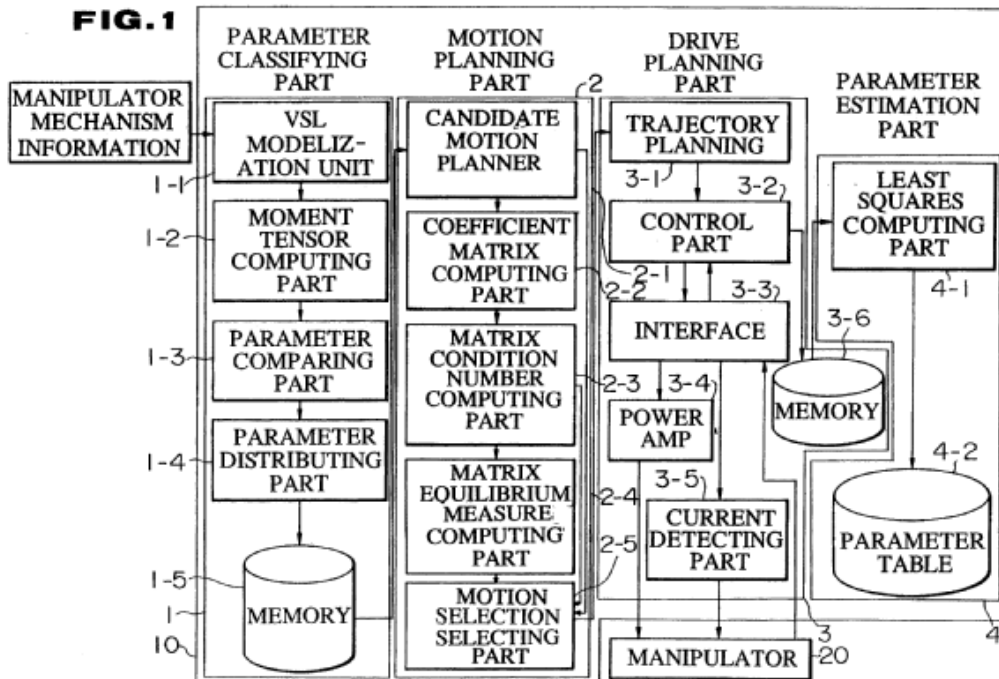
{parameters identification, estimation, stiffness, accuracy, error analysis}

### Definition statement

*This place covers:*

Illustrative example of subject matter classified in [B25J 9/1653](#)

US 5357424



## B25J 9/1656

{characterised by programming, planning systems for manipulators}

### Definition statement

*This place covers:*

Different types or robot programmes.

## B25J 9/1658

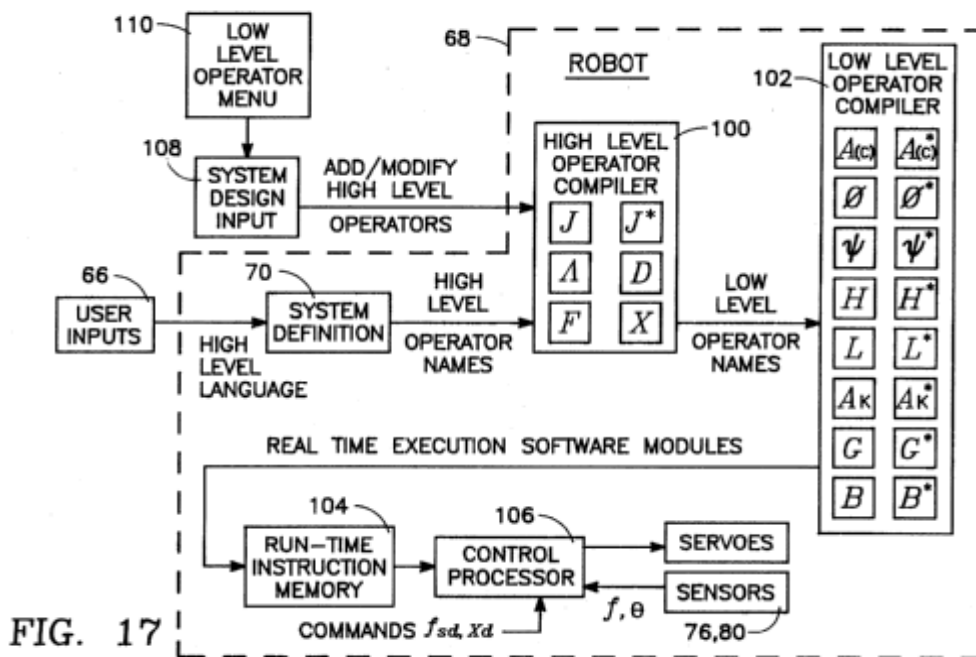
{characterised by programming language}

### Definition statement

*This place covers:*

Illustrative example of subject matter classified in [B25J 9/1658](#)

US 5519814



**B25J 9/1661**

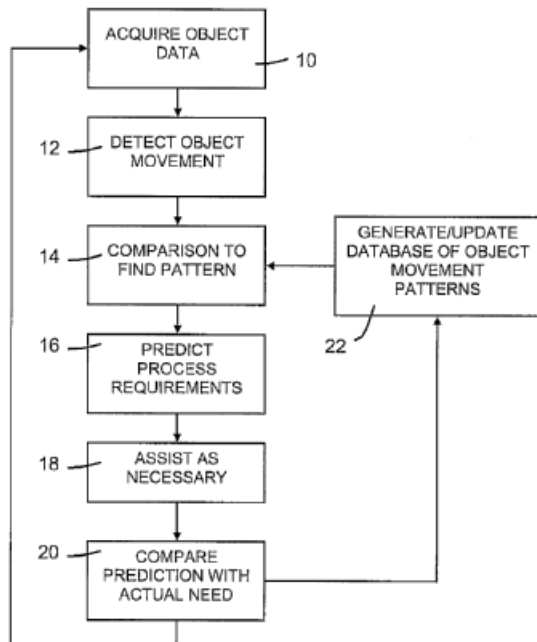
{characterised by task planning, object-oriented languages}

**Definition statement**

*This place covers:*

Illustrative example of subject matter classified in [B25J 9/1661](#)

US 2009210090



## B25J 9/1664

{characterised by motion, path, trajectory planning}

### Definition statement

*This place covers:*

Illustrative example of subject matter classified in [B25J 9/1664](#)

FR 2682905

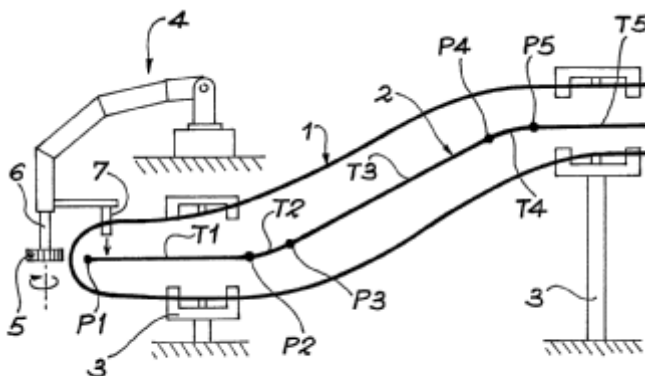


FIG. 2

**B25J 9/1666**

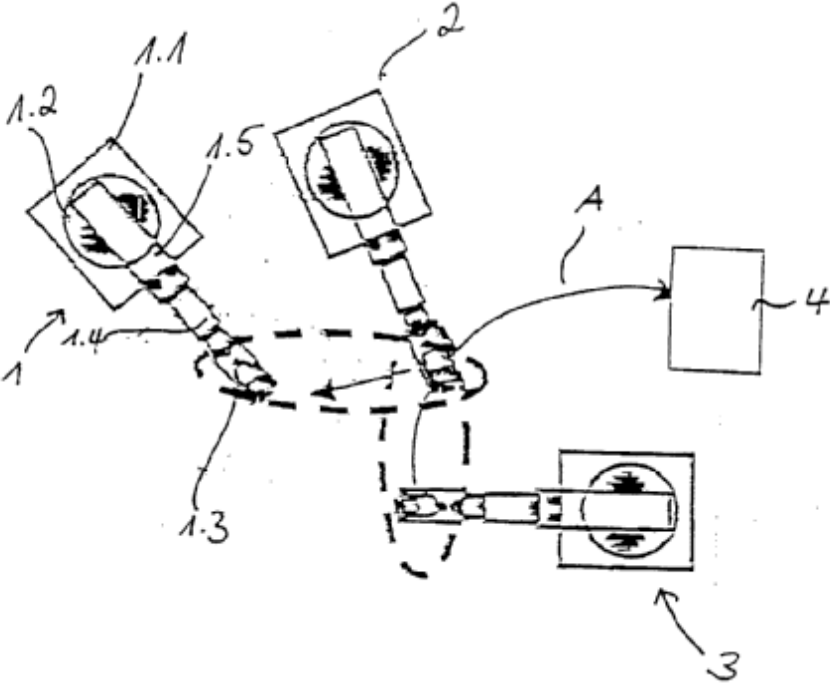
{Avoiding collision or forbidden zones}

**Definition statement**

*This place covers:*

Illustrative example of subject matter classified in [B25J 9/1666](#)

EP 1604790



**B25J 9/1669**

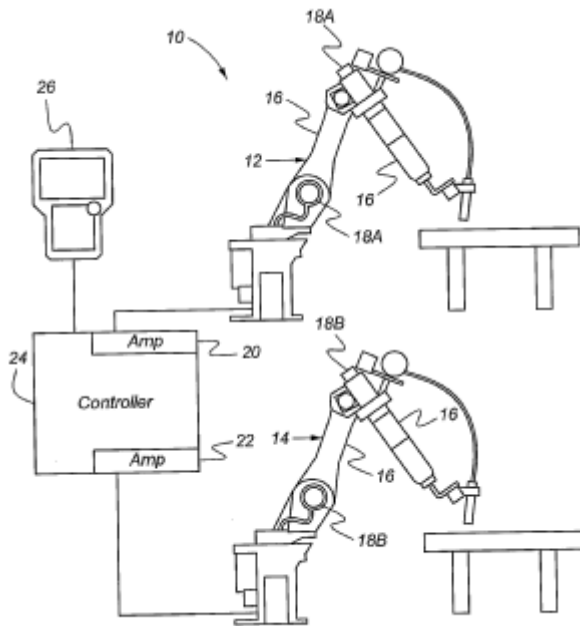
{characterised by special application, e.g. multi-arm co-operation, assembly, grasping}

**Definition statement**

*This place covers:*

Illustrative example of subject matter classified in [B25J 9/1669](#)

WO 2004114037



## **B25J 9/1671**

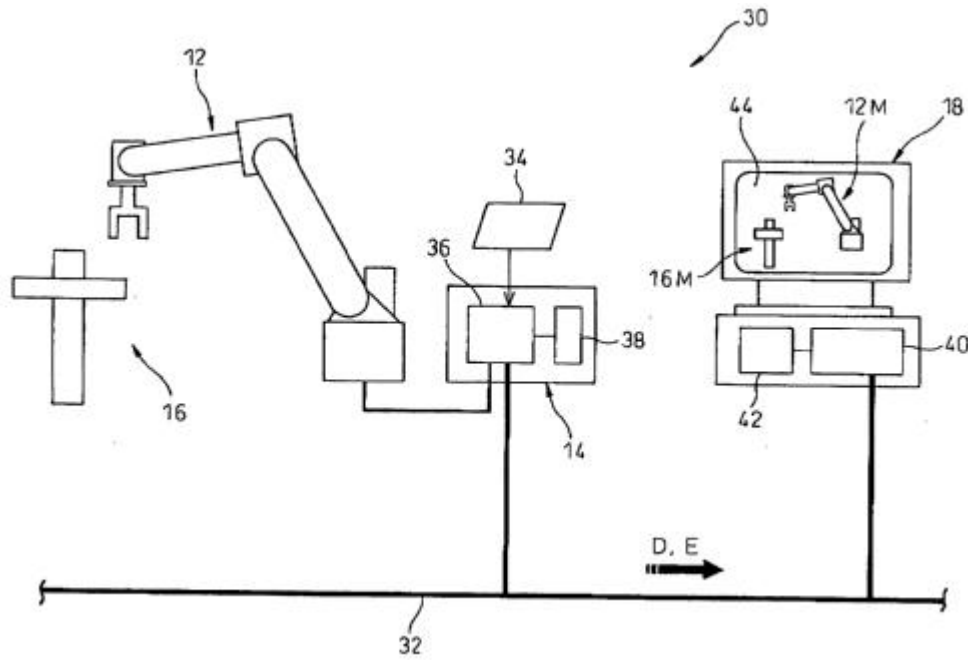
{characterised by simulation, either to verify existing program or to create and verify new program, CAD/CAM oriented, graphic oriented programming systems}

### **Definition statement**

*This place covers:*

Illustrative example of subject matter classified in [B25J 9/1671](#)

EP 1759817



## B25J 9/1674

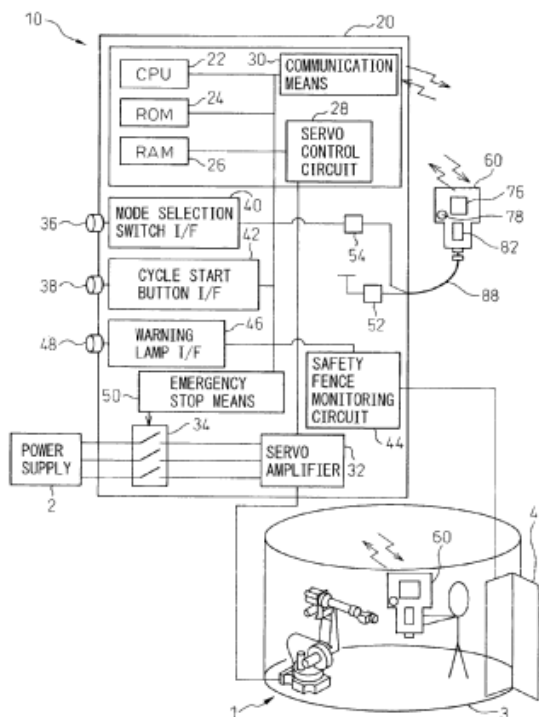
{characterised by safety, monitoring, diagnostic}

### Definition statement

*This place covers:*

Illustrative example of subject matter classified in [B25J 9/1674](#)

EP 1731978



**B25J 9/1676**

{Avoiding collision or forbidden zones}

**Definition statement**

*This place covers:*

Illustrative example of subject matter classified in [B25J 9/1676](#)

EP 1901150

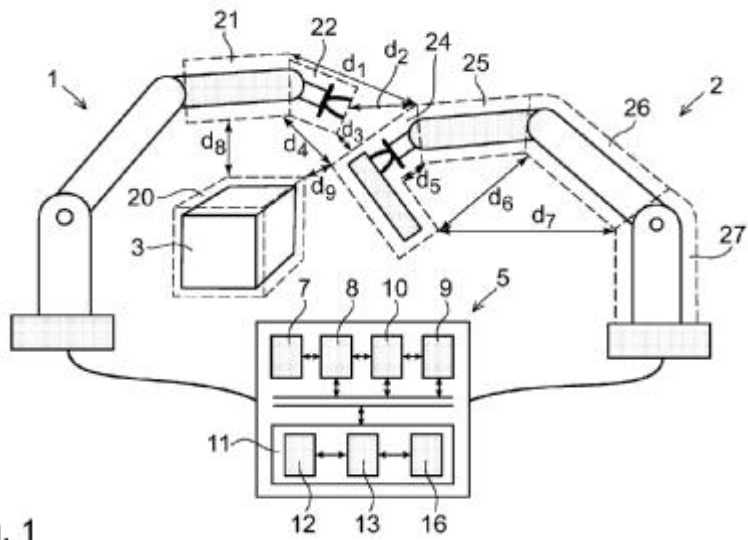


Fig. 1

**B25J 9/1679**

{characterised by the tasks executed}

**Definition statement**

*This place covers:*

Different control systems dedicated to a specific task of the manipulator.



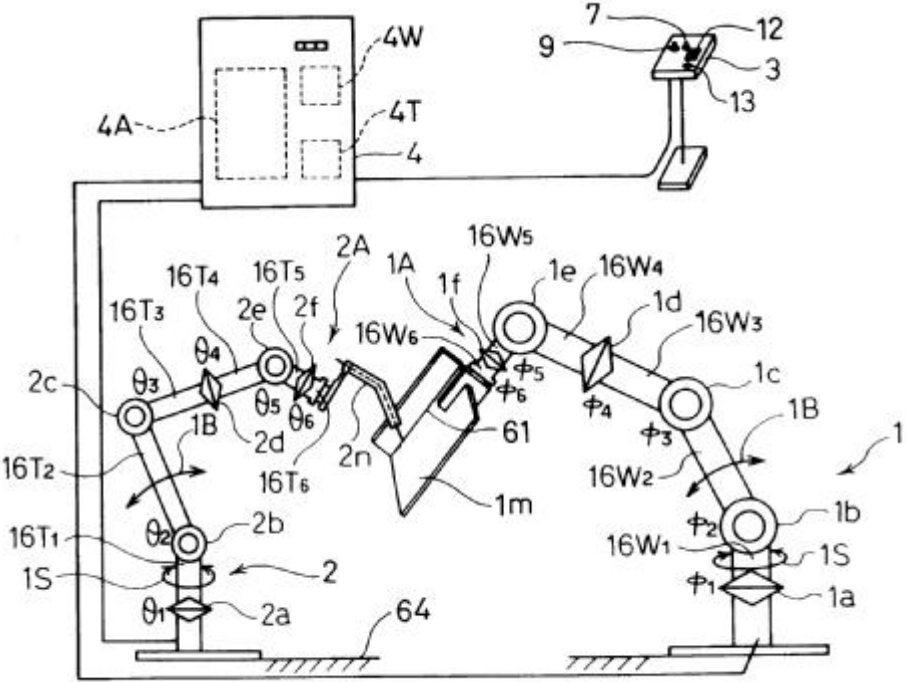
**B25J 9/1682**

{Dual arm manipulator; Coordination of several manipulators}

**Definition statement**

*This place covers:*

Illustrative example of subject matter classified in this group:



**B25J 9/1684**

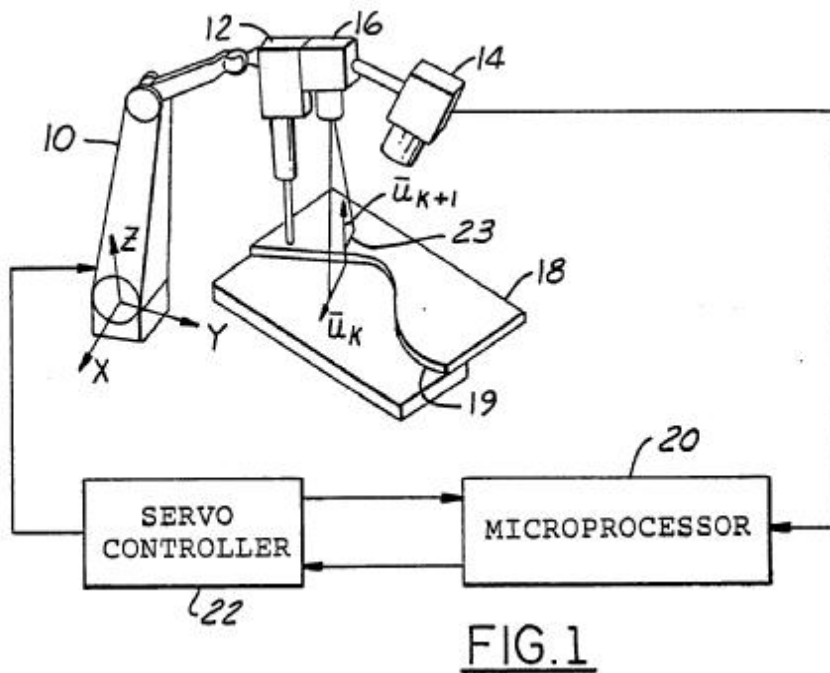
{Tracking a line or surface by means of sensors}

**Definition statement**

*This place covers:*

Illustrative example of subject matter classified in [B25J 9/1684](#)

EP 0361663



## B25J 9/1687

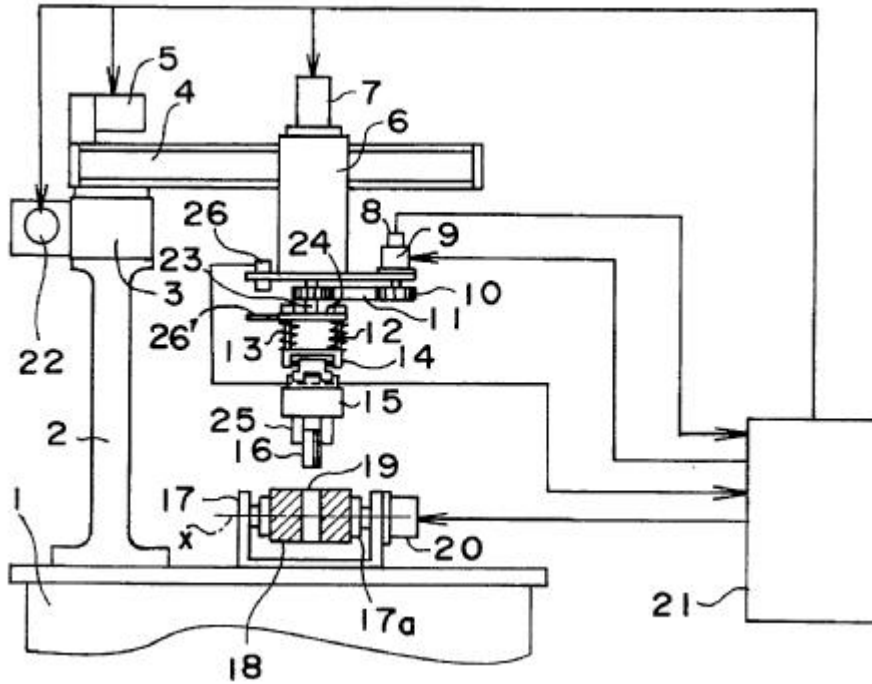
{Assembly, peg and hole, palletising, straight line, weaving pattern movement}

### Definition statement

*This place covers:*

Illustrative example of subject matter classified in [B25J 9/1687](#)

US 5619782



**Special rules of classification**

Compliant mechanisms per se should additionally be classified in [B25J 17/0208](#).

**B25J 9/1689**

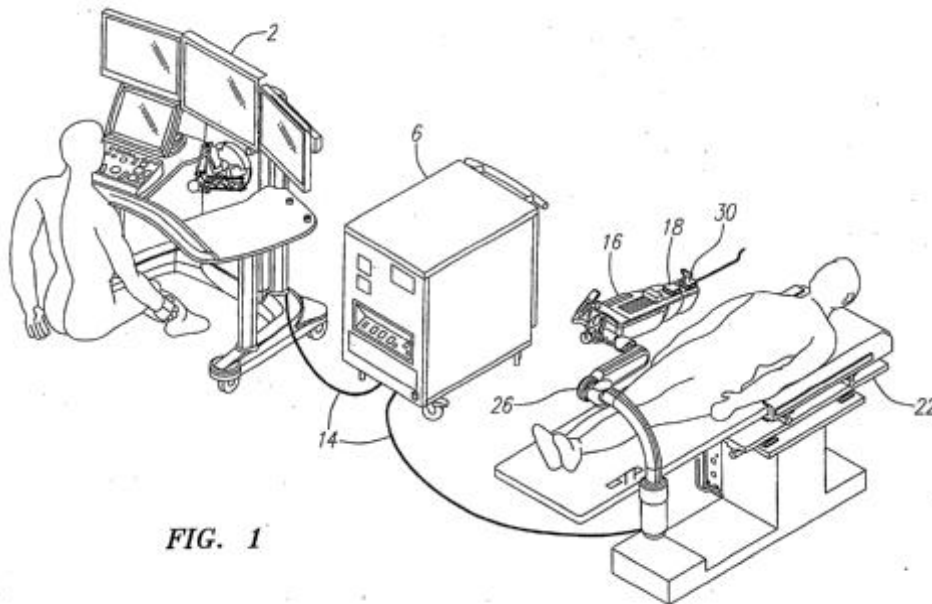
{Teleoperation}

**Definition statement**

*This place covers:*

Illustrative example of subject matter classified in [B25J 9/1689](#)

WO 2007136803



**FIG. 1**

### **Special rules of classification**

Master / slave systems as such should additionally be classified in [B25J 3/00](#).

Hand-grip control means as such should additionally be classified in [B25J 13/02](#).

## **B25J 9/1692**

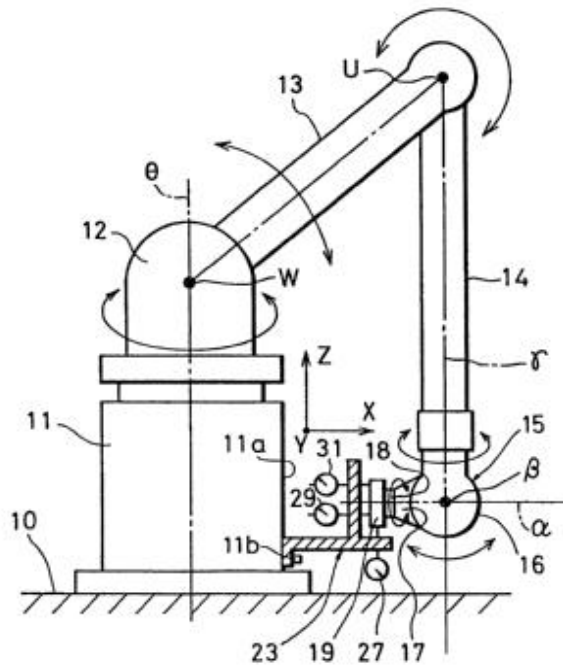
### **{Calibration of manipulator}**

#### **Definition statement**

*This place covers:*

Illustrative example of subject matter classified in [B25J 9/1692](#)

EP 0223862



## B25J 9/1694

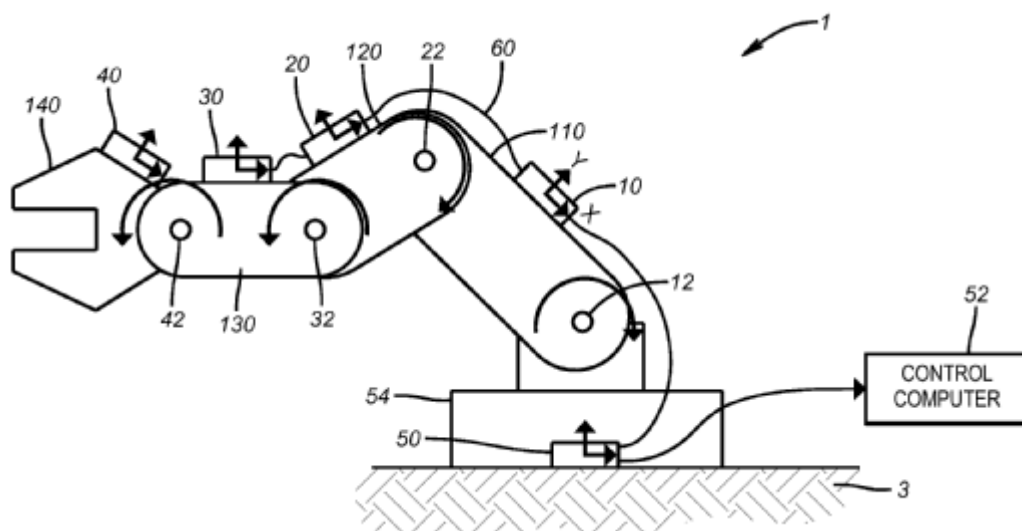
{characterised by use of sensors other than normal servo-feedback from position, speed or acceleration sensors, perception control, multi-sensor controlled systems, sensor fusion}

### Definition statement

*This place covers:*

Illustrative example of subject matter classified in [B25J 9/1694](#)

WO 2010019310



**B25J 9/1697****{Vision controlled systems}****Definition statement***This place covers:*Illustrative example of subject matter classified in [B25J 9/1697](#)

US 7313464

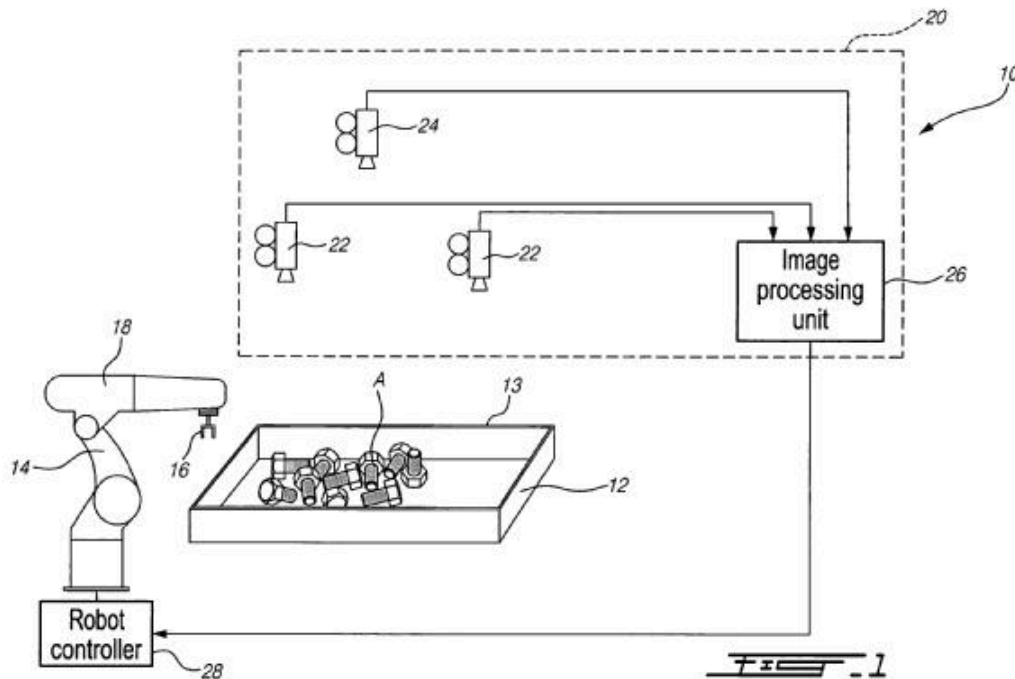
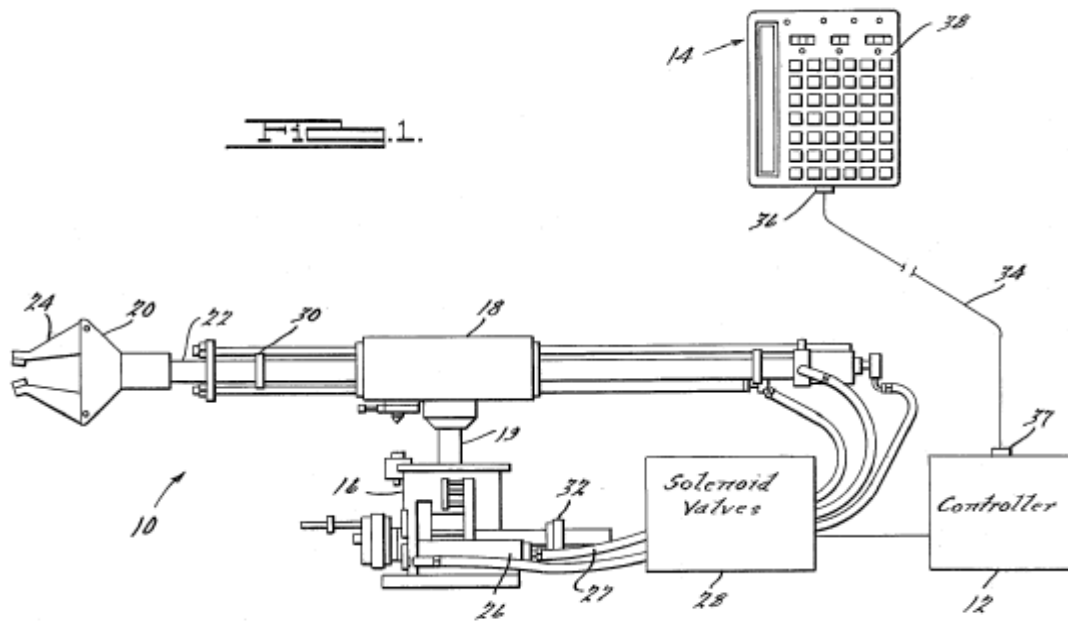
**References****Informative references***Attention is drawn to the following places, which may be of interest for search:*

Image feed-back for automatic industrial control, e.g. robot with camera	<a href="#">G06T 1/0014</a>
Image analysis	<a href="#">G06T 7/00</a>

**Special rules of classification**Details concerning the mounting of the vision system on the manipulator should be classified in [B25J 19/021](#).**B25J 9/20****fluidic****Definition statement***This place covers:*Illustrative example of subject matter classified in [B25J 9/20](#)

US 4379335



## B25J 11/00

### Manipulators not otherwise provided for

#### Definition statement

*This place covers:*

Special types of manipulators not covered by the other groups of [B25J](#) or manipulators for performing a specific tasks not covered by other subclasses.

## B25J 13/00

### Controls for manipulators (programme controls [B25J 9/16](#); control in general [G05](#))

#### Definition statement

*This place covers:*

Hardware components involved in the motion control procedure of a manipulator.

This includes input means which allow a user/operator to give instructions to the manipulator (i.e. to control its motions in real-time or to teach such motions).

This also includes all types of sensors which measure a physical quantity of the manipulator (e.g. force or speed) or its environment and convert it into a signal for a motion control system of the manipulator.

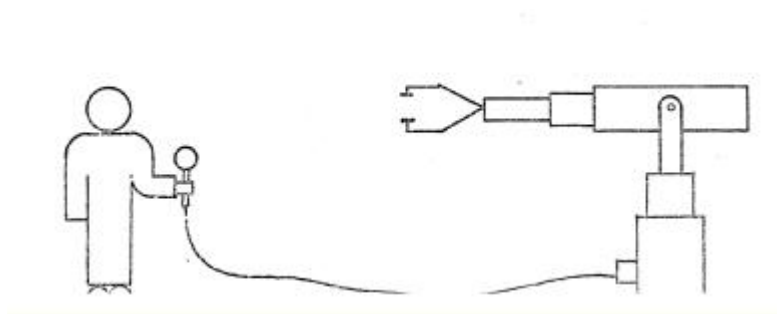
**B25J 13/003**

{by means of an audio-responsive input (audible safety signals [B25J 19/061](#))}

**Definition statement**

*This place covers:*

Illustrative example of subject matter classified in this group:

**References****Informative references**

*Attention is drawn to the following places, which may be of interest for search:*

Speech recognition	<a href="#">G10L 15/00</a>
--------------------	----------------------------

**Synonyms and Keywords**

*In patent documents the following expression/word "voice control" is often used.*

**B25J 13/02**

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-held casings for switching devices, e.g. joy-sticks [H01H 9/0214](#))}

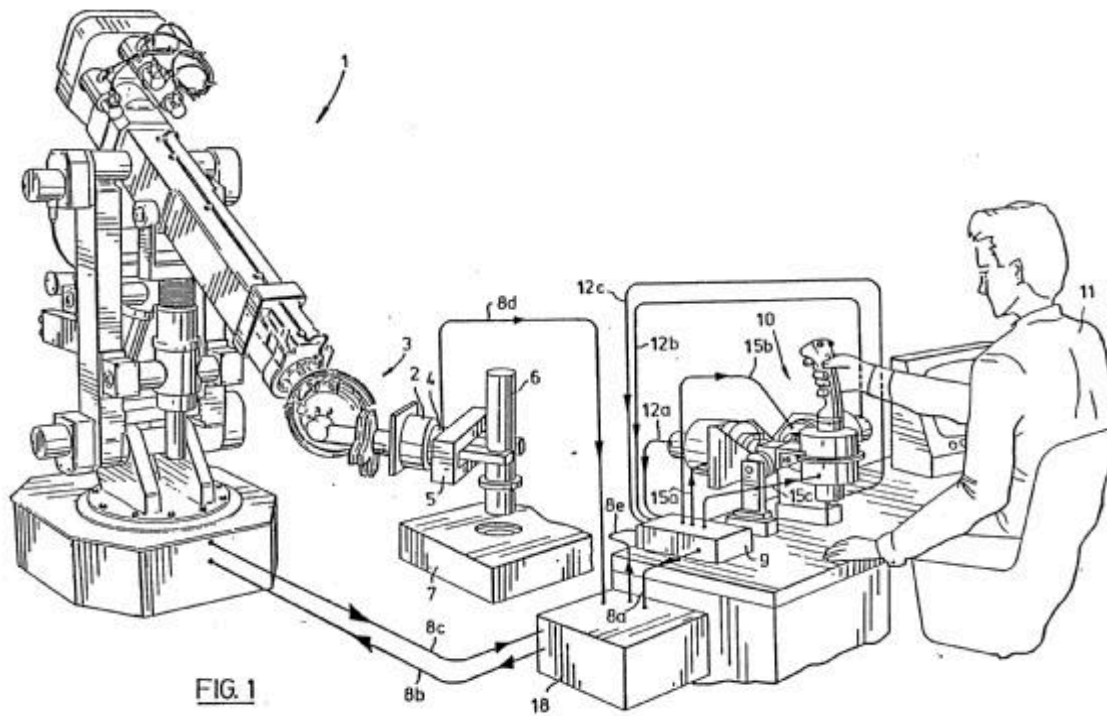
**Definition statement**

*This place covers:*

Illustrative example of subject matter classified in [B25J 13/02](#)



EP 0353841



## References

### Informative references

Attention is drawn to the following places, which may be of interest for search:

Manually-actuated control mechanisms movable by hand about orthogonal axes, e.g. joysticks
--

<a href="#">G05G 9/047</a>
----------------------------

## B25J 13/04

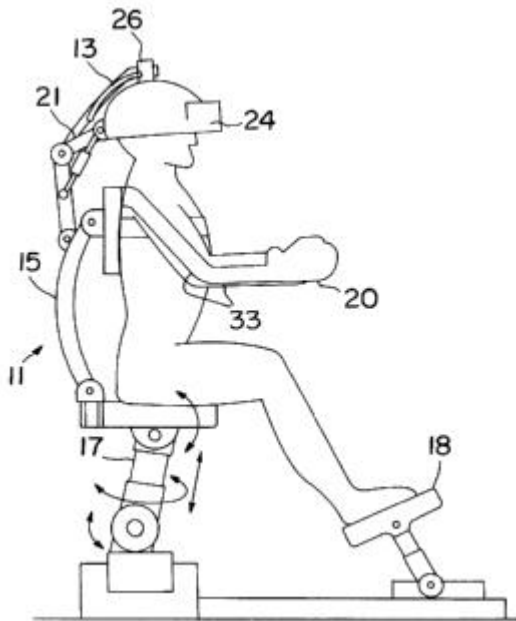
### Foot-operated control means

#### Definition statement

This place covers:

Illustrative example of subject matter classified in [B25J 13/04](#)

US 6016385



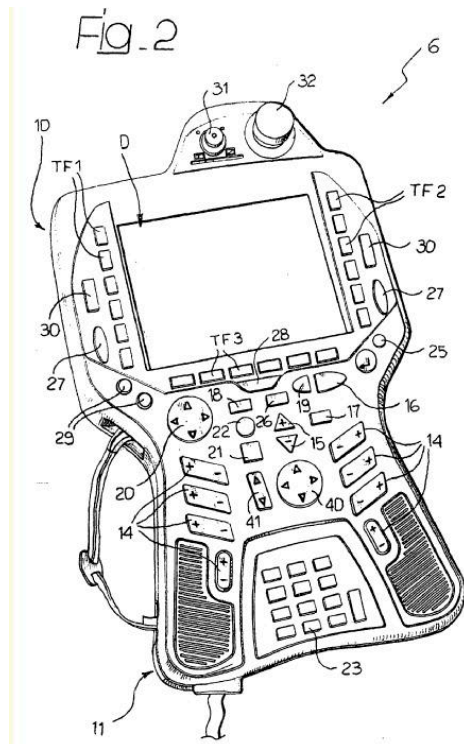
**B25J 13/06**

**Control stands, e.g. consoles, switchboards**

**Definition statement**

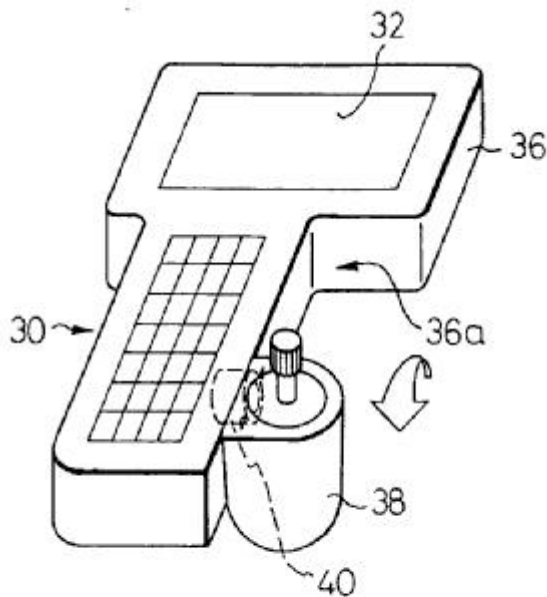
*This place covers:*

Illustrative example of subject matter classified in this group:



**B25J 13/065****{comprising joy-sticks}****Definition statement***This place covers:*Illustrative example of subject matter classified in [B25J 13/065](#)

JP 3003787



第 2 図

**B25J 13/08****by means of sensing devices, e.g. viewing or touching devices****Definition statement***This place covers:*

Different types of sensors which can be used in the control systems of manipulators.

**B25J 13/081****{Touching devices, e.g. pressure-sensitive}****Definition statement***This place covers:*

Contact sensors.

**B25J 13/082**

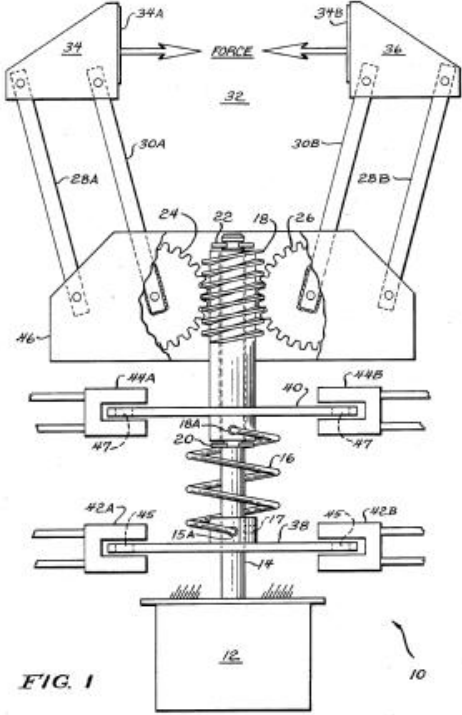
{Grasping-force detectors (in general [G01L 5/16](#), [G01L 5/22](#))}

**Definition statement**

*This place covers:*

Illustrative example of subject matter classified in [B25J 13/082](#)

US 4600357



**B25J 13/083**

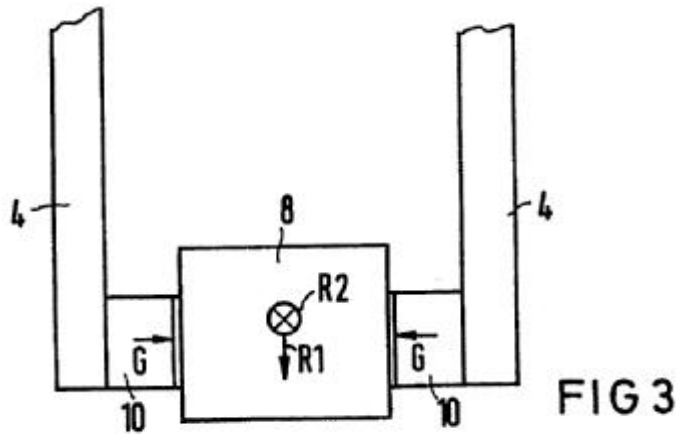
{fitted with slippage detectors}

**Definition statement**

*This place covers:*

Illustrative example of subject matter classified in [B25J 13/083](#)

DE 3332147



### B25J 13/084

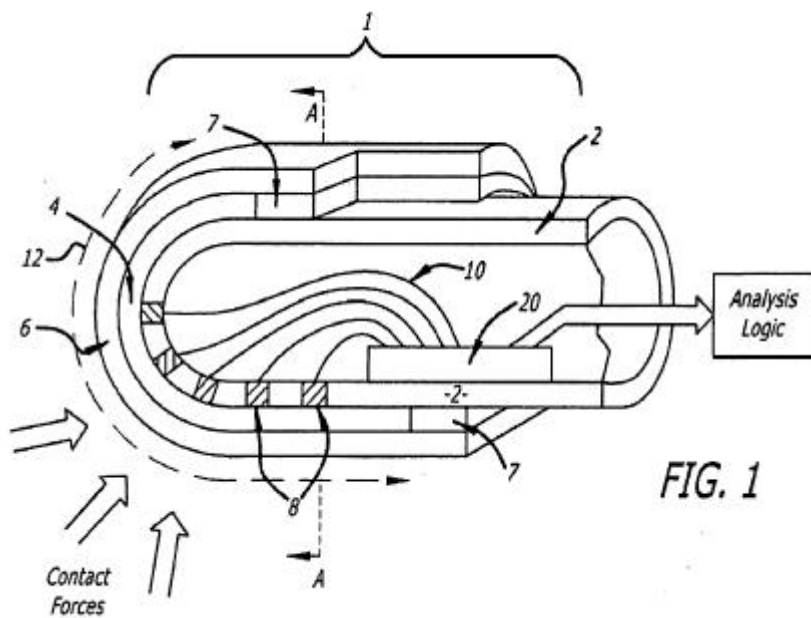
{Tactile sensors (in general [G01L 5/16](#), [G01L 5/22](#))}

#### Definition statement

*This place covers:*

Illustrative example of subject matter classified in [B25J 13/084](#)

WO 2009023334



## B25J 13/085

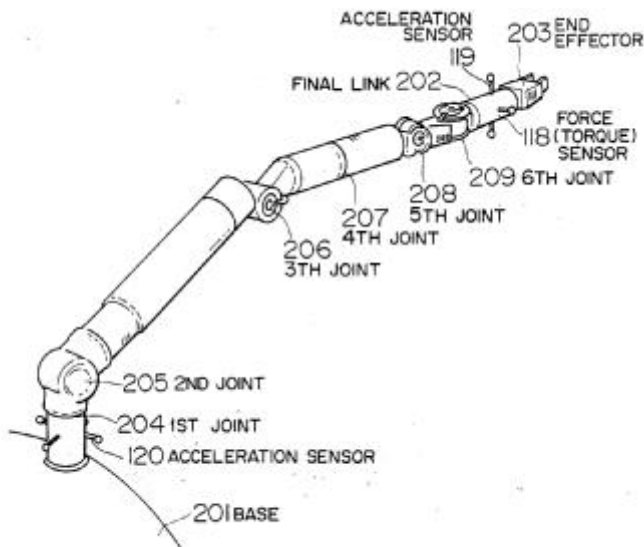
{Force or torque sensors ([B25J 13/082](#), [B25J 13/084](#) take precedence)}

### Definition statement

*This place covers:*

Illustrative example of subject matter classified in [B25J 13/085](#)

DE 3810691



## B25J 13/086

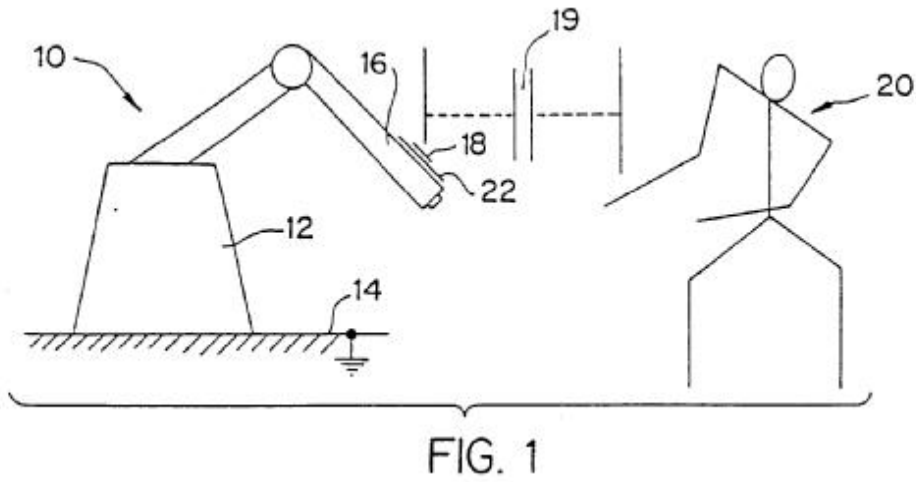
{Proximity sensors}

### Definition statement

*This place covers:*

Illustrative example of subject matter classified in [B25J 13/086](#)

EP 0518836



### B25J 13/087

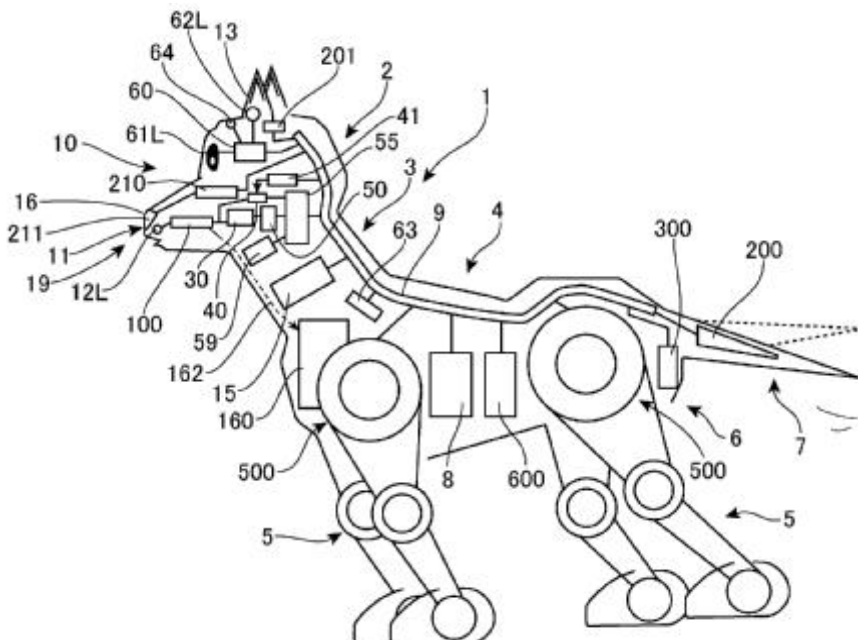
{for sensing other physical parameters, e.g. electrical or chemical properties}

#### Definition statement

*This place covers:*

Illustrative example of subject matter classified in [B25J 13/087](#)

WO 2011077730



## B25J 13/088

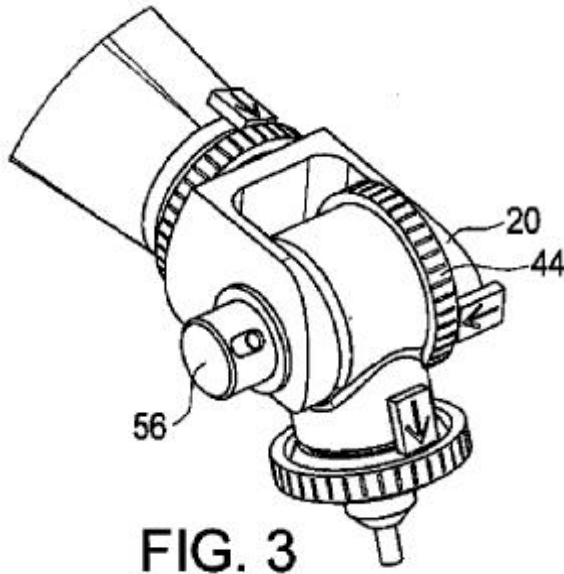
{with position, velocity or acceleration sensors}

### Definition statement

*This place covers:*

Illustrative example of subject matter classified in [B25J 13/088](#)

US 2011098852



## B25J 13/089

{Determining the position of the robot with reference to its environment}

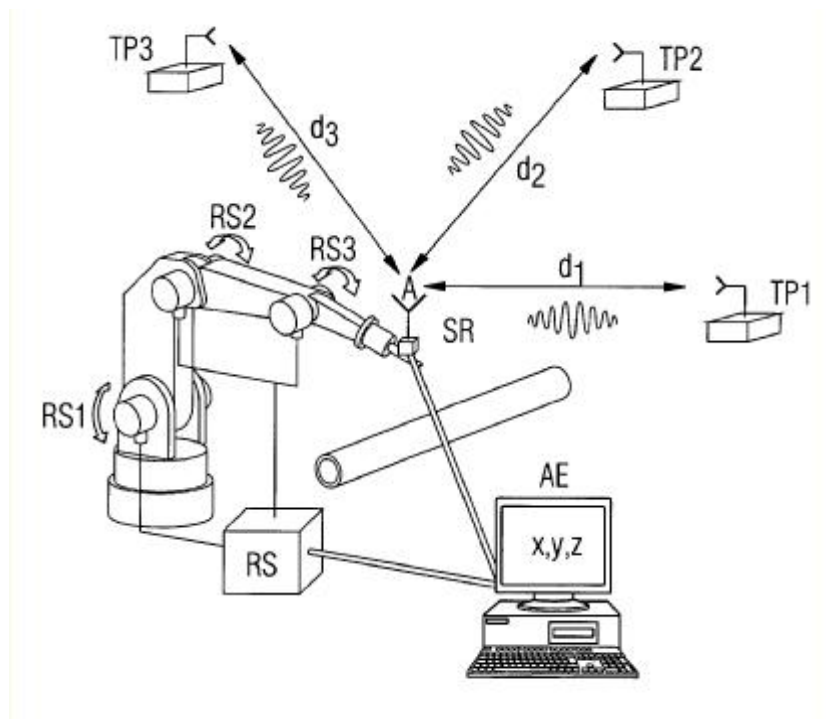
### Definition statement

*This place covers:*

Illustrative example of subject matter classified in [B25J 13/089](#)



DE 102005000732



## **B25J 15/00**

Gripping heads {and other end effectors (grippers used in machine tools [B23Q 7/04](#); gripping members fitted on cranes [B66C 1/42](#), [B66C 1/44](#); gripping means used in the manufacture of semiconductors [H01L 21/68707](#); gripping means used for mounting electrical components [H05K 13/04](#))}

### **Definition statement**

*This place covers:*

End effectors for manipulators designed to hold an object. It also includes other types of end effectors specially adapted for being mounted on manipulators.

## **B25J 15/0004**

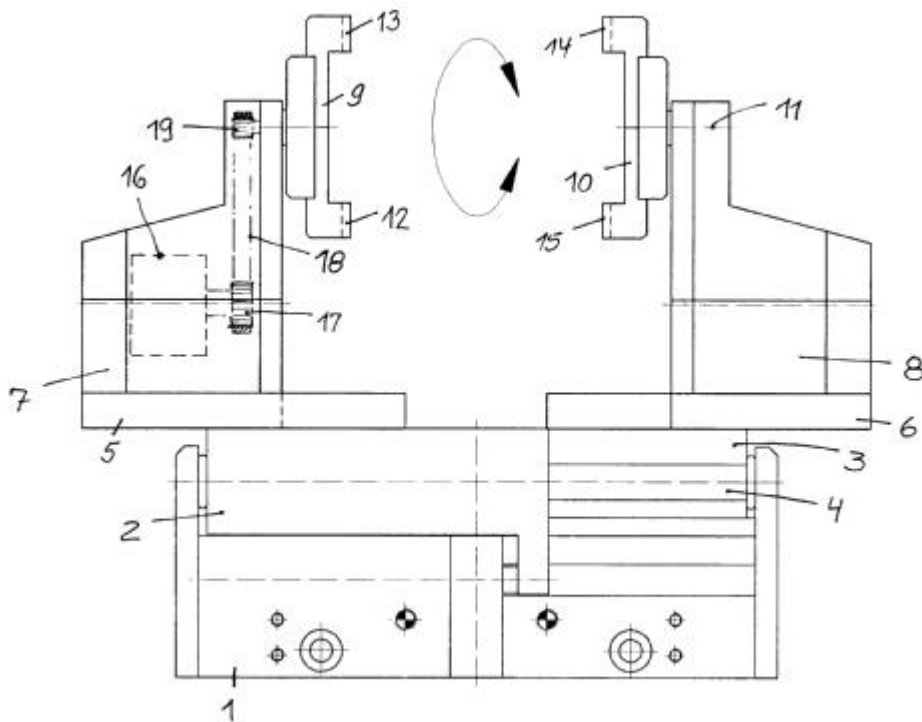
{with provision for adjusting the gripped object in the hand}

### **Definition statement**

*This place covers:*

Illustrative example of subject matter classified in [B25J 15/0004](#)

DE 9213010 U



**Special rules of classification**

In this subgroup, hand should be understood as head since this subgroup is drawn to reorienting the object with respect to the "hand/head", while the object is gripped in "head/hand".

**Glossary of terms**

*In this place, the following terms or expressions are used with the meaning indicated:*

Adjusting	Modifying the orientation of a work piece while being gripped
-----------	---

**B25J 15/0009**

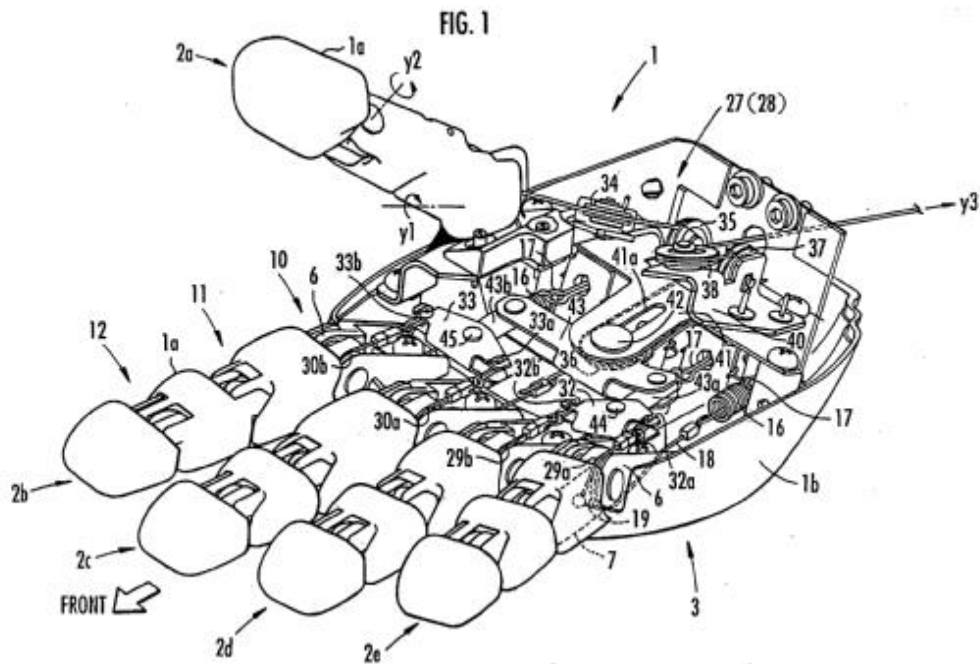
**{comprising multi-articulated fingers, e.g. resembling a human hand}**

**Definition statement**

*This place covers:*

Illustrative example of subject matter classified in [B25J 15/0009](#)

EP 1457294



## References

### Informative references

Attention is drawn to the following places, which may be of interest for search:

Hand prostheses	<a href="#">A61F 2/583</a>
-----------------	----------------------------

## B25J 15/0019

{End effectors other than grippers}

### Definition statement

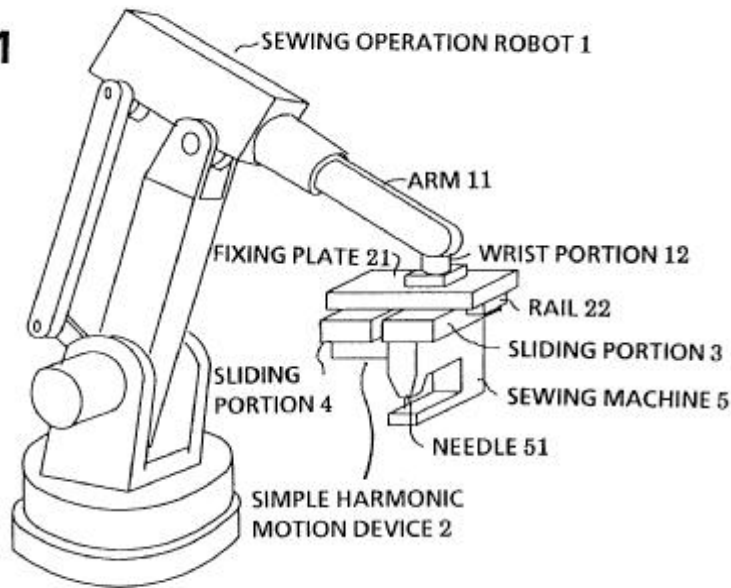
*This place covers:*

Any end-effector mounted on a manipulator and which is not a gripper. This includes welding tools, machining tools, spraying tools, screwing tools, medical or surgical tools/instruments, etc.

Illustrative example of subject matter classified in [B25J 15/0019](#)

EP 0520076

**FIG. 1**



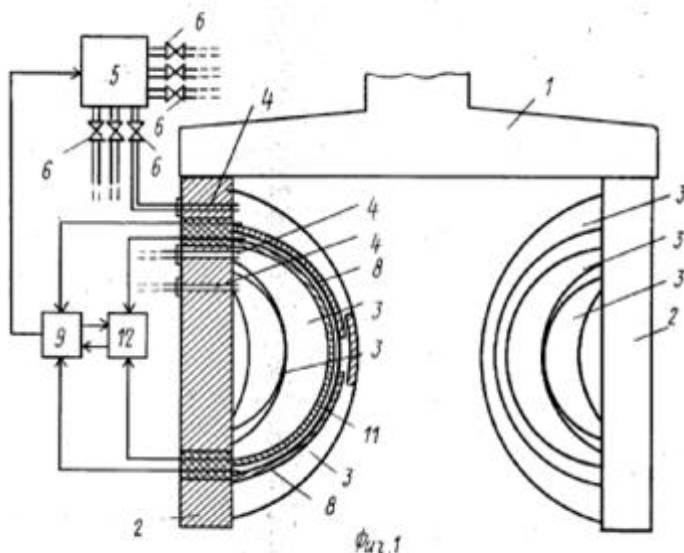
## B25J 15/0023

{Gripper surfaces directly activated by a fluid (flexible fingers [B25J 15/12](#))}

### Definition statement

*This place covers:*

Illustrative example of subject matter classified in this group:



## References

### Informative references

Attention is drawn to the following places, which may be of interest for search:

Devices for picking up and depositing articles or materials with inflatable picking-up means	<a href="#">B65G 47/908</a>
--	-----------------------------

## B25J 15/0028

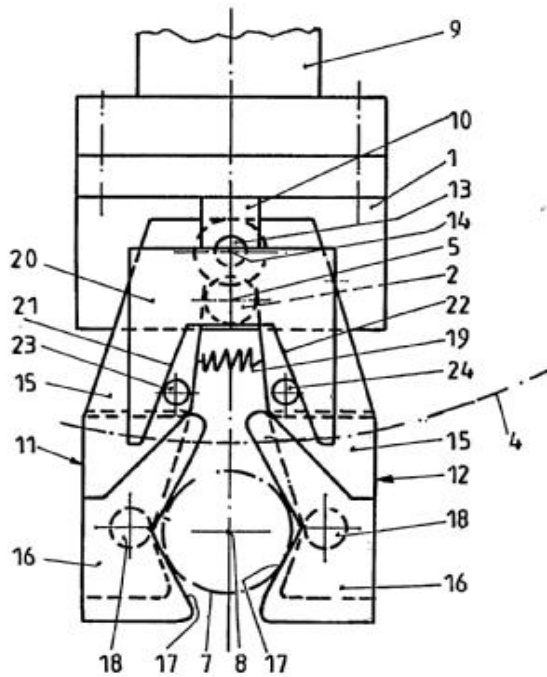
{with movable, e.g. pivoting gripping jaw surfaces}

### Definition statement

This place covers:

Illustrative example of subject matter classified in [B25J 15/0028](#)

DE 4400354



## References

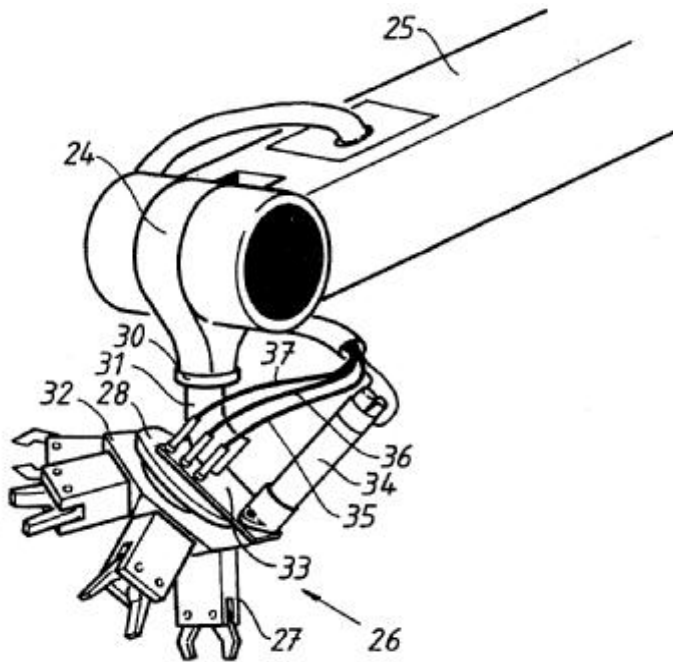
### Limiting references

This place does not cover:

Grippers with jaw surfaces comprising actuating means for moving the gripped objects	<a href="#">B25J 15/0004</a>
--	------------------------------

**B25J 15/0052****{multiple gripper units or multiple end effectors}****Definition statement***This place covers:*Illustrative example of subject matter classified in [B25J 15/0052](#)

EP 0094338

**B25J 15/02****servo-actuated****Definition statement***This place covers:*

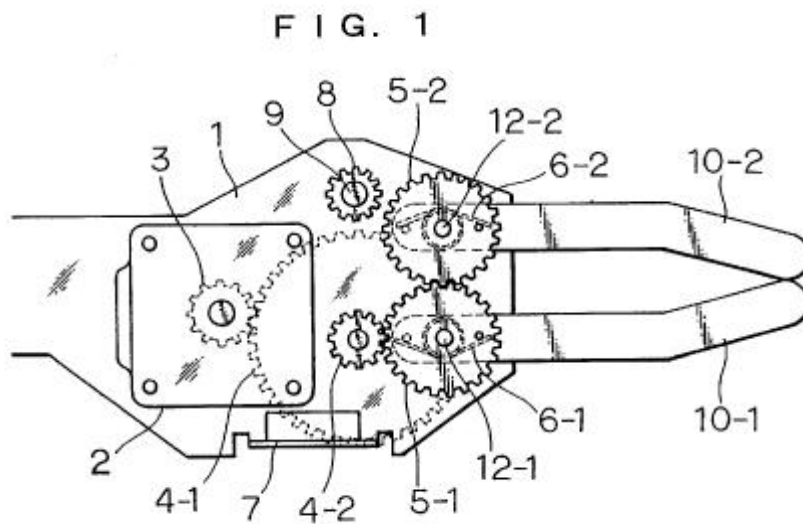
Grippers having actuators for moving holding elements, sensors and a feedback loop for correcting an error on the position, speed or force of the holding elements.

**B25J 15/0206****{comprising articulated grippers}****Definition statement***This place covers:*

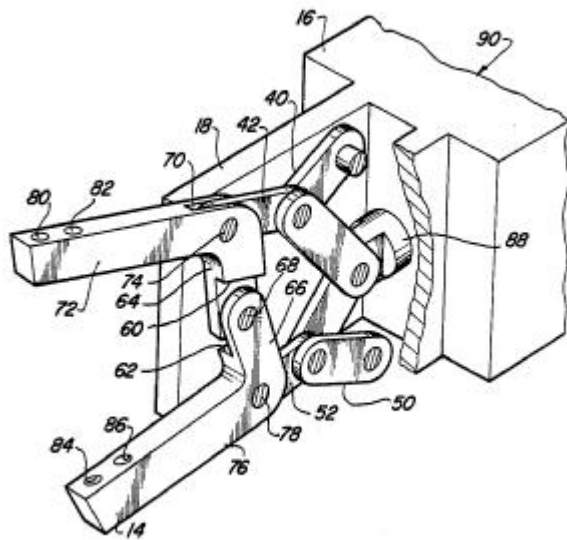
Grippers having pivoting fingers or jaws.

**B25J 15/0213****{actuated by gears}****Definition statement***This place covers:*Illustrative example of subject matter classified in [B25J 15/0213](#)

US 62217094

**B25J 15/022****{actuated by articulated links}****Definition statement***This place covers:*Illustrative example of subject matter classified in [B25J 15/022](#)

US 4728137



## B25J 15/0226

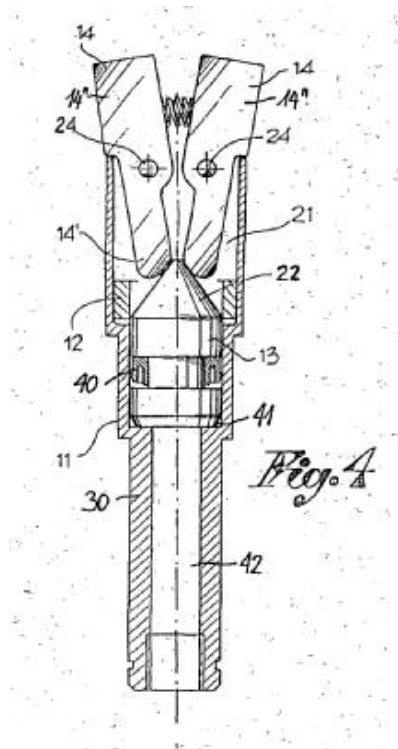
{actuated by cams}

### Definition statement

*This place covers:*

Illustrative example of subject matter classified in [B25J 15/0226](#)

DE 29806798 U



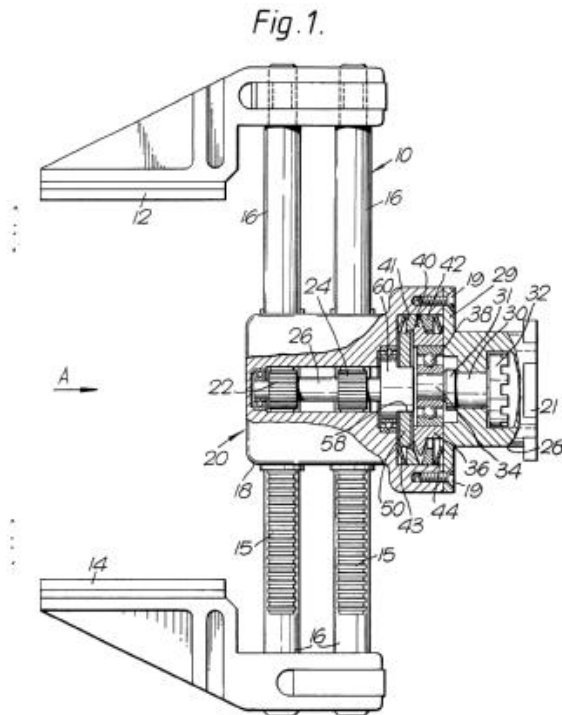


**B25J 15/0253****{comprising parallel grippers}****Definition statement***This place covers:*

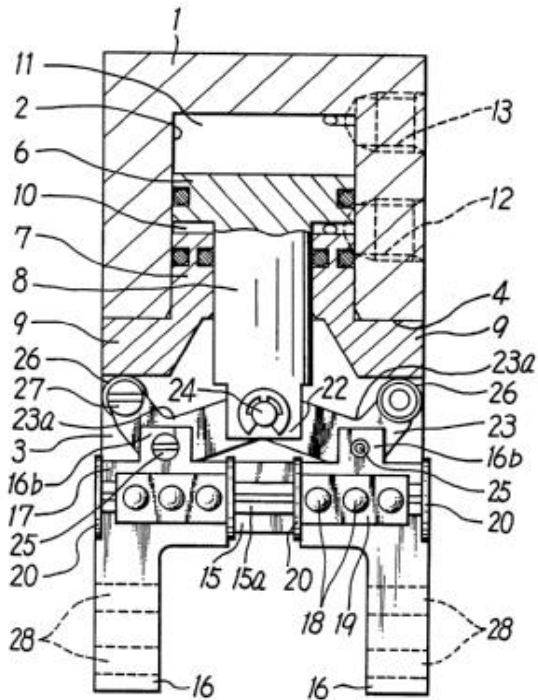
Grippers having fingers or jaws moving in translation.

**B25J 15/026****{actuated by gears}****Definition statement***This place covers:*Illustrative example of subject matter classified in [B25J 15/026](#)

GB 2119894

**B25J 15/0266****{actuated by articulated links}****Definition statement***This place covers:*Illustrative example of subject matter classified in [B25J 15/0266](#)

EP 0293153



## **B25J 15/0273**

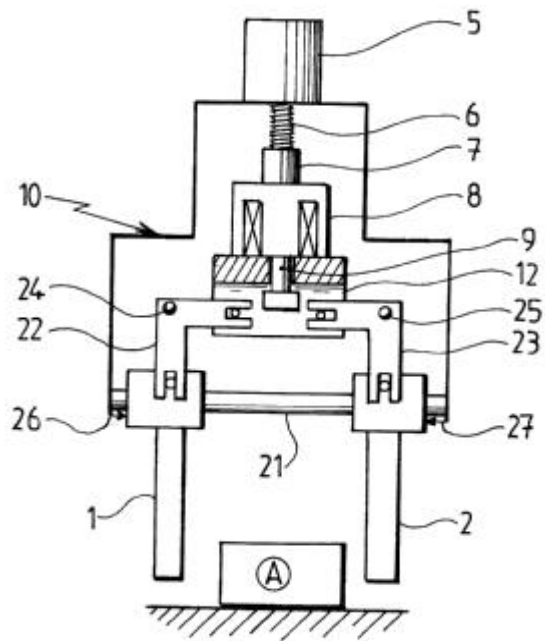
**{comprising linear guide means}**

### **Definition statement**

*This place covers:*

Illustrative example of subject matter classified in [B25J 15/0273](#)

FR 2816232



## **B25J 15/028**

{actuated by cams}

### **Definition statement**

*This place covers:*

Illustrative example of subject matter classified in [B25J 15/028](#)



**B25J 15/0475**

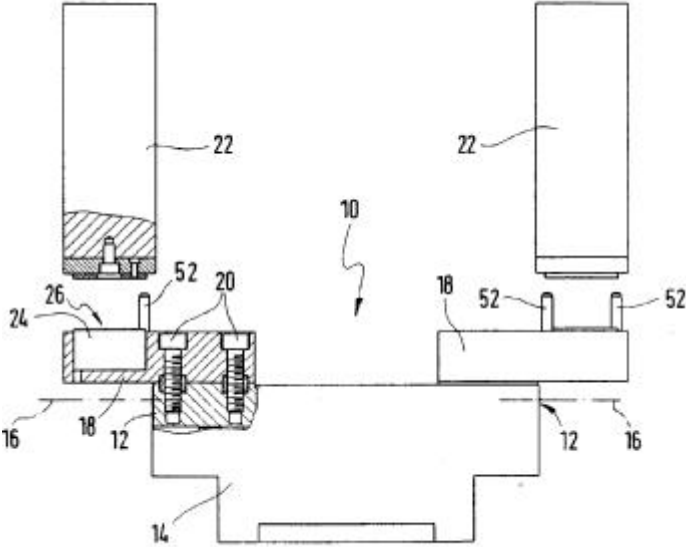
{Exchangeable fingers}

**Definition statement**

*This place covers:*

Illustrative example of subject matter classified in [B25J 15/0475](#)

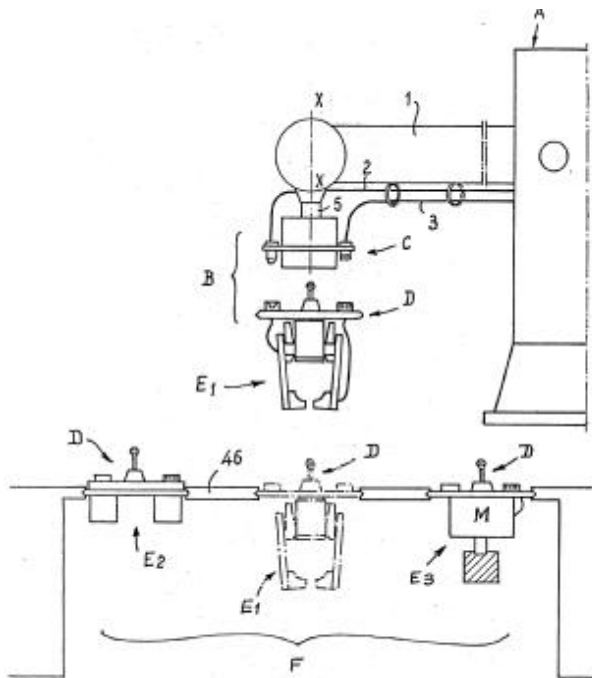
EP 1785238



**Fig. 1**

**B25J 15/0491****{comprising end-effector racks}****Definition statement***This place covers:*

Illustrative example of subject matter classified in this group:

**Special rules of classification**

Documents classified in this subgroup also disclose some information concerning the head, the head exchange mechanism or the head exchange process as such.

**B25J 15/06****with vacuum or magnetic holding means****Definition statement***This place covers:*

Grippers holding an object by suction or magnetic force.

**Relationships with other classification places**

A document is classified in [B25J 15/06](#) when it both discloses vacuum holding means and magnetic holding means (in different embodiments or combined in one embodiment). In this case, and provided that the inventive concept is independent of the very nature of the holding means, the document should be classified in [B25J 15/06](#) only and not in the subgroups [B25J 15/0608](#) and [B25J 15/0616](#). If the inventive concept of a document directly concerns the design of vacuum holding means, respectively of magnetic holding means, the document should be classified in [B25J 15/0616](#), respectively in [B25J 15/0608](#).

**B25J 15/0608**

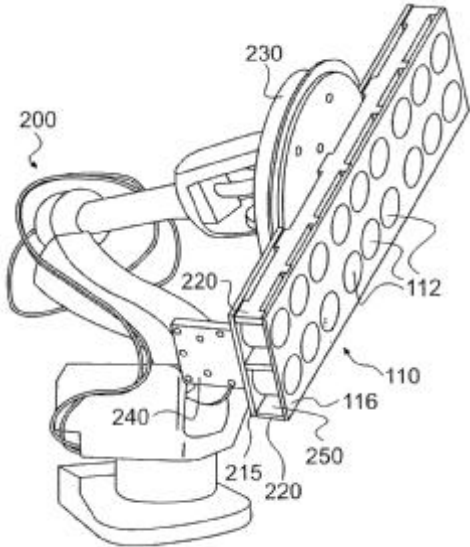
{with magnetic holding means}

**Definition statement**

*This place covers:*

Illustrative example of subject matter classified in [B25J 15/0608](#)

DE 102009015345



**References**

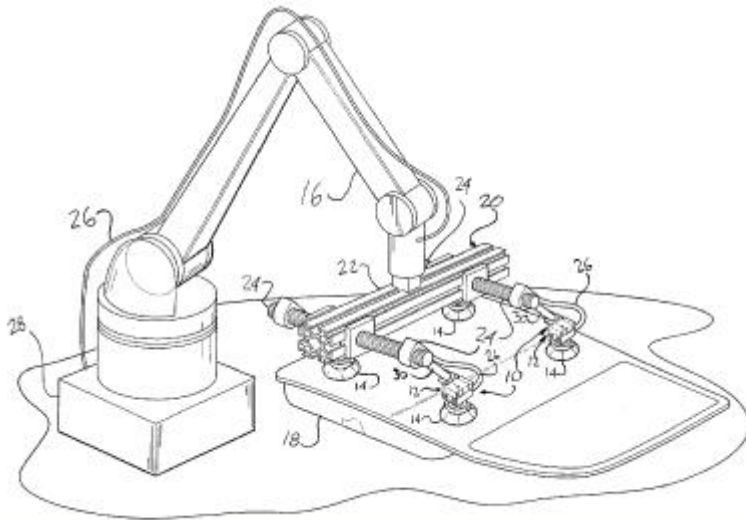
**Informative references**

Attention is drawn to the following places, which may be of interest for search:

Magnetic work holders	<a href="#">B25B 11/002</a>
Devices for picking-up and depositing articles incorporating electrostatic or magnetic grippers	<a href="#">B65G 47/92</a>
Load-engaging elements by magnetic means attached to lifting or lowering gear of cranes	<a href="#">B66C 1/04</a>

**B25J 15/0616****{with vacuum}****Definition statement***This place covers:*

Illustrative example of subject matter classified in this group:

**References****Informative references***Attention is drawn to the following places, which may be of interest for search:*

Vacuum work holders	<a href="#">B25B 11/005</a>
Devices for picking-up and depositing articles incorporating pneumatic, e.g. suction, grippers	<a href="#">B65G 47/91</a>
Separating articles from piles using suction grippers	<a href="#">B65H 3/0808</a>
Load-engaging elements with suction means attached to lifting or lowering gear of cranes	<a href="#">B66C 1/02</a>
Suction cups for attaching purposes	<a href="#">F16B 47/00</a>

**Synonyms and Keywords***In patent documents, the following words/expressions are often used as synonyms:*

- (EN) "vacuum", "suction", "sucking", (FR) "vide", "dépression", "aspir+", (DE) "saug+", and "vakuum"
- (EN) "cup", "pad", (DE) "napf", and (FR) "ventouse"

**B25J 15/08****having finger members ([B25J 15/02](#), [B25J 15/04](#) take precedence)****Definition statement***This place covers:*Grippers having a plurality of finger members not covered by [B25J 15/02](#).



**B25J 15/10**

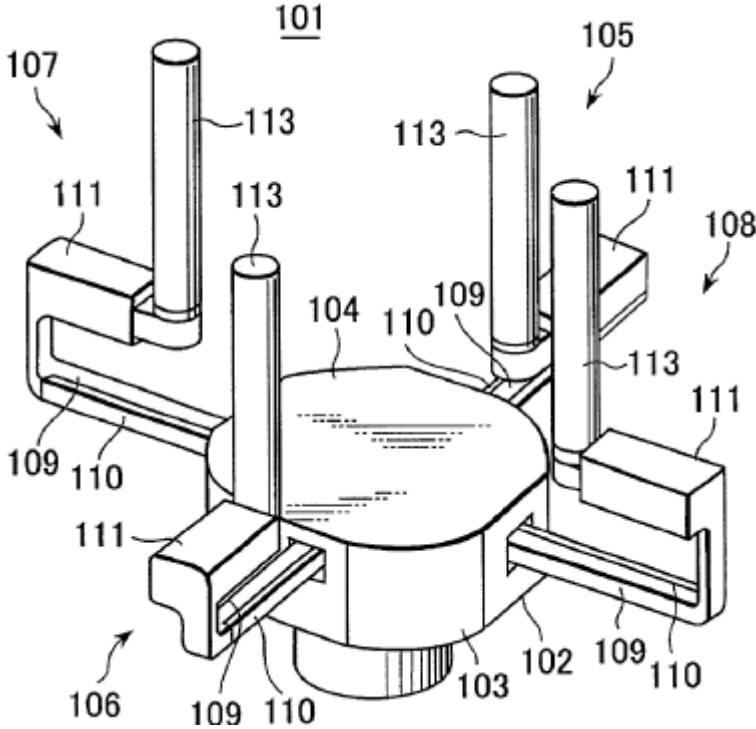
with three or more finger members {(B25J 15/0009 takes precedence)}

**Definition statement**

*This place covers:*

Illustrative example of subject matter classified in [B25J 15/10](#)

US 2003102640



**B25J 15/103**

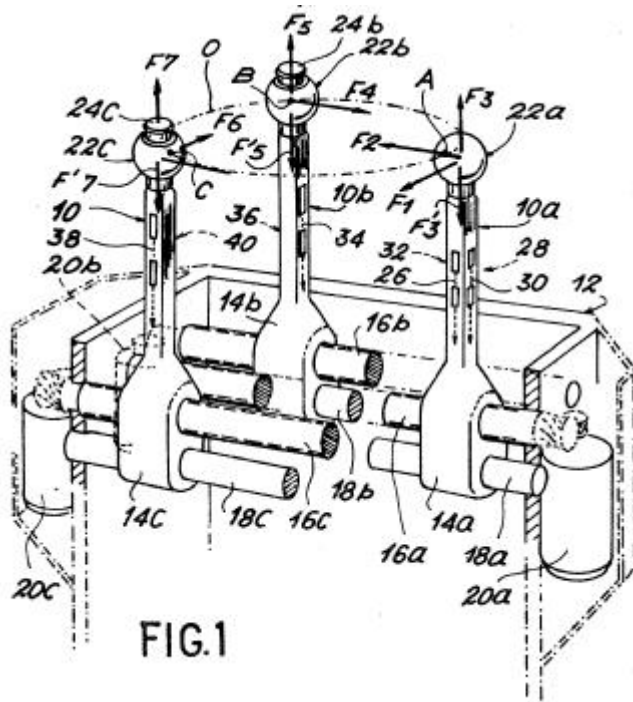
{for gripping the object in three contact points}

**Definition statement**

*This place covers:*

Illustrative example of subject matter classified in [B25J 15/103](#)

FR 2551389



**B25J 15/106**

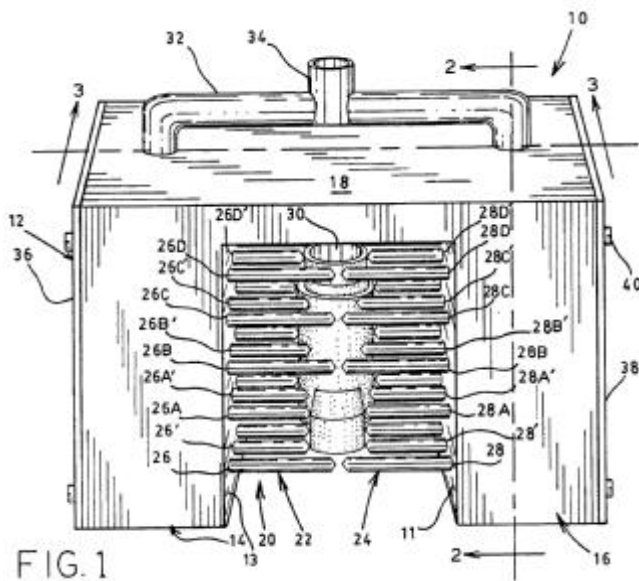
{moving in parallel relationship}

**Definition statement**

*This place covers:*

Illustrative example of subject matter classified in [B25J 15/106](#)

US 5011207



## References

### Informative references

Attention is drawn to the following places, which may be of interest for search:

Vices having a plurality of parts with linear movement	<a href="#">B25B 1/2421</a>
--	-----------------------------

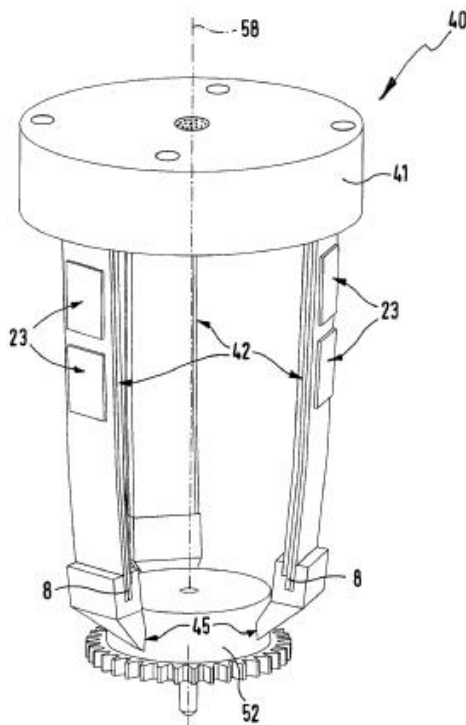
## B25J 15/12

### with flexible finger members

### Definition statement

This place covers:

Illustrative example of subject matter classified in this group:



## References

### Informative references

Attention is drawn to the following places, which may be of interest for search:

Devices for picking-up and depositing articles with inflatable picking-up means	<a href="#">B65G 47/908</a>
---	-----------------------------

### Special rules of classification

Fingers directly actuated by a fluid should additionally be classified in [B25J 15/0023](#).

## B25J 17/00

### Joints

#### Definition statement

*This place covers:*

Devices for linking two parts of a manipulator while allowing a freedom of movement between these two parts.

## B25J 17/02

### Wrist joints

#### Definition statement

*This place covers:*

Joints specially adapted for linking an end effector to the manipulator.

## B25J 17/0208

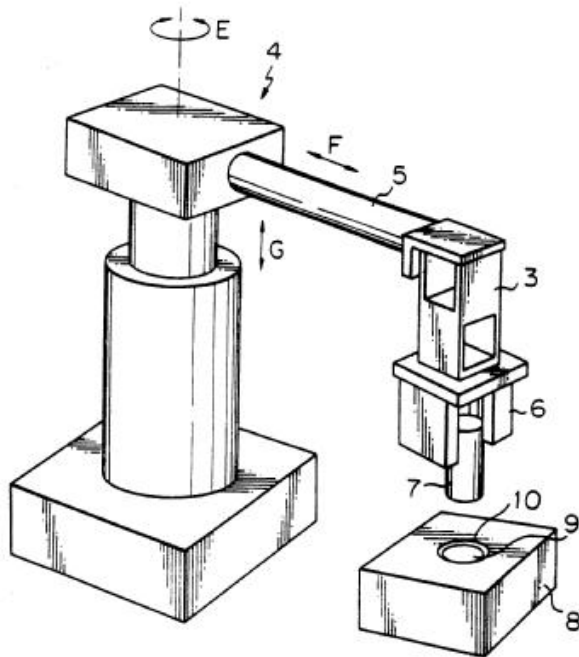
### {Compliance devices}

#### Definition statement

*This place covers:*

Illustrative example of subject matter classified in [B25J 17/0208](#)

US 5207554



## References

### Informative references

Attention is drawn to the following places, which may be of interest for search:

Machines for connecting objects by press fit	<a href="#">B23P 19/02</a>
Machines for aligning articles to be assembled	<a href="#">B23P 19/10</a>

### Special rules of classification

Passive compliant mechanisms avoiding breaking of a robot arm when this robot hurts an obstacle should also additionally classified in [B25J 19/063](#).

## B25J 17/0216

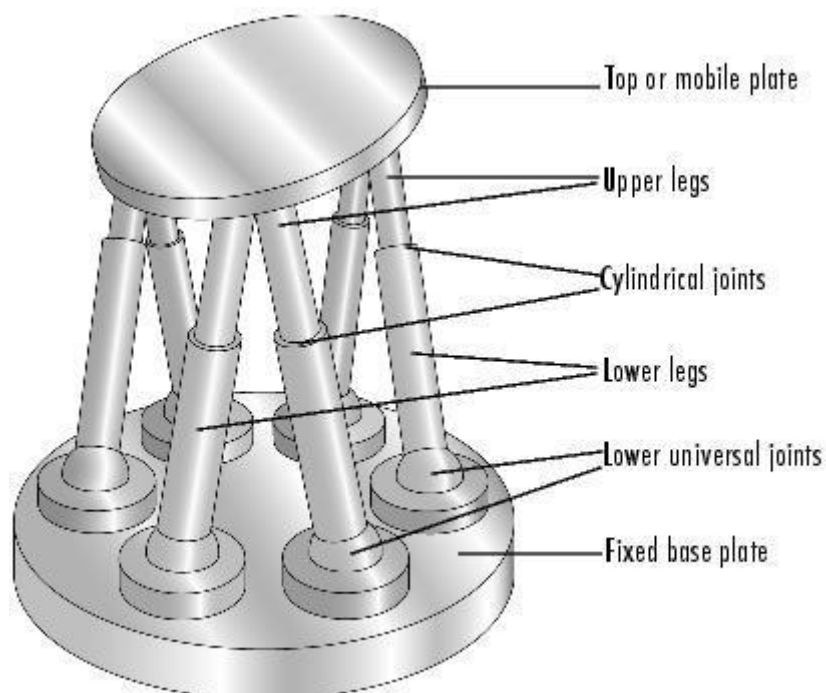
{comprising a stewart mechanism}

### Definition statement

*This place covers:*

Exclusively parallel kinematics manipulators having 6 linear actuators linked to a base and a moving platform by means of universal or ball joints and allowing 6 degrees of freedom for the platform.

Illustrative example of subject matter classified in this group:



## References

### Limiting references

*This place does not cover:*

2D parallel kinematics manipulators	<a href="#">B25J 9/106</a>
Control of parallel manipulators	<a href="#">B25J 9/1623</a>
Other type of 3D parallel kinematics manipulators	<a href="#">B25J 17/0266</a>

**Informative references**

Attention is drawn to the following places, which may be of interest for search:

Machine tools having parallel kinematics	<a href="#">B23Q 1/5462</a>
Gearings comprising primarily only links or levers, with movements in three dimensions	<a href="#">F16H 21/46</a>

**Synonyms and Keywords**

In patent documents, the following words/expressions are often used as synonyms:

- "parallel manipulators", "parallel robots" and "parallel kinematics"

**B25J 17/0241**

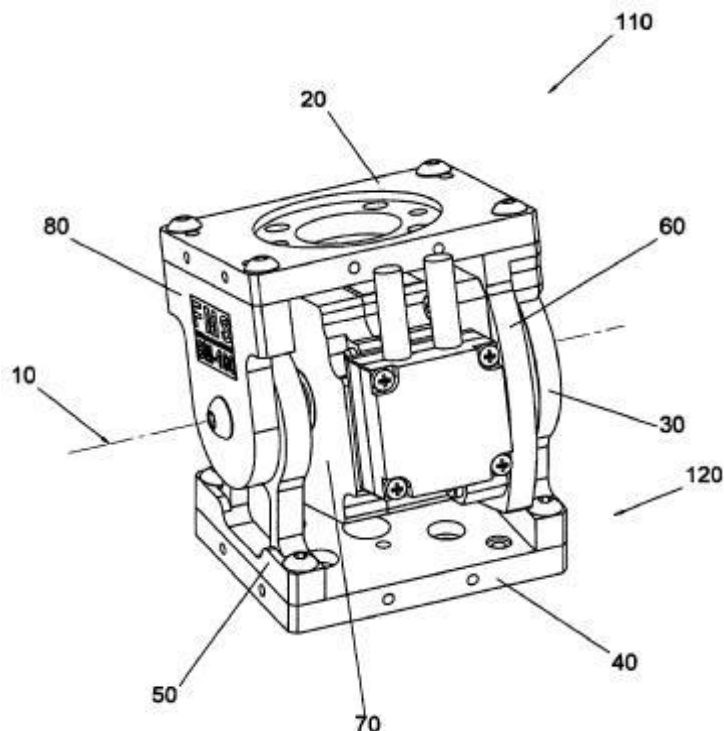
{One-dimensional joints}

**Definition statement**

This place covers:

Illustrative example of subject matter classified in [B25J 17/0241](#)

DE 202011004164 U

**B25J 17/025**

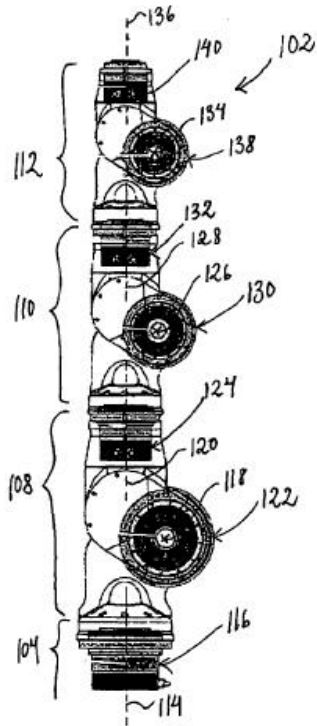
{mounted in series}

**Definition statement**

This place covers:

Illustrative example of subject matter classified in [B25J 17/025](#)

WO 2011003451



### Special rules of classification

Manipulators having a high numbers of joints mounted in series should additionally be classified in [B25J 9/06](#).

## B25J 17/0258

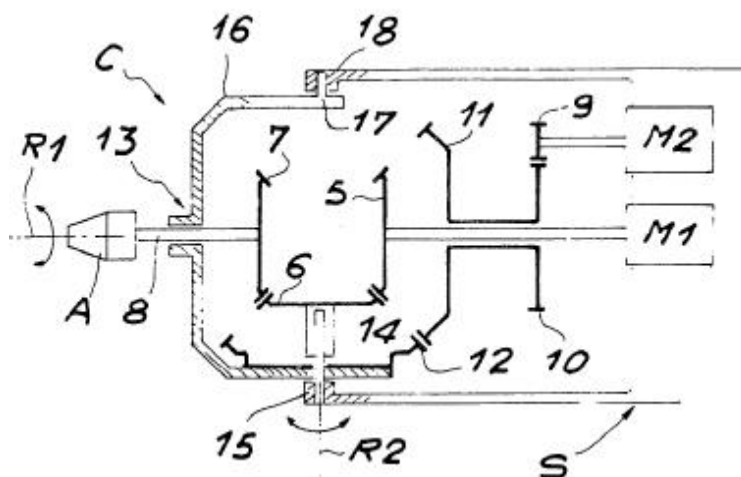
{Two-dimensional joints}

### Definition statement

*This place covers:*

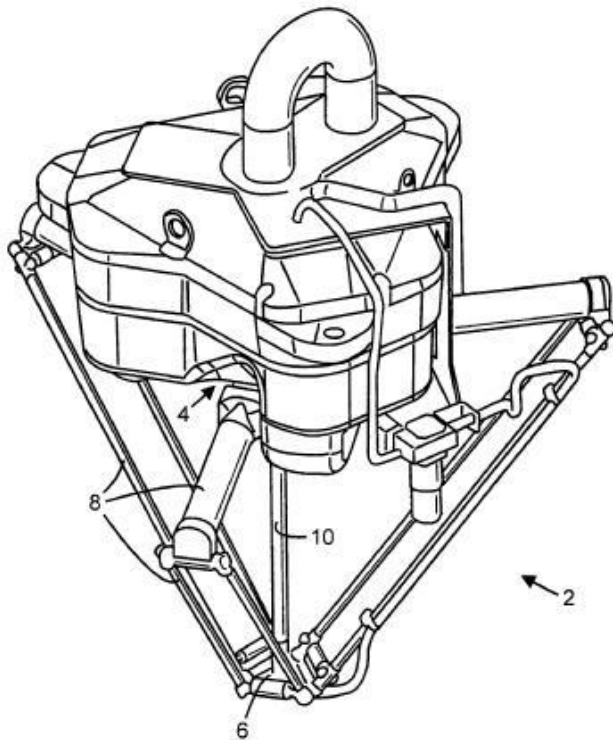
Illustrative example of subject matter classified in [B25J 17/0258](#)

EP 0309329



**B25J 17/0266****{comprising more than two actuating or connecting rods}****Definition statement***This place covers:*

Illustrative example of subject matter classified in this group:

**References****Limiting references***This place does not cover:*

2D parallel manipulators (movements in one plane only)	<a href="#">B25J 9/106</a>
Control of parallel manipulators	<a href="#">B25J 9/1623</a>
Stewart mechanism (6 linears actuators linked to the base and the platform by universal joints and allowing 6 degrees of freedom for the platform)	<a href="#">B25J 17/0216</a>

**Informative references***Attention is drawn to the following places, which may be of interest for search:*

Machine tools having parallel kinematics	<a href="#">B23Q 1/5462</a>
Gearings comprising primarily only links or levers, with movements in three dimensions	<a href="#">F16H 21/46</a>



**Synonyms and Keywords**

In patent documents, the following words/expressions are often used as synonyms:

- "parallel manipulators", "parallel robots" and "parallel kinematics"

**B25J 17/0275**

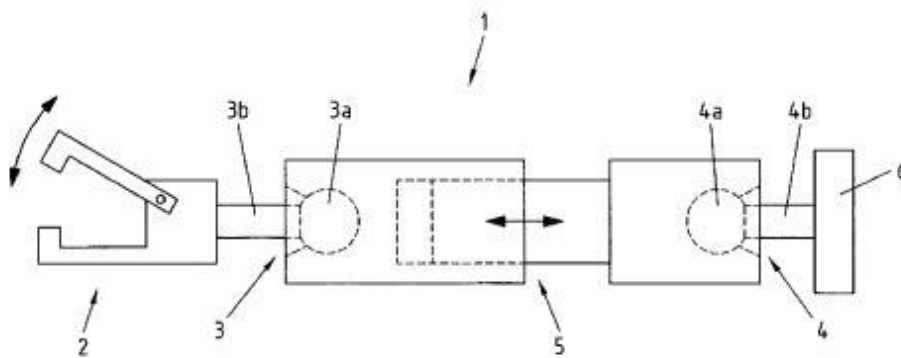
{Universal joints, e.g. Hooke, Cardan, ball joints}

**Definition statement**

This place covers:

Illustrative example of subject matter classified in [B25J 17/0275](#)

WO 2007063006



**B25J 17/0283**

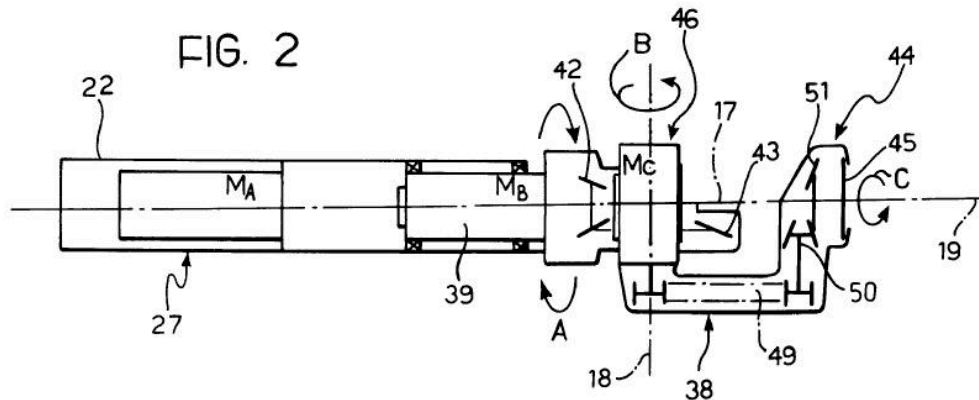
{Three-dimensional joints}

**Definition statement**

This place covers:

Illustrative example of subject matter classified in [B25J 17/0283](#)

EP 0479739



**B25J 18/00****Arms****Definition statement**

*This place covers:*

Main elongated parts of manipulators.

**B25J 18/002**

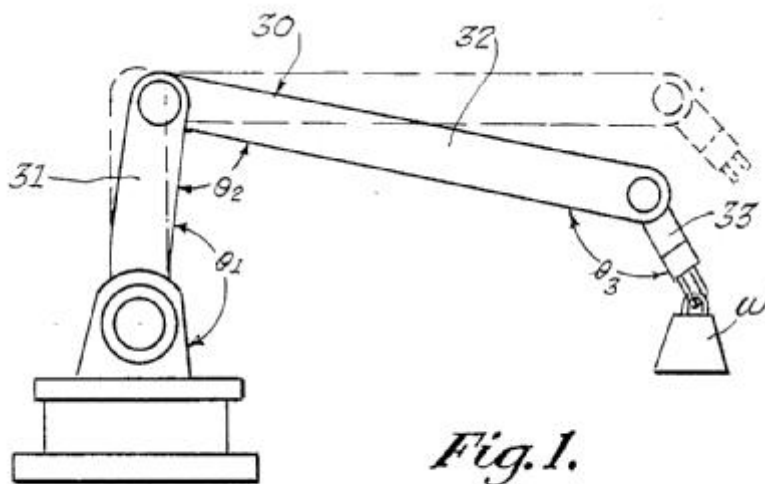
**{comprising beam bending compensation means}**

**Definition statement**

*This place covers:*

Illustrative example of subject matter classified in [B25J 18/002](#)

US 4606691

**References****Informative references**

*Attention is drawn to the following places, which may be of interest for search:*

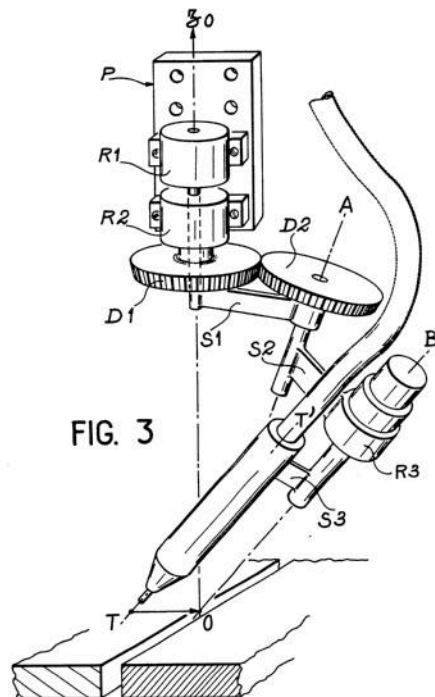
Accessories fitted to machine tools; Weight and flexion compensation	<a href="#">B23Q 11/001</a>
--	-----------------------------

**Special rules of classification**

Control aspects should additionally be classified in [B25J 9/1638](#).

**B25J 18/007****{the end effector rotating around a fixed point}****Definition statement***This place covers:*Illustrative example of subject matter classified in [B25J 18/007](#)

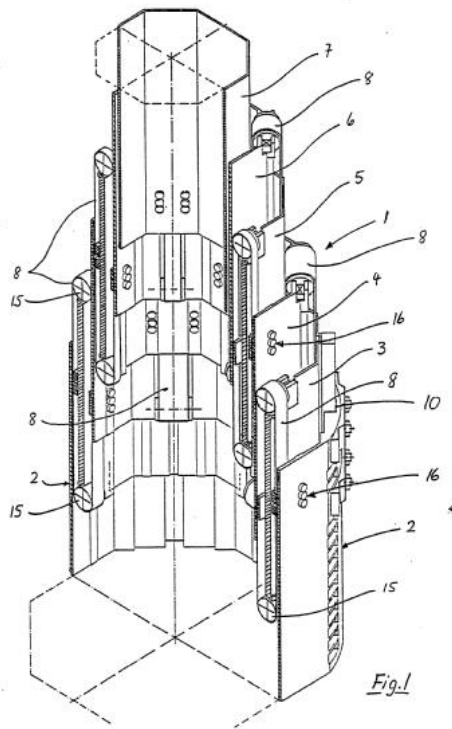
EP 0115728

**Synonyms and Keywords***In patent documents the following expression/word "spherical robot" is often used.***B25J 18/02****extensible****Definition statement***This place covers:*

This group covers manipulator arms having a variable length.

**B25J 18/025****{telescopic}****Definition statement***This place covers:*

Illustrative example of subject matter classified in this group:

**References****Informative references***Attention is drawn to the following places, which may be of interest for search:*

Telescopic jib-cranes	<a href="#">B66C 23/701</a>
-----------------------	-----------------------------

**B25J 18/04****rotatable****Definition statement***This place covers:*Illustrative example of subject matter classified in [B25J 18/04](#)



## B25J 18/06

### flexible

#### Definition statement

*This place covers:*

Illustrative example of subject matter classified in this group:

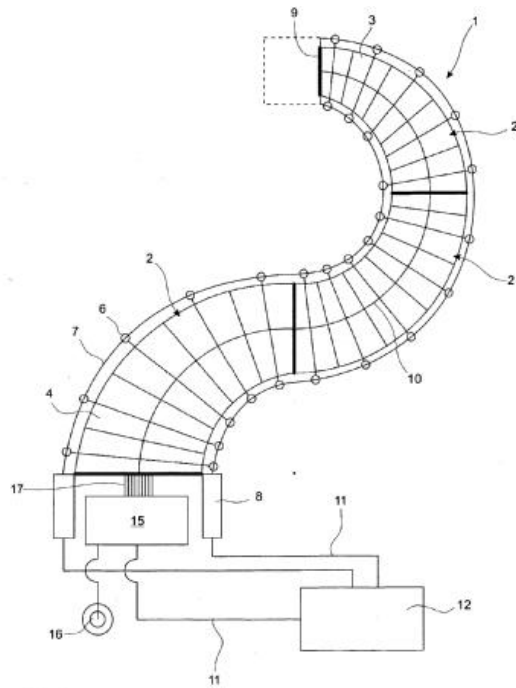


Fig. 1

#### Special rules of classification

Manipulator arms being flexible by means of a large number of articulations must additionally be classified in [B25J 9/06](#).

## B25J 19/00

**Accessories fitted to manipulators, e.g. for monitoring, for viewing; Safety devices combined with or specially adapted for use in connection with manipulators (safety-devices in general [F16P](#); protection against radiation in general [G21F](#))**

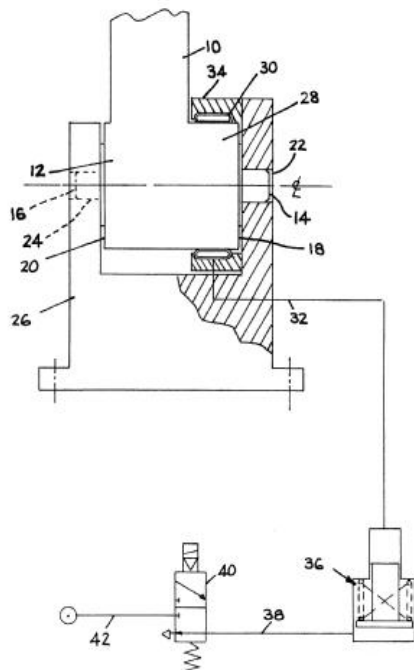
#### Definition statement

*This place covers:*

This group covers all accessories for manipulators, i.e. components of manipulators not directly intended for structure, actuation or control functions.

**B25J 19/0004****{Braking devices (brakes in general [F16D](#))}****Definition statement***This place covers:*

Illustrative example of subject matter classified in this group:

*Fig. 1***B25J 19/0008****{Balancing devices}****Definition statement***This place covers:*

Accessories allowing to partially compensate the load applied on the manipulator.

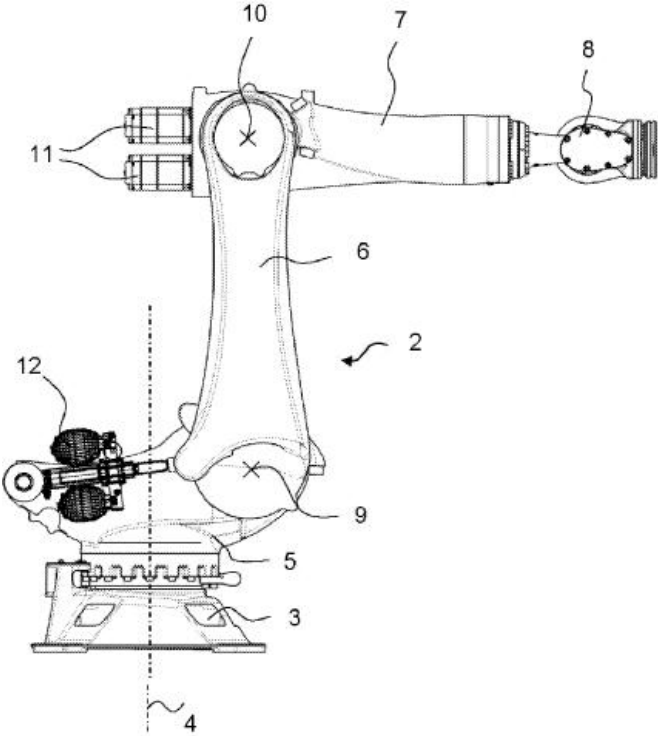
**B25J 19/0012**

{using fluidic devices}

**Definition statement**

*This place covers:*

Illustrative example of subject matter classified in this group:





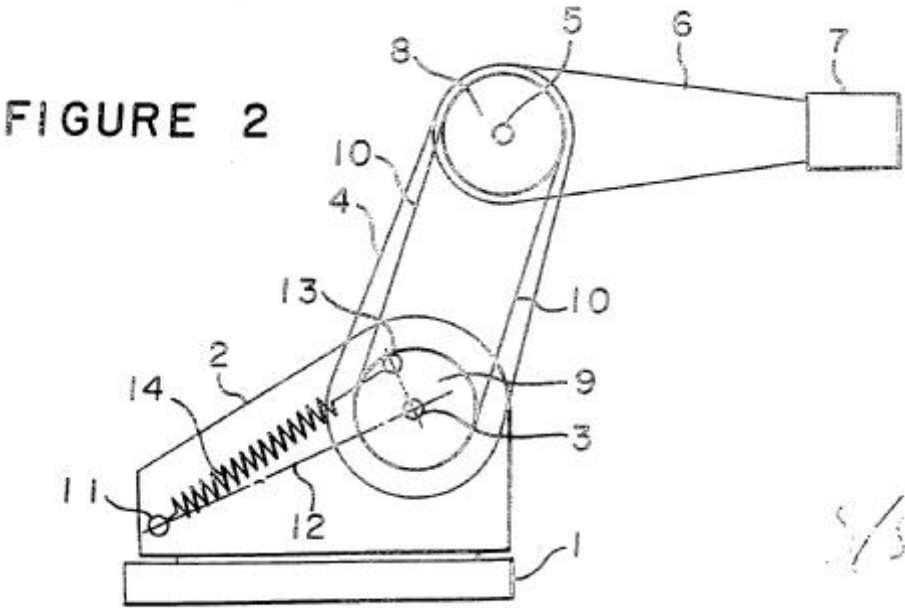
**B25J 19/0016**

{using springs}

**Definition statement**

*This place covers:*

Illustrative example of subject matter classified in this group:



**References**

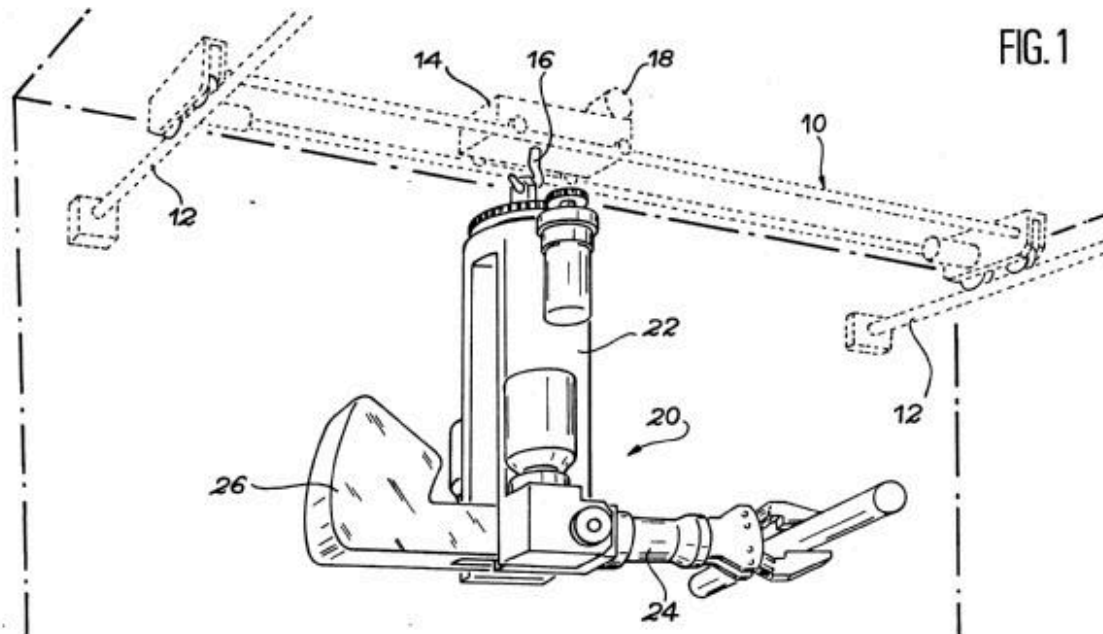
**Informative references**

Attention is drawn to the following places, which may be of interest for search:

Springs; shock-absorbers; means for damping vibration	<a href="#">F16F</a>
---	----------------------

**B25J 19/002****{using counterweights}****Definition statement***This place covers:*

Illustrative example of subject matter classified in this group:

**Synonyms and Keywords***In patent documents, the following words/expressions are often used as synonyms:*

- (DE)"gegengewicht", "ausgleichgewicht" and (FR)"contrepoids"

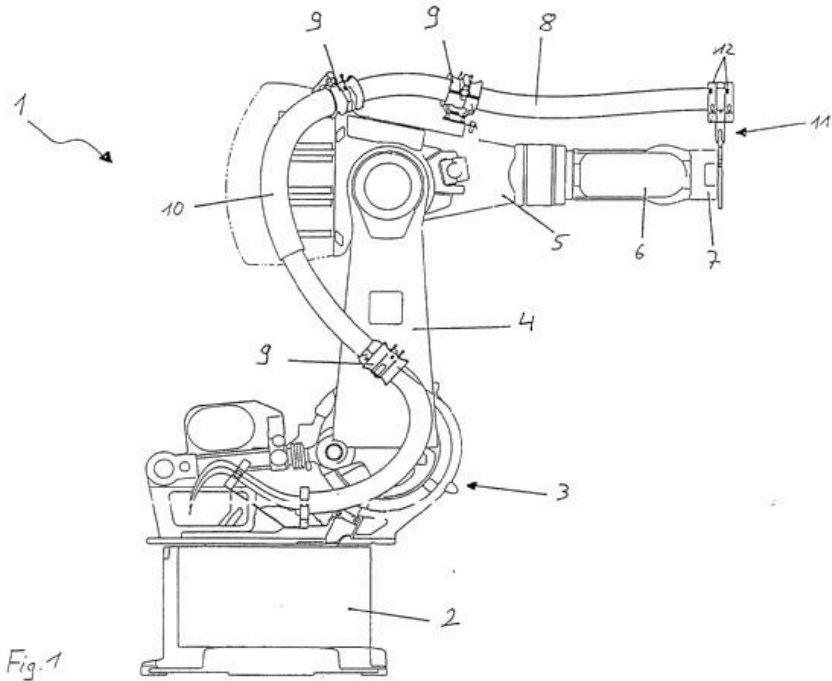
**B25J 19/0025**

{Means for supplying energy to the end effector}

**Definition statement**

*This place covers:*

Illustrative example of subject matter classified in this group:



**References**

**Informative references**

Attention is drawn to the following places, which may be of interest for search:

Arrangements of means for transmitting pneumatic, hydraulic, or electric power to movable parts of a crane	<a href="#">B66C 13/12</a>
Supports for pipes, cables or protective tubing	<a href="#">F16L 3/00</a>
Arrangements of electric cables or lines between relatively-movable parts	<a href="#">H02G 11/00</a>

**Synonyms and Keywords**

*In patent documents, the following words/expressions are often used as synonyms:*

- (EN) "cable", "line", "pipe", "hose", "umbilical member", (DE) "energieversorgung", "kabel", "schlauch", (FR) "alimentation en énergie",

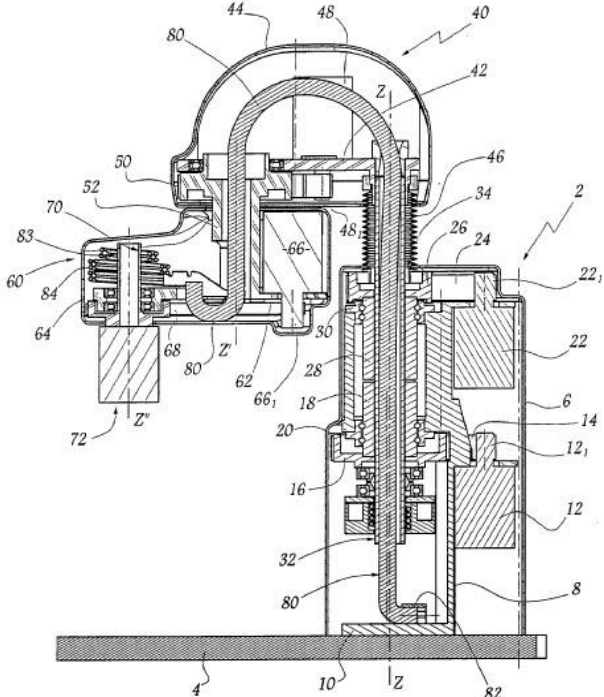
**B25J 19/0029**

{arranged within the different robot elements}

**Definition statement**

*This place covers:*

Illustrative example of subject matter classified in this group:



**B25J 19/0037**

{comprising a light beam pathway, e.g. laser}

**Definition statement**

*This place covers:*

Illustrative example of subject matter classified in [B25J 19/0037](#)

US 4667081

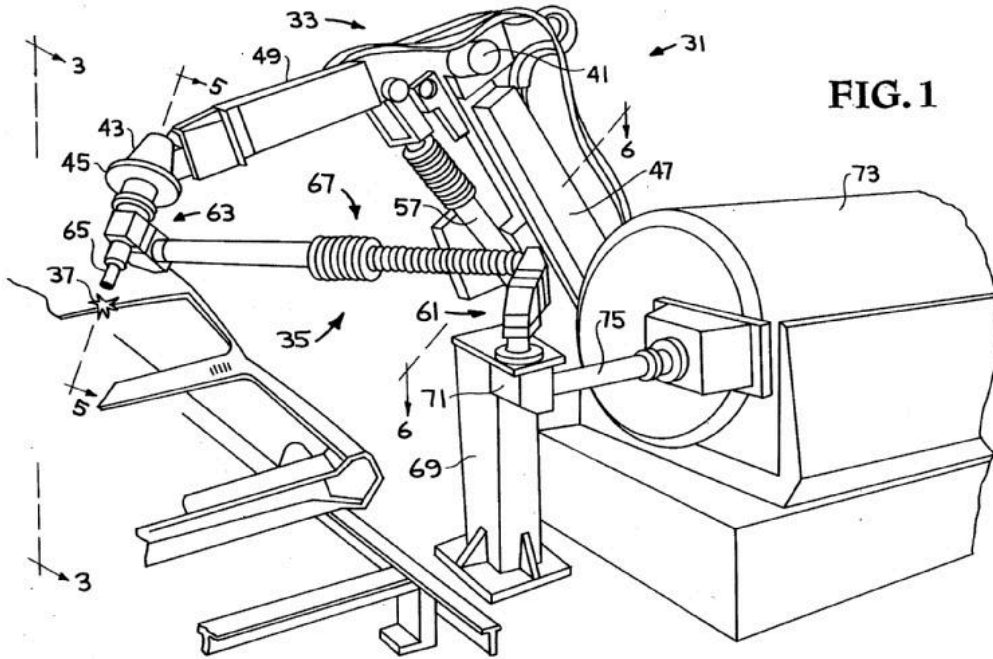


FIG. 1

**References**

**Informative references**

Attention is drawn to the following places, which may be of interest for search:

Robots for moving a laser beam	<a href="#">B23K 26/0884</a>
--------------------------------	------------------------------

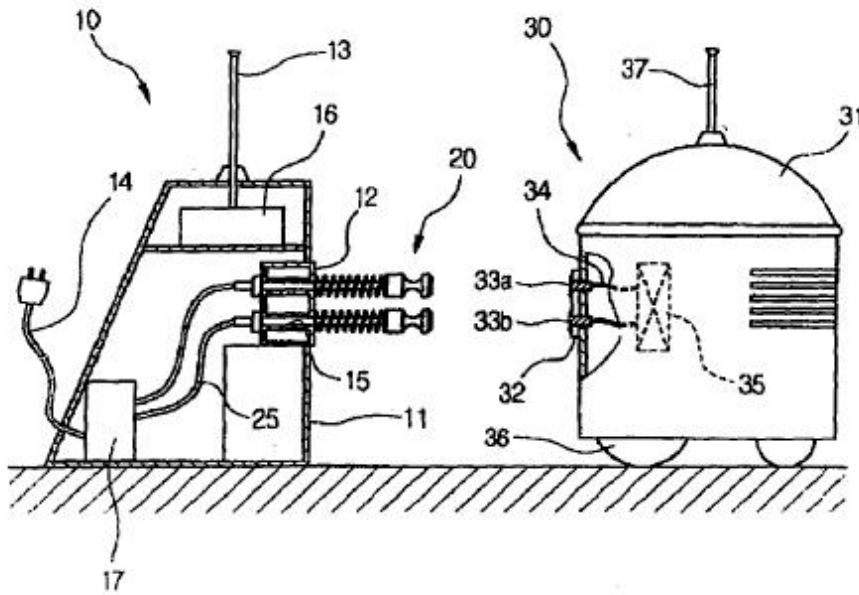
**B25J 19/005**

{using batteries, e.g. as a back-up power source}

**Definition statement**

*This place covers:*

Illustrative example of subject matter classified in this group:

**Synonyms and Keywords**

*In patent documents, the following words/expressions are often used as synonyms:*

- "energy cell", "accumulator" and "power source"

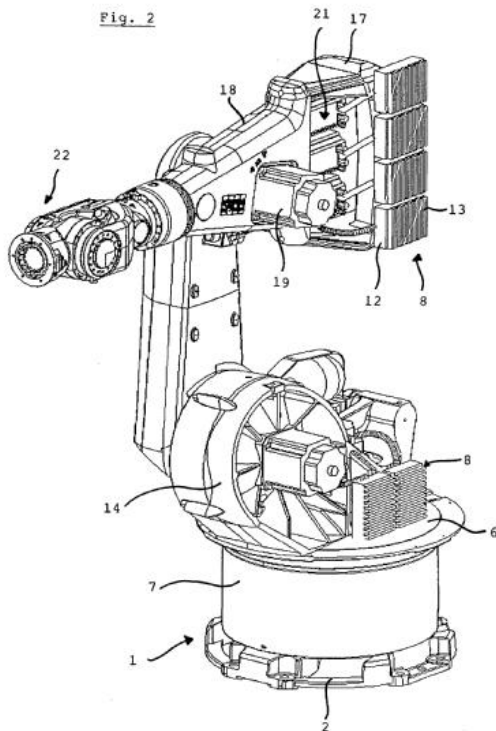
## B25J 19/0054

{Cooling means}

### Definition statement

*This place covers:*

Illustrative example of subject matter classified in this group:



## B25J 19/0058

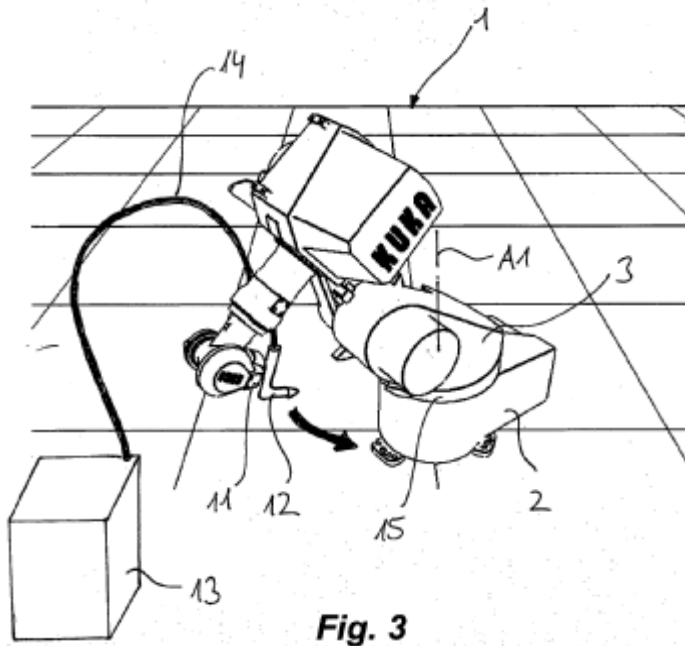
{Means for cleaning manipulators, e.g. dust removing means}

### Definition statement

*This place covers:*

Illustrative example of subject matter classified in [B25J 19/0058](#)

EP 2149435



## References

### Limiting references

*This place does not cover:*

Means for preventing dust from entering/escaping manipulators	<a href="#">B25J 19/0075</a>
---	------------------------------

## B25J 19/0075

{Means for protecting the manipulator from its environment or vice versa}

### Definition statement

*This place covers:*

Means for avoiding the intrusion of foreign matter, e.g. dust, inside the manipulator or for avoiding the release of harmful matter, e.g. grease particles, from the manipulator into its environment.

## References

### Informative references

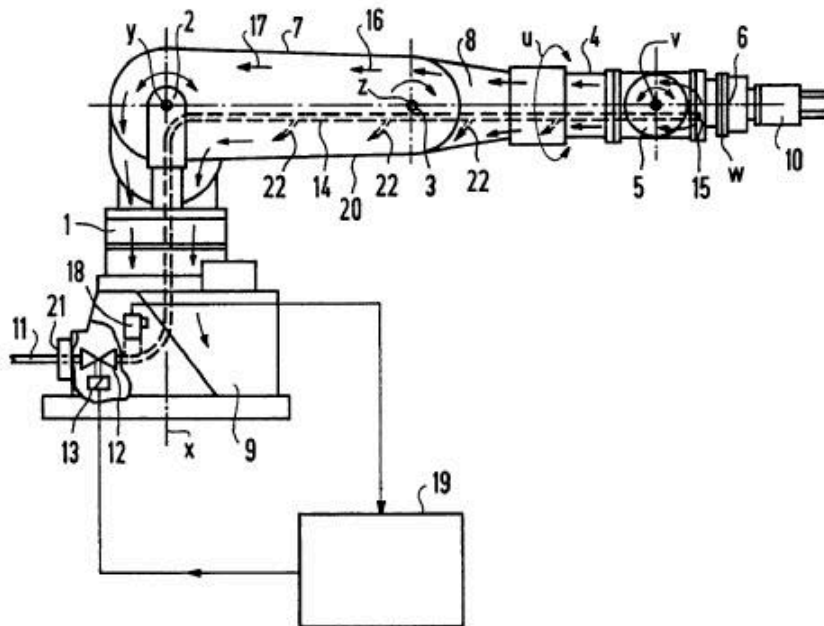
*Attention is drawn to the following places, which may be of interest for search:*

Protective coverings for parts of machine tools	<a href="#">B23Q 11/08</a>
---	----------------------------



**B25J 19/0079****{using an internal pressure system}****Definition statement***This place covers:*

Illustrative example of subject matter classified in this group:

**B25J 19/0083****{using gaiters}****Definition statement***This place covers:*Illustrative example of subject matter classified in - [B25J 19/0083](#)

US 4762455

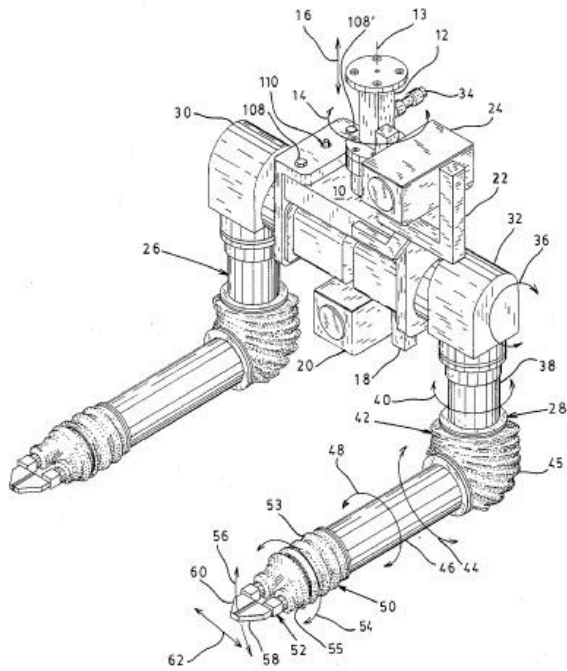


FIG. 1

### Synonyms and Keywords

*In patent documents, the following words/expressions are often used as synonyms:*

- (EN)"bellow", "(protective) boot", (FR)"soufflet", "manchon (protecteur)" (DE)"schutzbalg" and "faltenbalg"

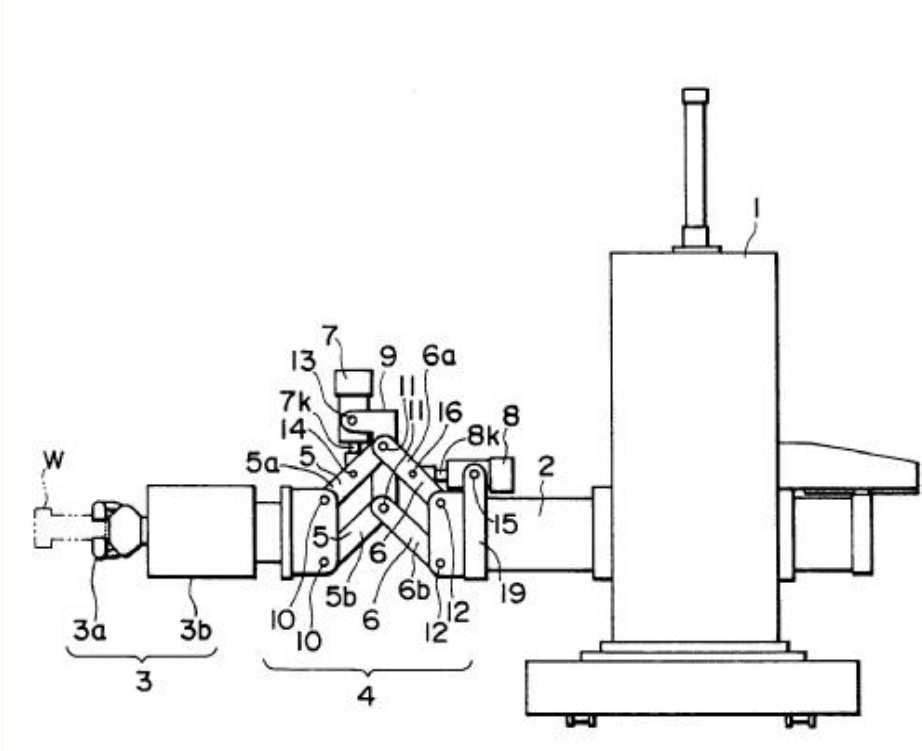
**B25J 19/0091**

{Shock absorbers (in general [F16F](#))}

**Definition statement**

*This place covers:*

Illustrative example of subject matter classified in this group:



**B25J 19/02**

**Sensing devices**

**Definition statement**

*This place covers:*

Sensors fitted on manipulators and not directly used in the control systems of the manipulators.

**References**

**Limiting references**

*This place does not cover:*

Sensors specifically used for controlling manipulators	<a href="#">B25J 13/08</a>
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## B25J 19/021

{Optical sensing devices}

### Definition statement

*This place covers:*

Sensors having optical components.

## B25J 19/022

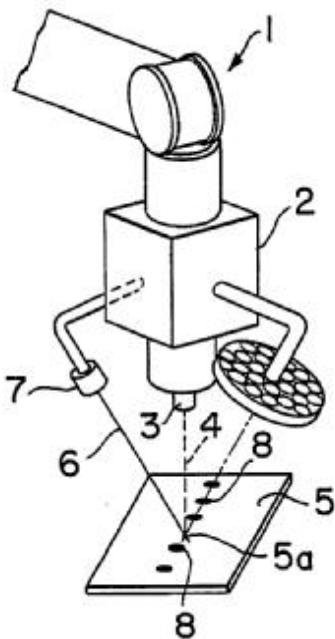
{using lasers}

### Definition statement

*This place covers:*

Illustrative example of subject matter classified in [B25J 19/022](#)

EP 0339560



## B25J 19/023

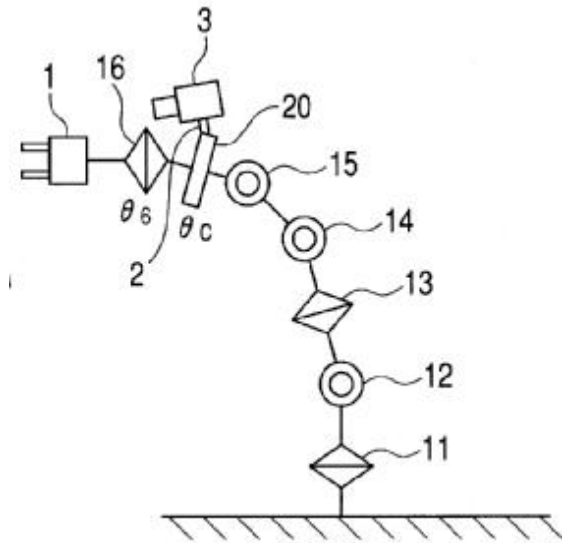
{including video camera means}

### Definition statement

*This place covers:*

Illustrative example of subject matter classified in [B25J 19/023](#)

US 2010298978



## B25J 19/025

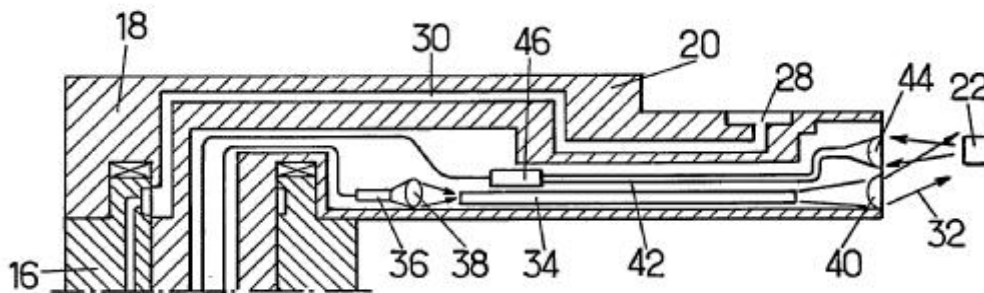
{including optical fibres}

### Definition statement

*This place covers:*

Illustrative example of subject matter classified in [B25J 19/025](#)

FR 2664525



## B25J 19/026

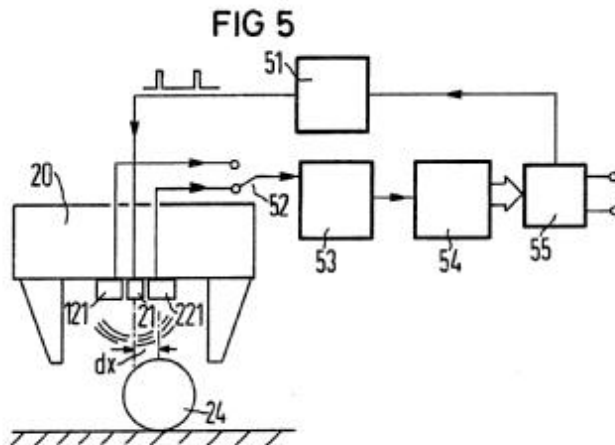
{Acoustical sensing devices}

### Definition statement

*This place covers:*

Illustrative example of subject matter classified in [B25J 19/026](#)

DE 3409767



### Special rules of classification

This group includes robots with ultrasonic sensors.

### B25J 19/027

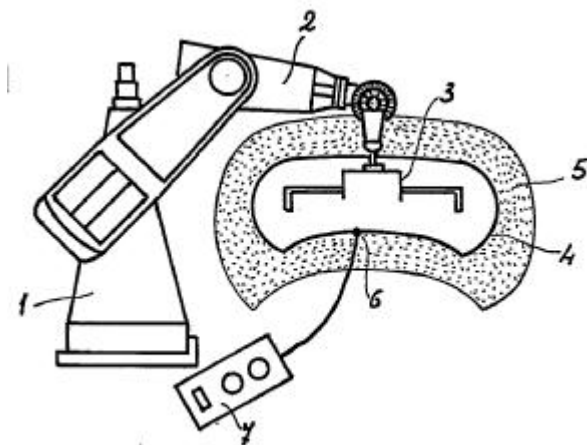
{Electromagnetic sensing devices}

### Definition statement

*This place covers:*

Illustrative example of subject matter classified in [B25J 19/027](#)

FR 2663105



### B25J 19/028

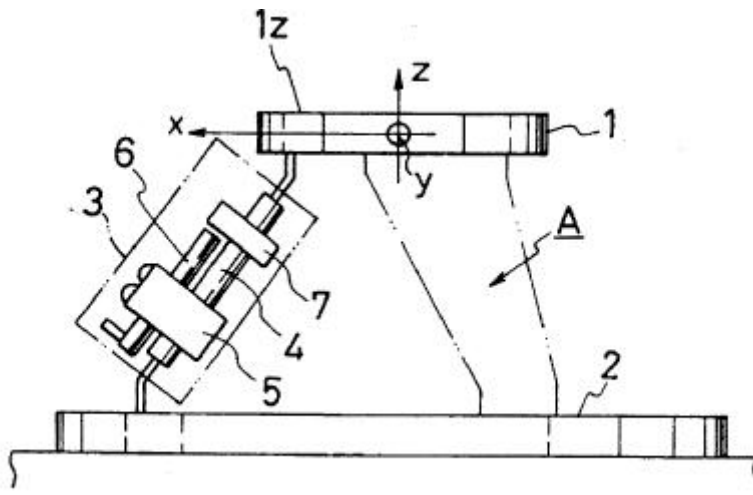
{Piezoresistive or piezoelectric sensing devices}

### Definition statement

*This place covers:*

Illustrative example of subject matter classified in [B25J 19/028](#)

US 5511931



## **B25J 19/04**

### **Viewing devices**

#### **Definition statement**

*This place covers:*

Sensors for capturing an image.

## **B25J 19/06**

### **Safety devices**

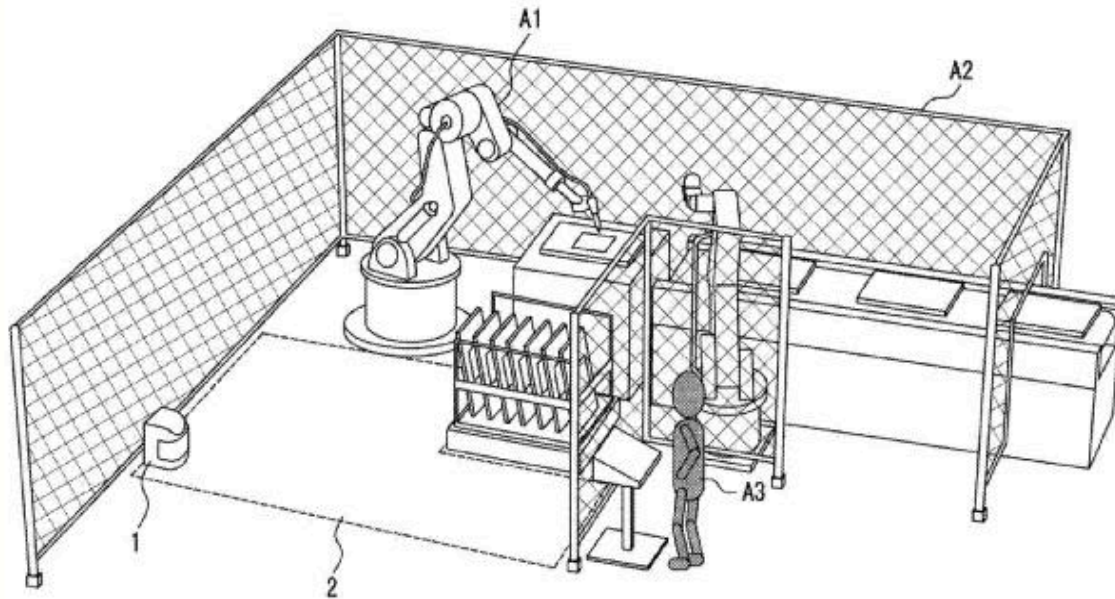
#### **Definition statement**

*This place covers:*

Illustrative example of subject matter classified in [B25J 19/06](#)

US 2009295580

FIG. 1



## References

### Informative references

Attention is drawn to the following places, which may be of interest for search:

Safety devices independent of the control and operation of the machine	<a href="#">F16P 1/00</a>
Safety devices acting in conjunction with the control or operation of the machine	<a href="#">F16P 3/00</a>



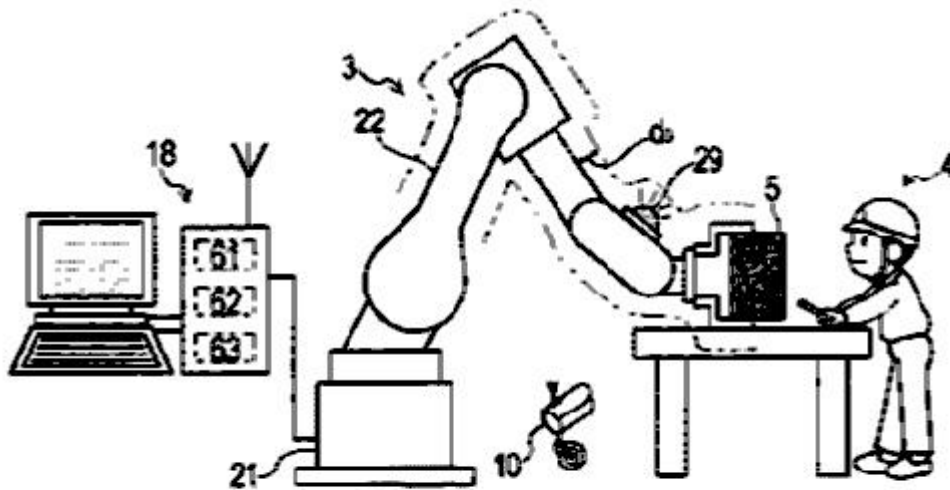
**B25J 19/061**

{with audible signals (audio controls [B25J 13/003](#))}

**Definition statement**

*This place covers:*

Illustrative example of subject matter classified in this group:



Robot 3 itself, or its vicinity, is equipped with alarm 29 so that it can warn for operator 4 who operates/ works with robot 3.

**B25J 19/063**

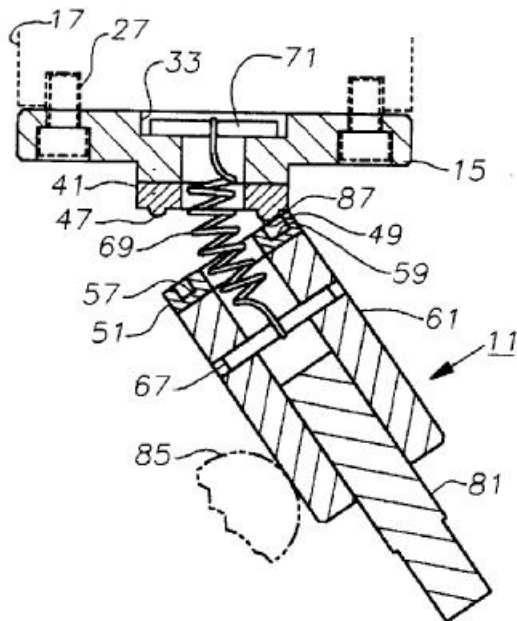
{working only upon contact with an outside object}

**Definition statement**

*This place covers:*

Illustrative example of subject matter classified in [B25J 19/063](#)

US 6129476



**Fig. 5**

### Special rules of classification

Devices comprising a compliant mechanism should additionally be classified in [B25J 17/0208](#).

### B25J 21/00

**Chambers provided with manipulation devices (constructional features of the mounting of the manipulator in the wall [B25J 1/08](#) {; glove-boxes for nuclear applications [G21F 7/04](#)})**

### Definition statement

*This place covers:*

Closed spaces containing manipulation means.

### B25J 21/005

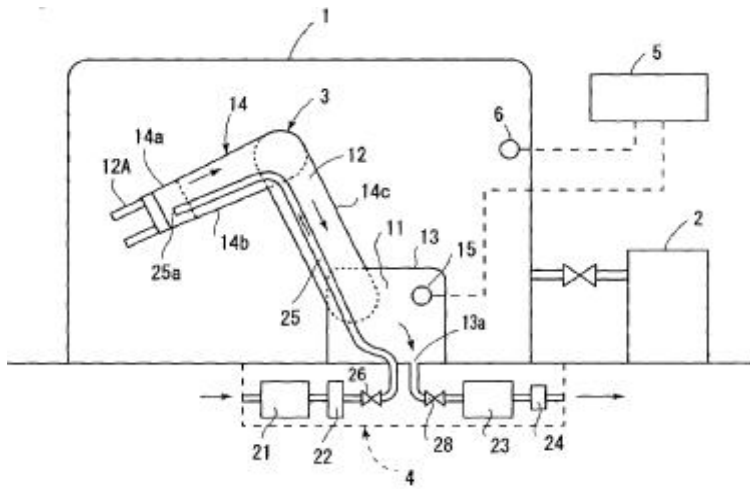
**{Clean rooms}**

### Definition statement

*This place covers:*

Illustrative example of subject matter classified in [B25J 21/005](#)

EP 1557245



## B25J 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 [B08B 15/026](#); glove-boxes shielded against radiation [G21F 7/04](#))}; Gloves therefor

### Definition statement

*This place covers:*

Illustrative example of subject matter classified in [B25J 21/02](#)

DE 102008001411

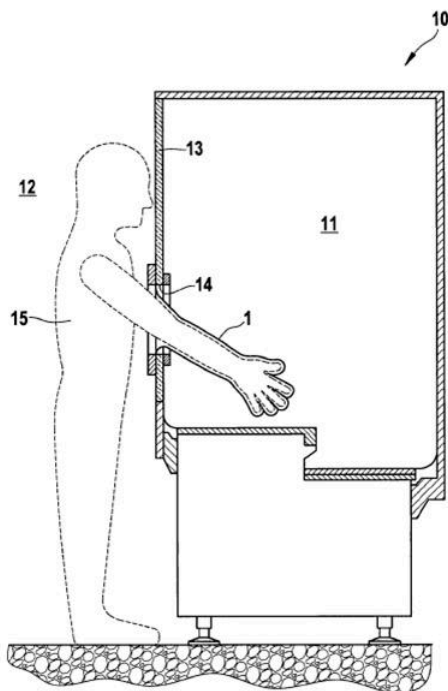


Fig. 1

## References

### *Informative references*

*Attention is drawn to the following places, which may be of interest for search:*

Baby incubators	<a href="#">A61G 11/00</a>
Microbiological incubators	<a href="#">C12M 1/005</a>
Apparatus providing an anaerobic atmosphere	<a href="#">C12M 1/045</a>

## Synonyms and Keywords

*In patent documents, the following words/expressions are often used as synonyms:*

- (EN)"isolator", (FR)"boîte à gants" and (DE)"handschuhkasten"