

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	B25J 1/00
Manipulators not otherwise provided for	B25J 11/00
Leader-follower manipulators	B25J 3/00
Manipulators mounted on wheels or on carriages	B25J 5/00 , B25J 9/162
Micromanipulators	B25J 7/00
Service robots	B25J 9/0003
Exoskeletons	B25J 9/0006
Manipulators moved by gravity	B25J 9/1055
Manipulators comprising mechanical "programming" means, e.g. cams	B25J 9/109

Cellular, reconfigurable manipulators, e.g. cebot	B25J 9/1617
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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	A61B 34/70
Spray heads moved by robots or articulated arms	B05B 13/0431
Manipulators for transferring metal sheets from / to a press	B21D 43/105
Manipulators in machines for forging, hammering, pressing riveting	B21J 13/10
Manipulators for moving laser head in more than two directions	B23K 26/0884
Manipulators for moving workpieces between mould parts	B29C 37/0007
Manipulators in machines for gluing by wetting	B65C 9/2226
Manipulators for handling sheets	B65G 49/067
Manipulators for stacking or de-stacking articles	B65G 61/00
Manipulators with gripping or holding means for transferring the packages from one station to another	B65H 67/065
Manipulators for underwater operations	E21B 41/04
Automatic analysis systems comprising robots	G01N 35/0099
Manipulators integrated in shielded cells	G21F 7/061
Manipulators for transferring wafers	H01L 21/67742 , H01L 21/67766 , H01L 21/68707
Pick and place apparatus for mounting of components	H05K 13/0404

B25J 1/00

Manipulators positioned in space by hand (of leader-follower 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.

References

Limiting references

This place does not cover:

Manipulators of leader-follower type	B25J 3/00
Micromanipulators	B25J 7/00

B25J 1/02

articulated or flexible

Definition statement

This place covers:

Illustrative example of subject matter classified in this group:

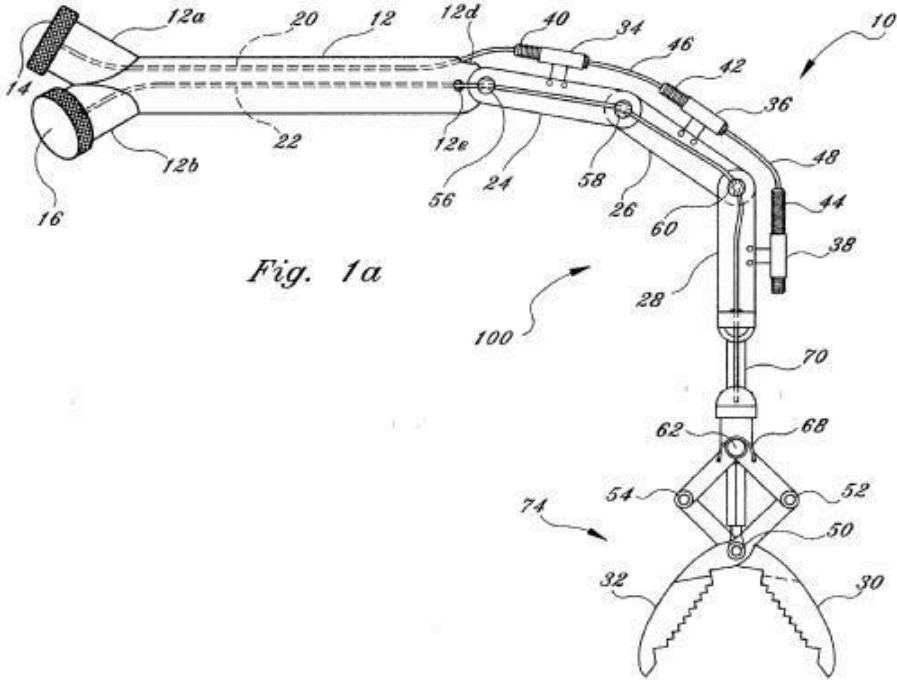


Fig. 1a

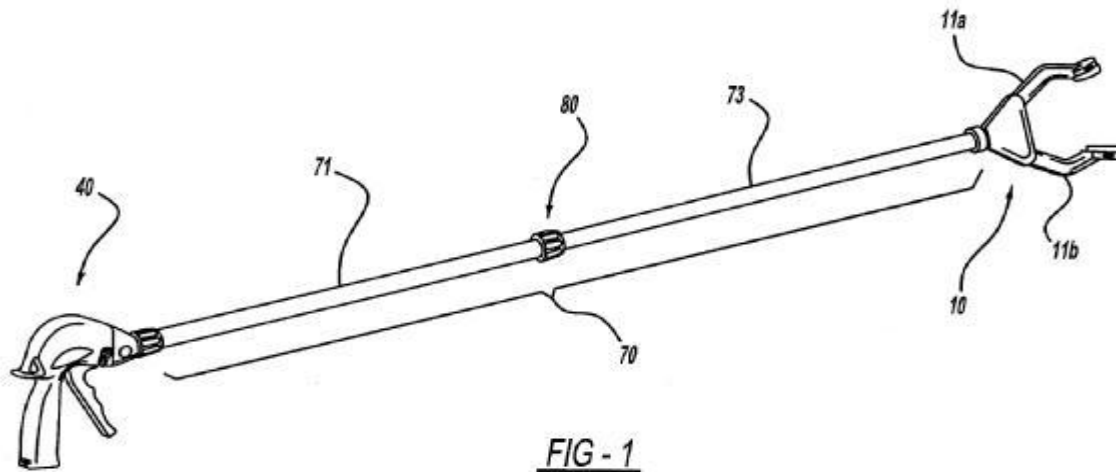
B25J 1/04

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

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

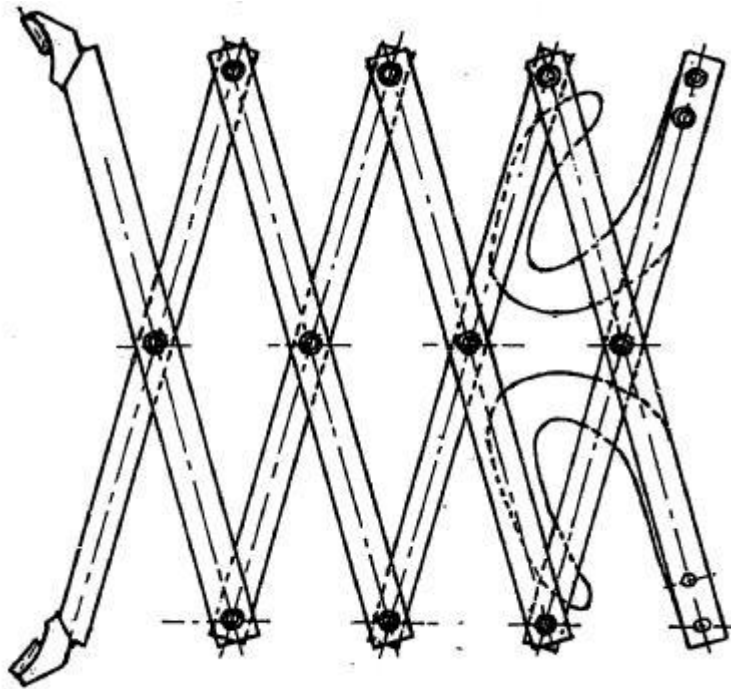
of the lazy-tongs type

Definition statement

This place covers:

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

DE 8901596 U



B25J 1/08

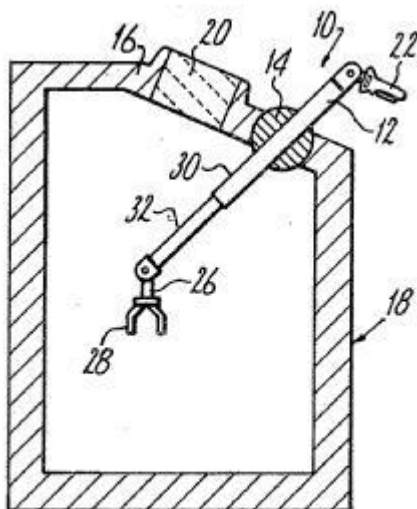
movably mounted in a wall

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	G21F 7/06
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Special rules of classification

Manipulators of leader-follower 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

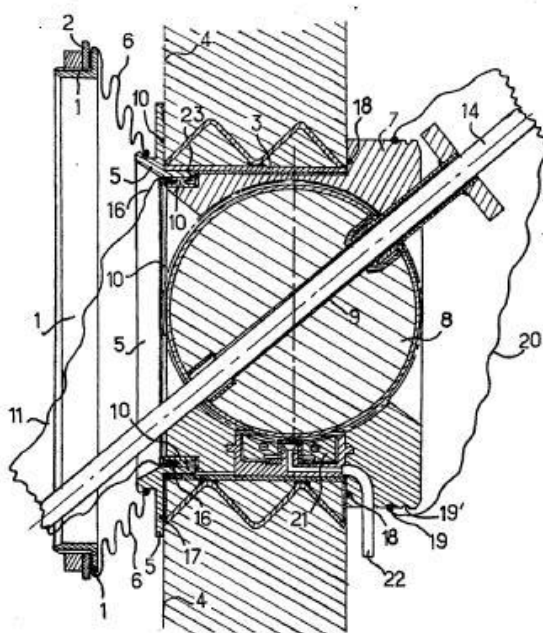


Fig. 4

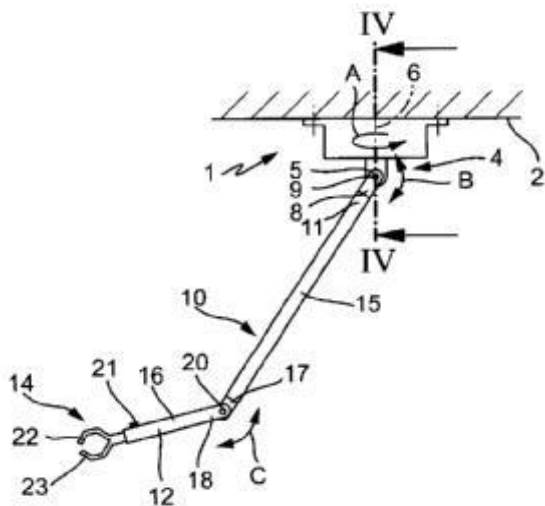
B25J 1/12

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 leader-follower type, i.e. both controlling unit and controlled unit perform corresponding spatial movements

Definition statement

This place covers:

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

B25J 3/02

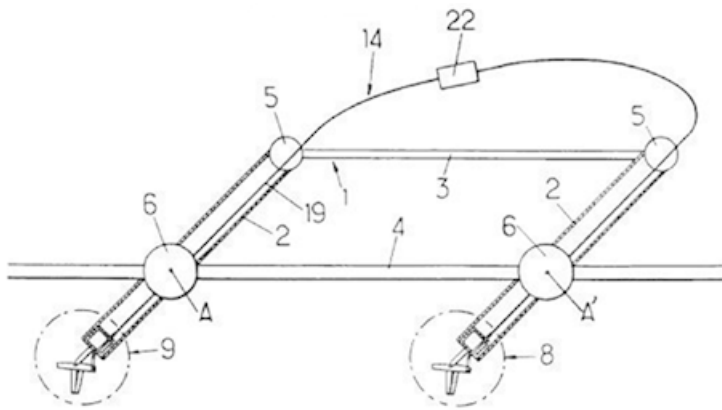
involving a parallelogram coupling of the leader and follower units
(pantographic instruments [B43L 13/00](#))

Definition statement

This place covers:

Leader-follower manipulators having a mechanical connection between the leader unit and the follower unit (e.g. connection by shafts, rods, wires, etc).

Illustrative example of subject matter classified in this place:



References

Limiting references

This place does not cover:

Pantographic instruments	B43L 13/00
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Informative references

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

Manual leader-follower manipulators mounted in a wall	B25J 1/08
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B25J 3/04

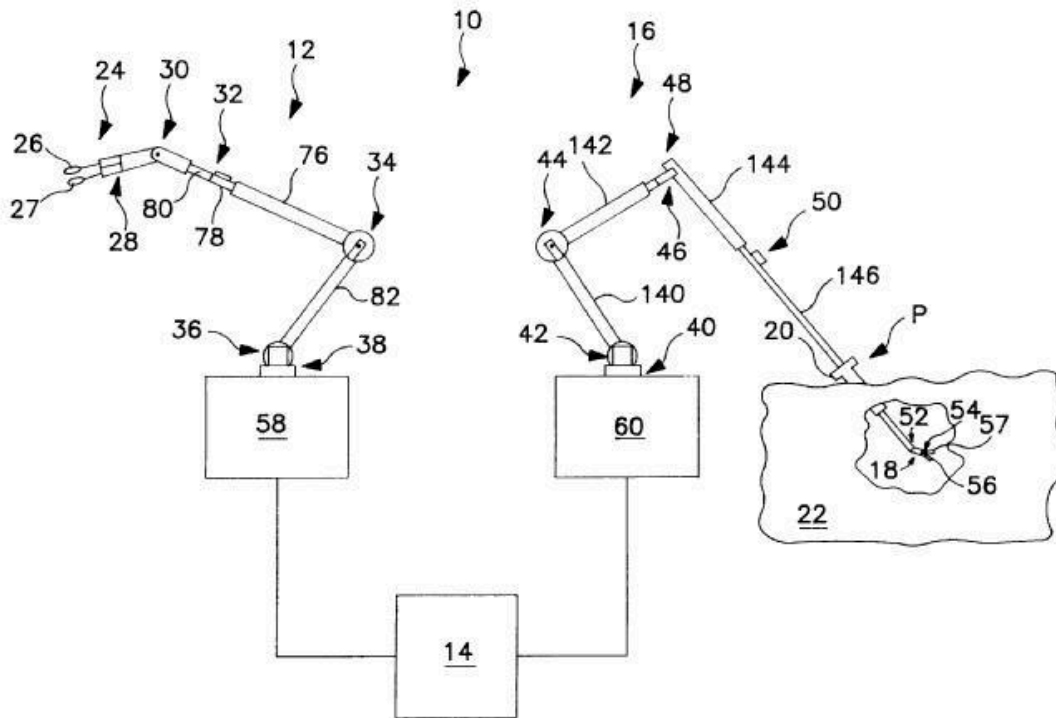
involving servo mechanisms (servo-actuated heads [B25J 15/02](#))

Definition statement

This place covers:

Leader-follower manipulators having an electrical connection between the leader unit and the follower unit (i.e. the movements of the leader 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 leader-follower manipulators	B25J 9/1689
Leader part in the form of hand-grip control means	B25J 13/02

Informative references

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

Manipulators specially adapted for use in surgery	A61B 34/70
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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	B62D 57/032
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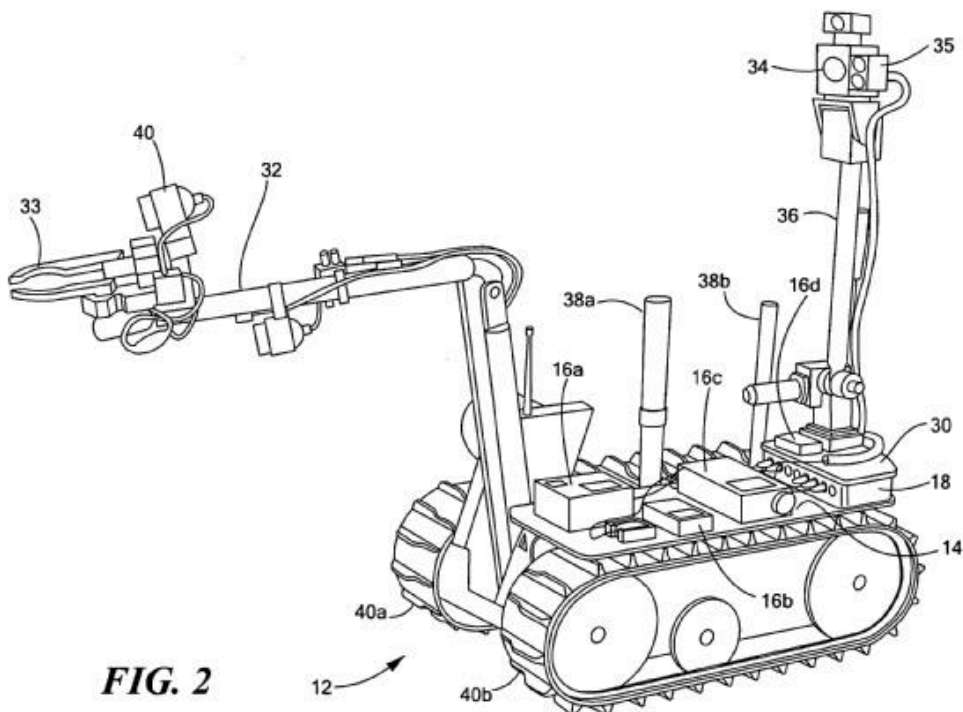
B25J 5/005

{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	B62D 55/00
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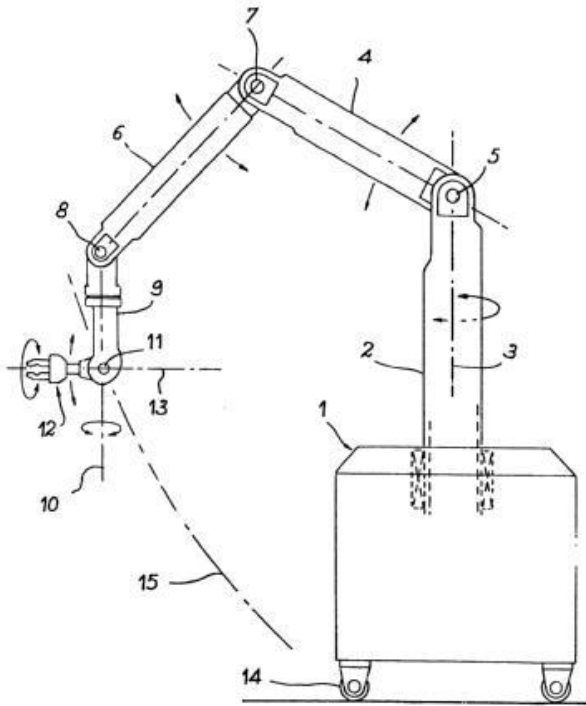
Synonyms and Keywords

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	A47L
Control of position or course in two dimensions	G05D 1/43

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

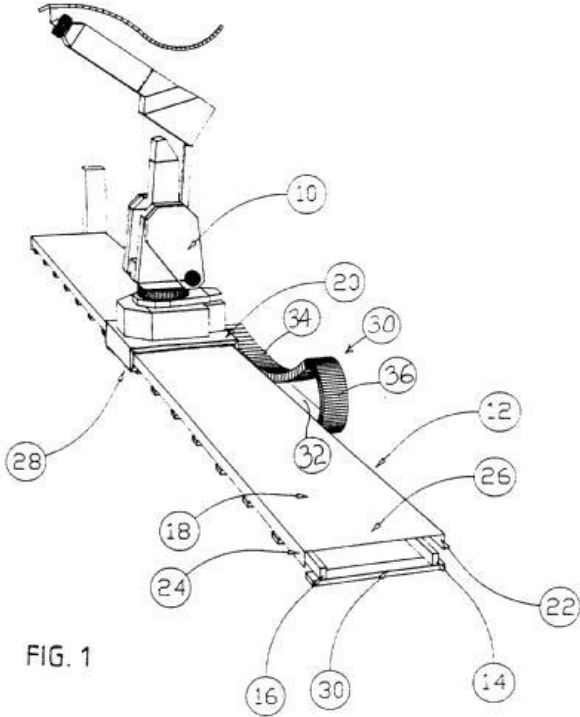
B25J 5/02

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	B25J 9/023
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B25J 5/04

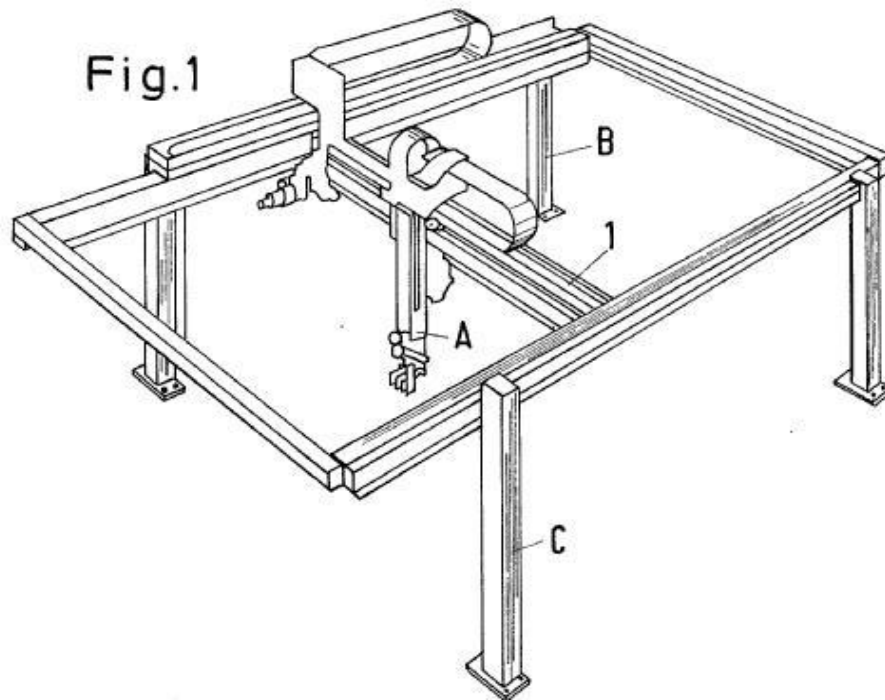
wherein the guideway is also moved, e.g. travelling crane bridge type

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	B25J 9/026
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B25J 5/06

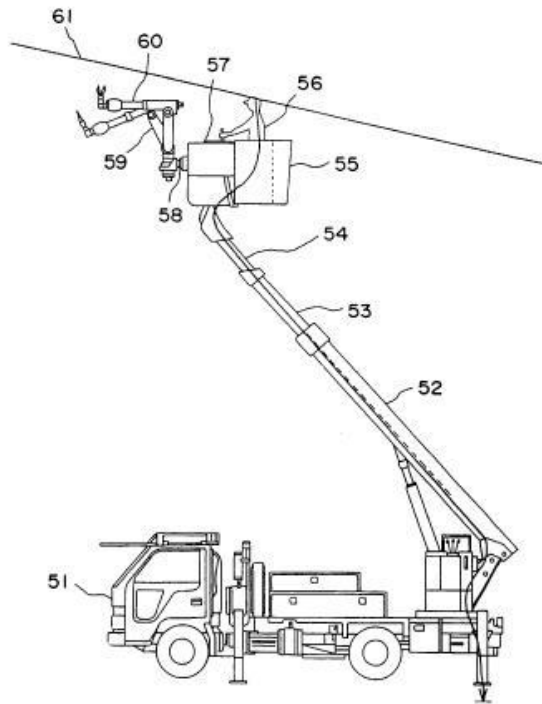
Manipulators combined with a control cab for the operator

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

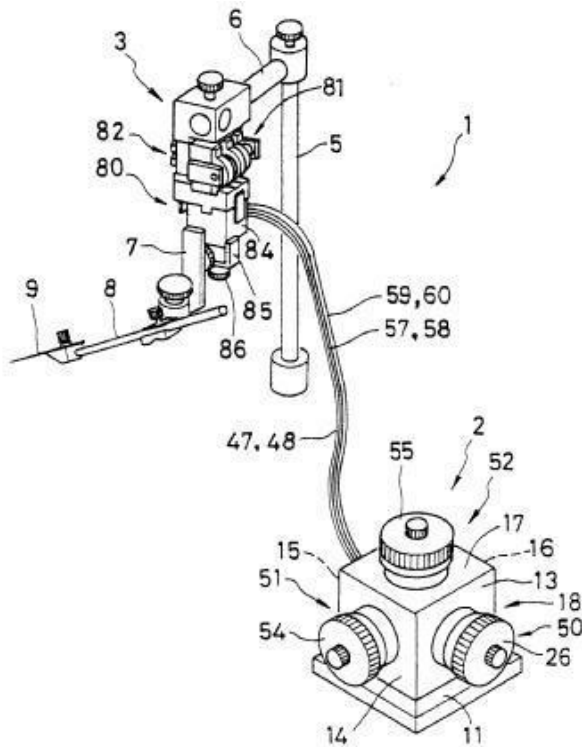
Micromanipulators {(specimen supports for investigating or analysing materials [G01N 23/2204](#); associated with microscopes [G02B 21/32](#); means for supporting or positioning the objects or the material in discharge tubes [H01J 37/20](#))}

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	B81B
Nanostructures	B82B
Piezoelectric devices	H10N 30/00

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

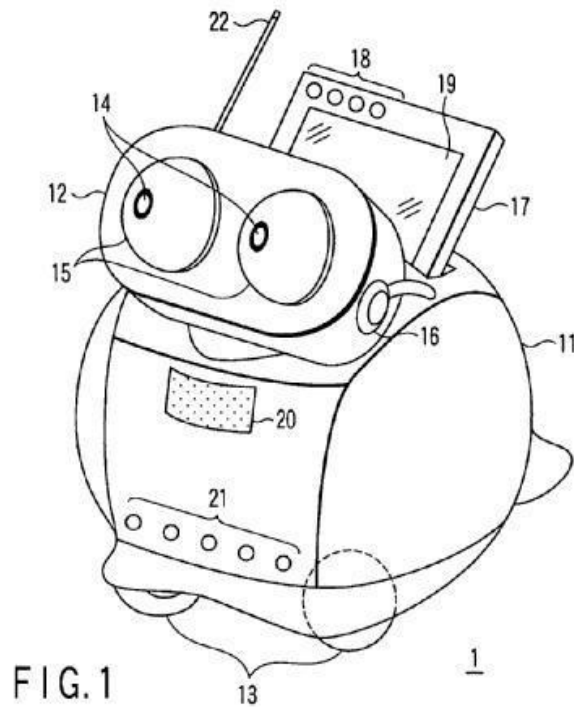
{Home robots, i.e. small robots for domestic use}

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	A47L
Control of position or course in two dimensions	G05D 1/43

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

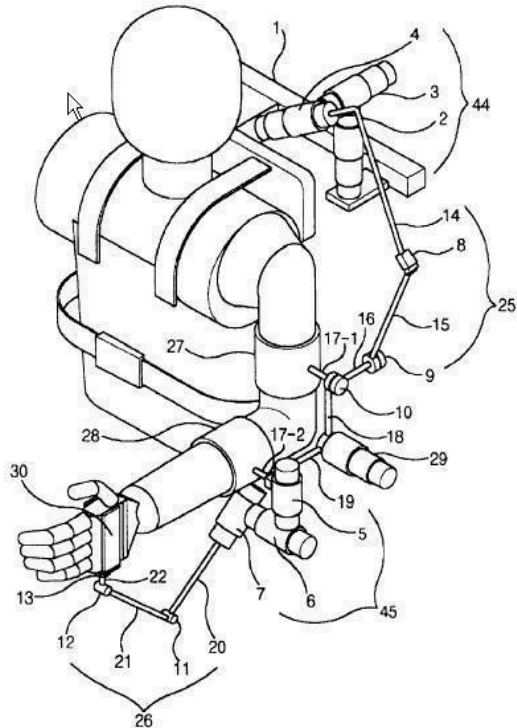
{Exoskeletons, i.e. resembling a human figure}

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	A61F 5/0102
Apparatus for passive stretching or bending of the lower limbs	A61H 1/0237
Apparatus for passive stretching or bending of the upper limbs	A61H 1/0274
Suspension devices for supporting the body of disabled persons in an upright walking or standing position	A61H 3/00
Walking robots	B62D 57/032
Input/output arrangements in interaction with the human body for transferring data to be processed	G06F 3/015

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

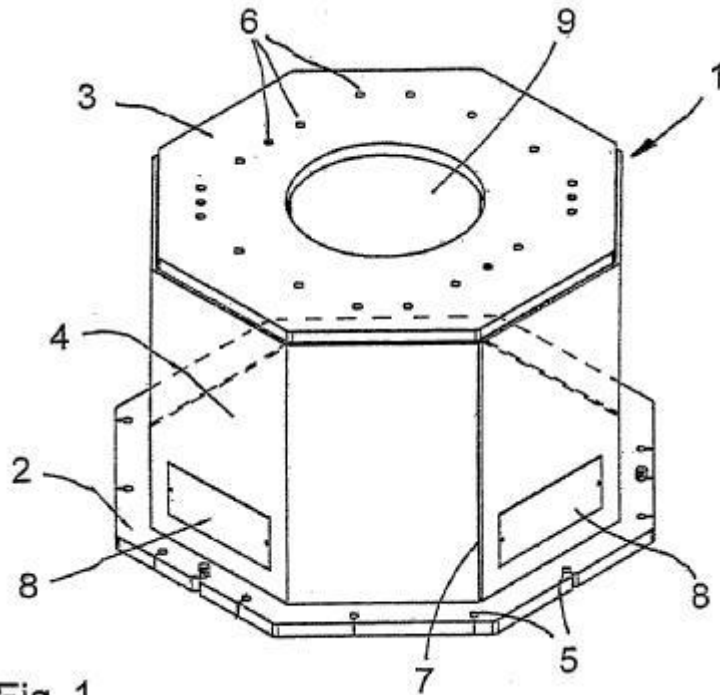


Fig. 1

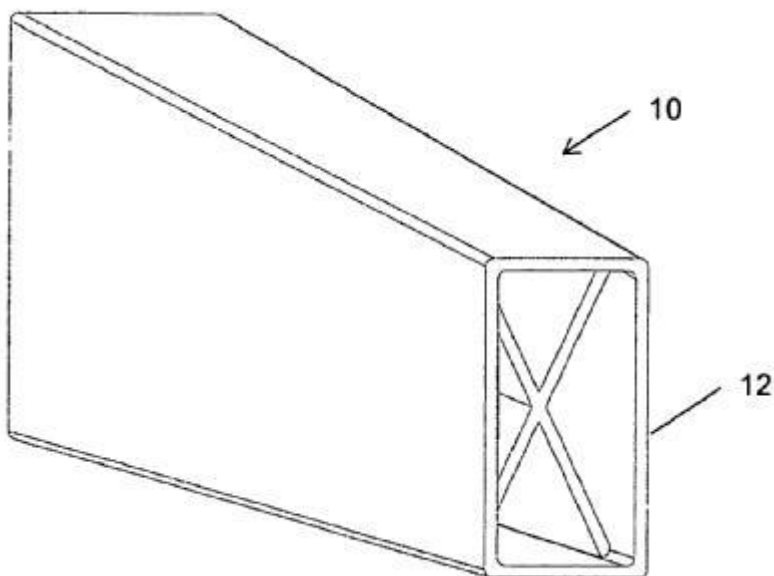
B25J 9/0012

{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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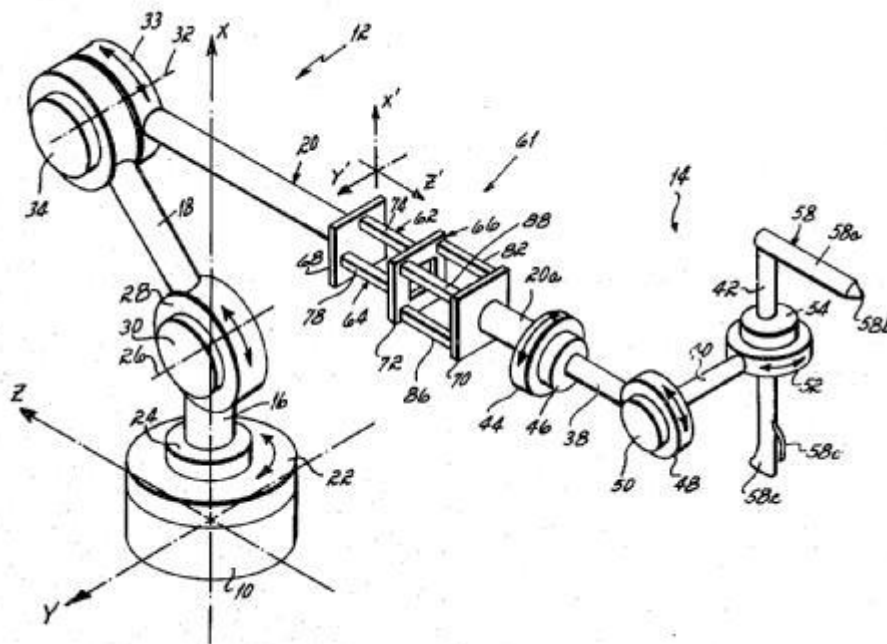
B25J 9/0081

{with leader 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	G05B 19/423
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Glossary of terms

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

Leader 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

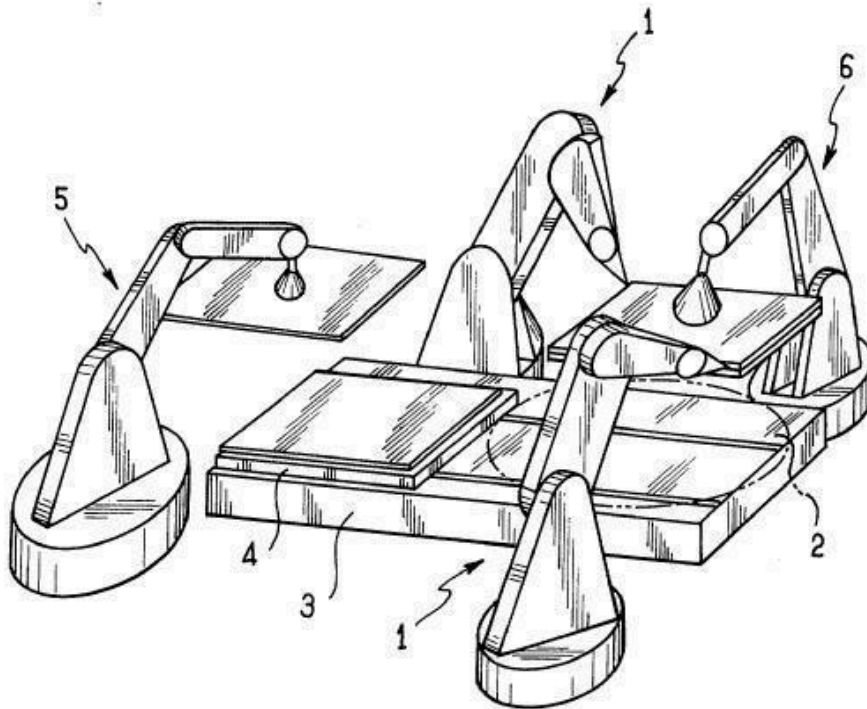
{comprising a plurality of manipulators}

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

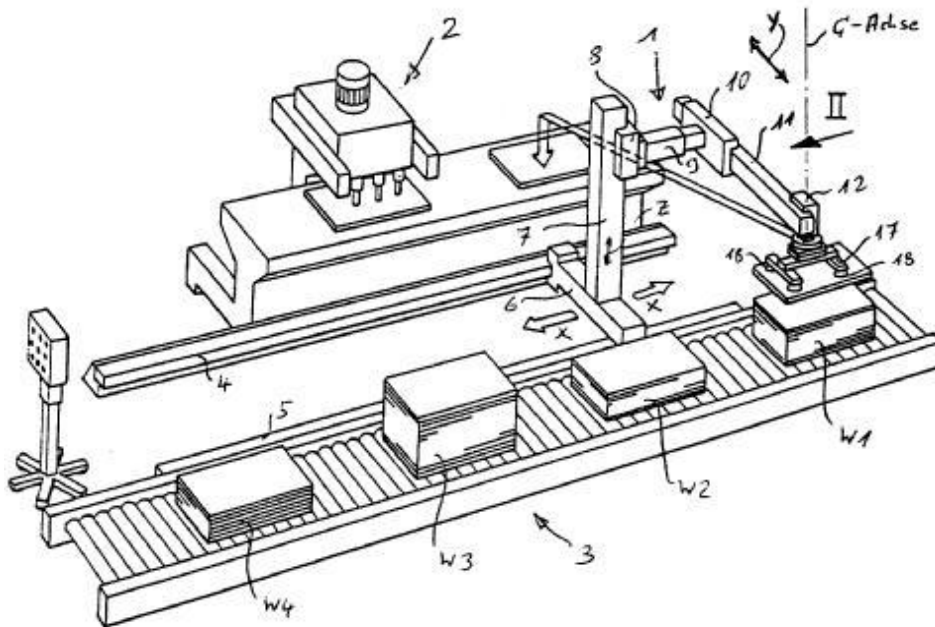
Limiting references

This place does not cover:

Humanoid robots having two arms (mostly in)	B62D 57/032
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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	G05B 19/4182
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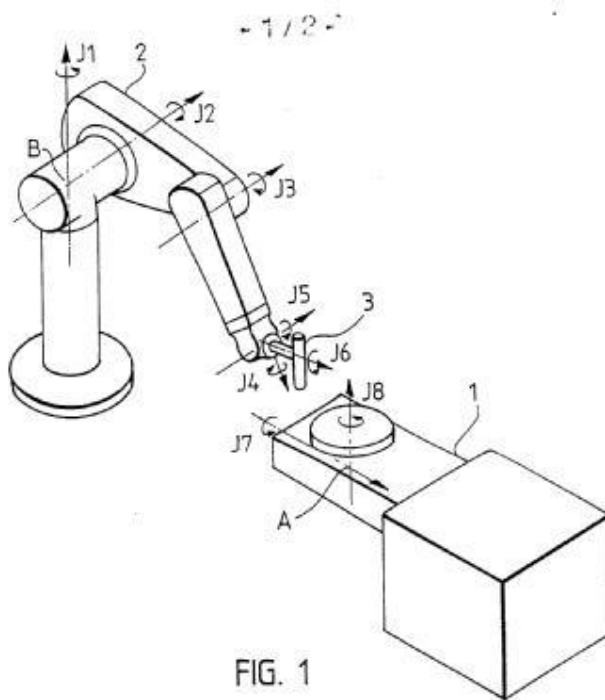
B25J 9/0096

{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

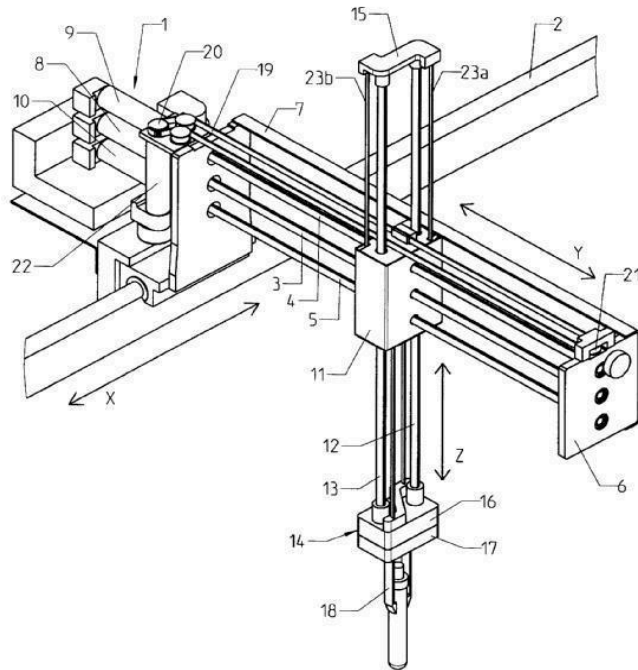
{Cartesian coordinate type}

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	B23Q 1/621
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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:

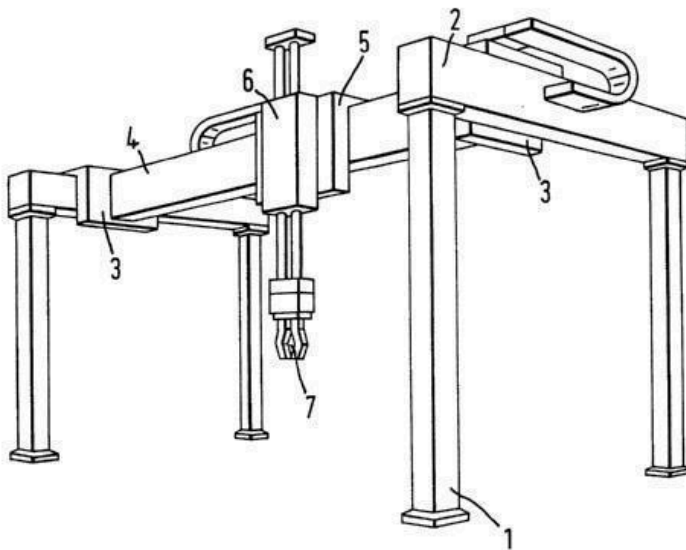


FIG. 1

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)	B25J 5/04
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Informative references

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

Portals	B23Q 1/012
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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

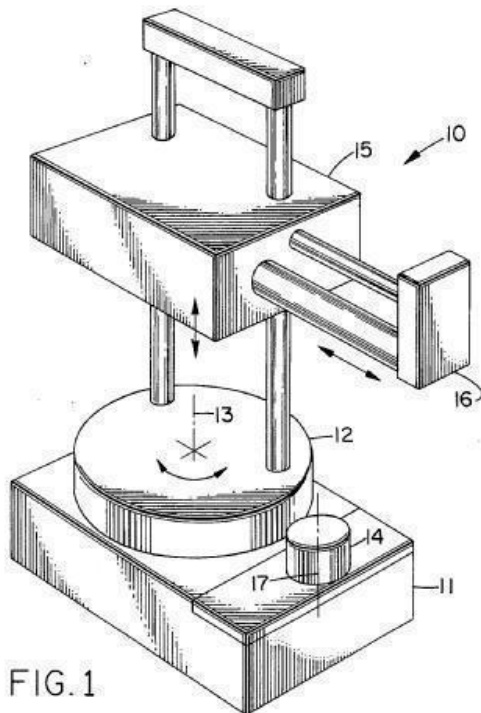
This place covers:

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

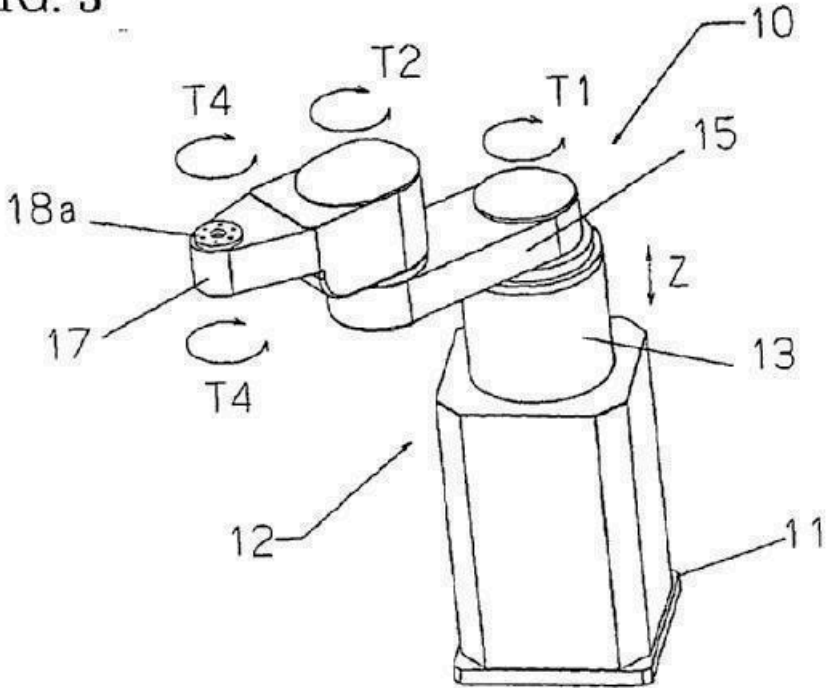
{comprising an articulated arm}

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	H01L 21/67742
Apparatus specially adapted for handling semiconductor, the wafer being placed on a robot blade, or gripped for conveyance	H01L 21/68707

Synonyms and Keywords

In patent documents the following abbreviations are often used:

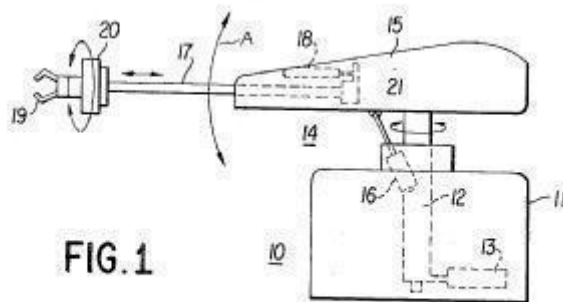
SCARA	Selective Compliance Assembly Robot Arm
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In patent documents the following expression/word "horizontal articulated manipulator" is often used.

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**

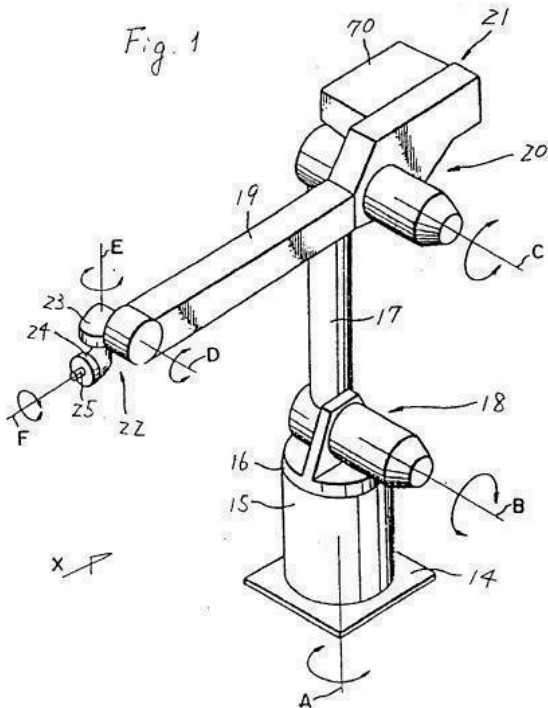
In patent documents the following expression/word "spherical" is often used.

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.
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Synonyms and Keywords

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

- "articulated type", and "jointed type"

B25J 9/047

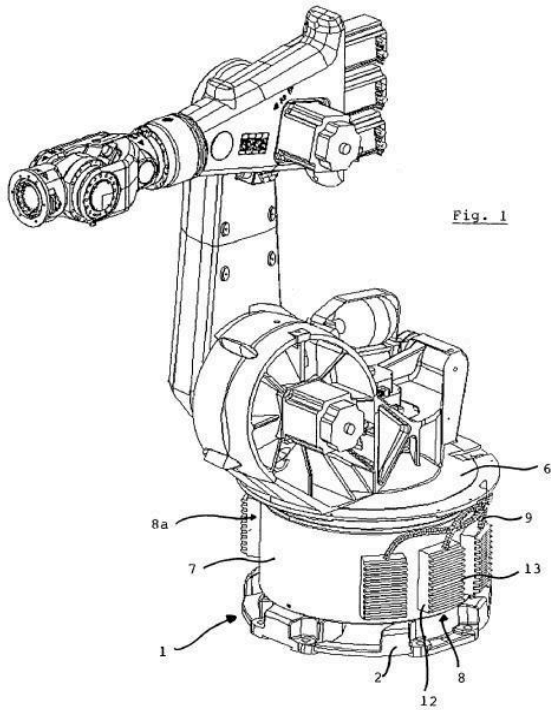
{the pivoting axis of the first arm being offset to the vertical axis}

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

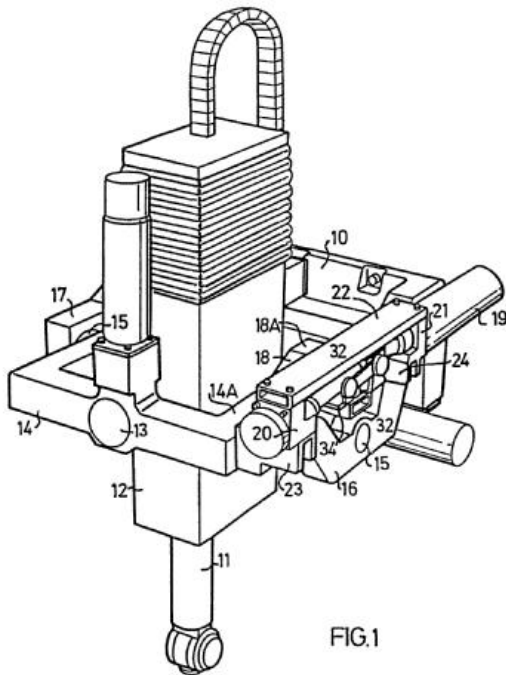


FIG.1

B25J 9/06

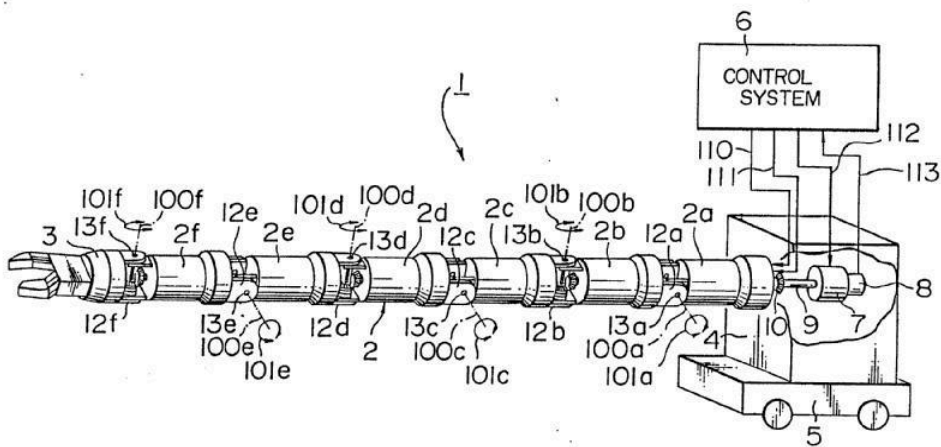
characterised by multi-articulated arms

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

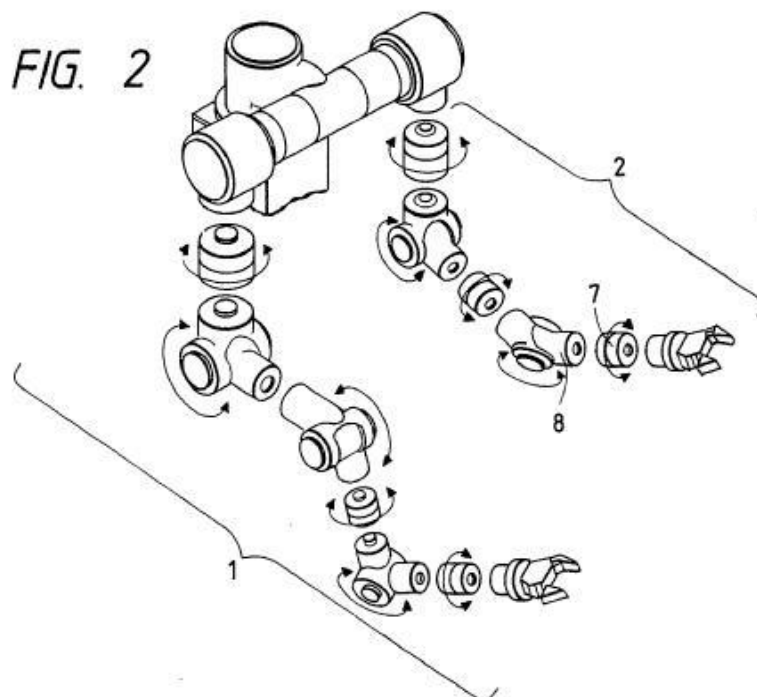
characterised by modular constructions

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.

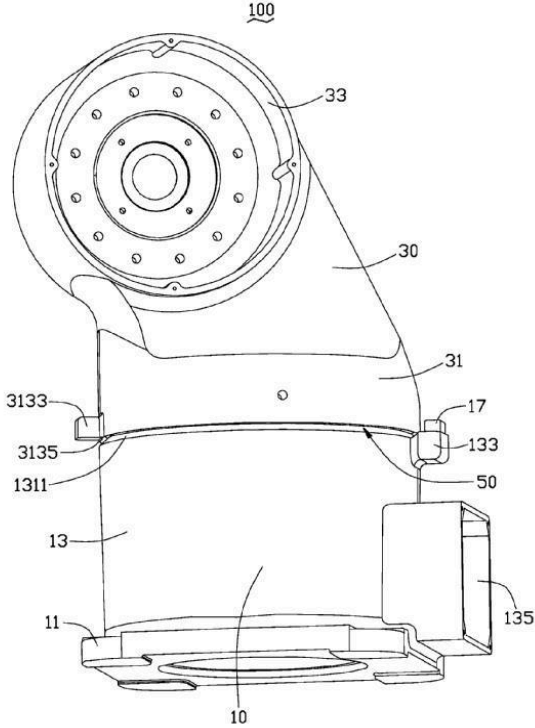
B25J 9/101

{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	G05G 5/04
---	---------------------------

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

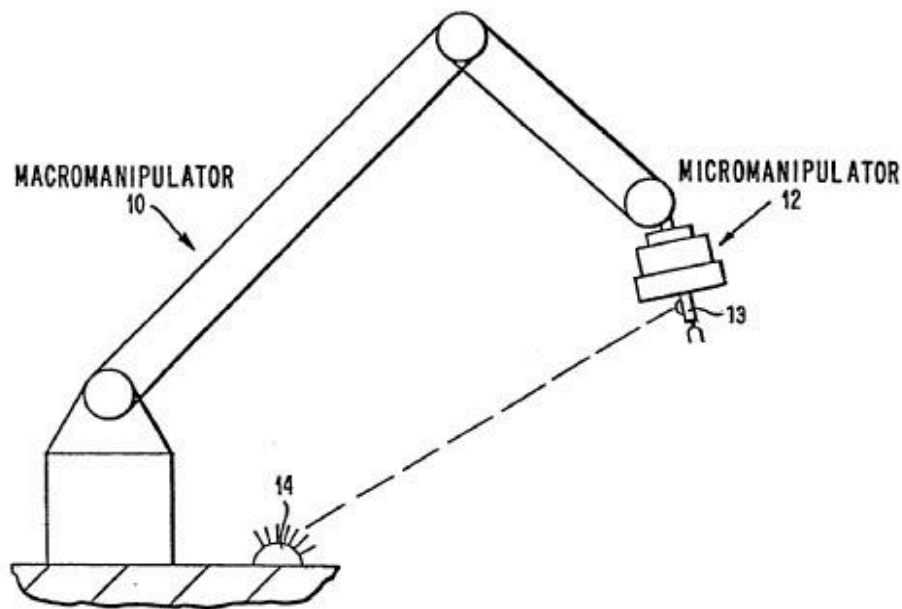


FIG. 1

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.

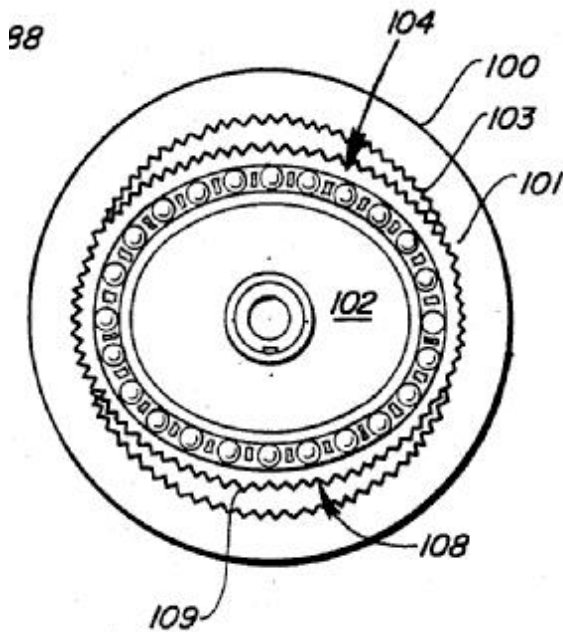
B25J 9/1025

{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

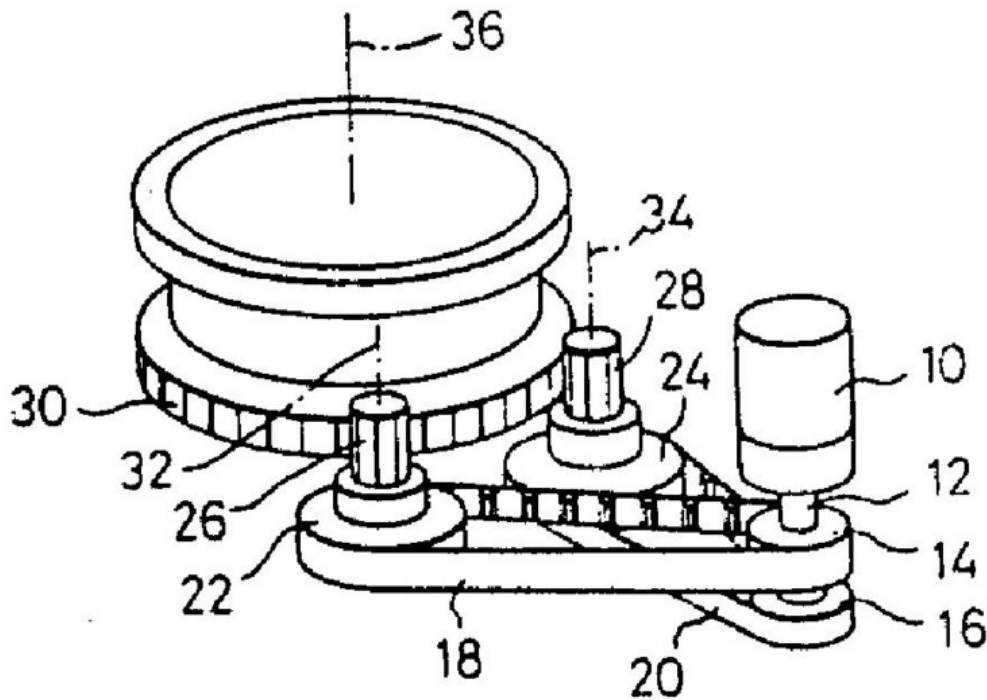
Harmonic drives consist of three basic parts:

- 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	F16H 55/18
Arrangements for adjusting or for taking-up backlash not provided for elsewhere	F16H 57/12

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:

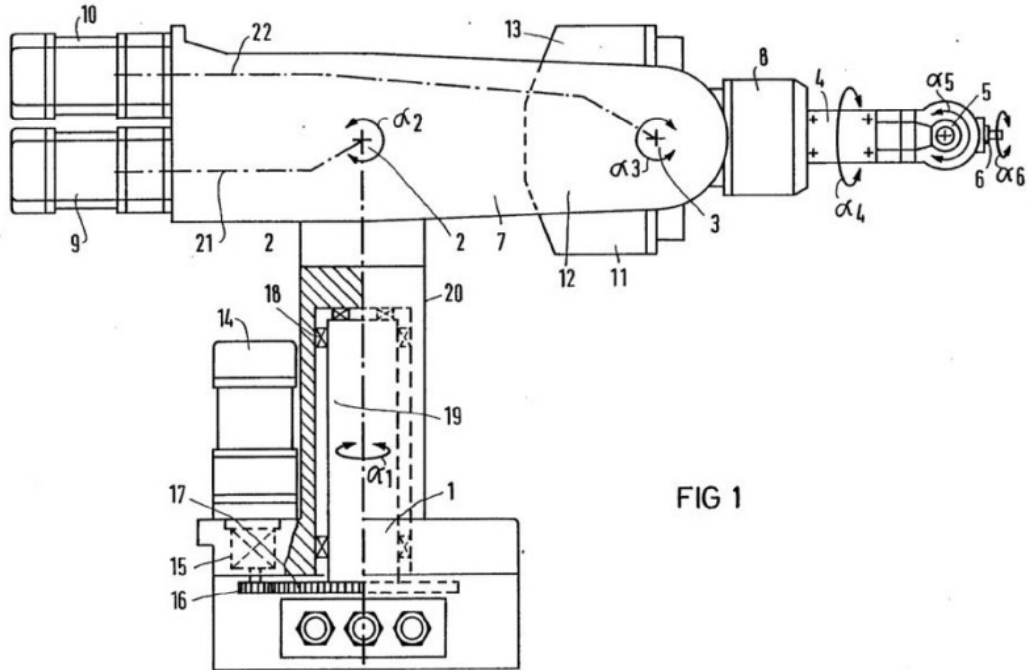


FIG 1

References

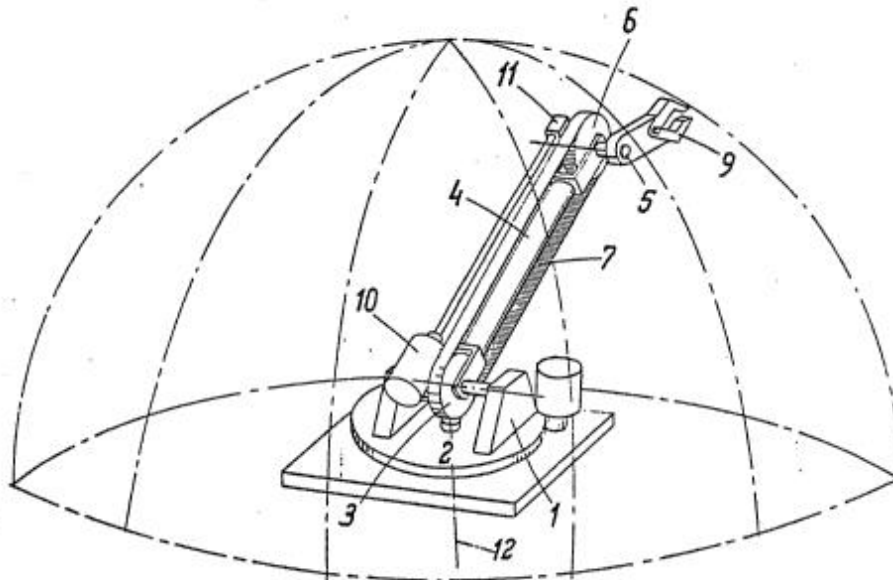
Informative references

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	F16H 19/005 , F16H 19/006
Racks	F16H 55/26

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

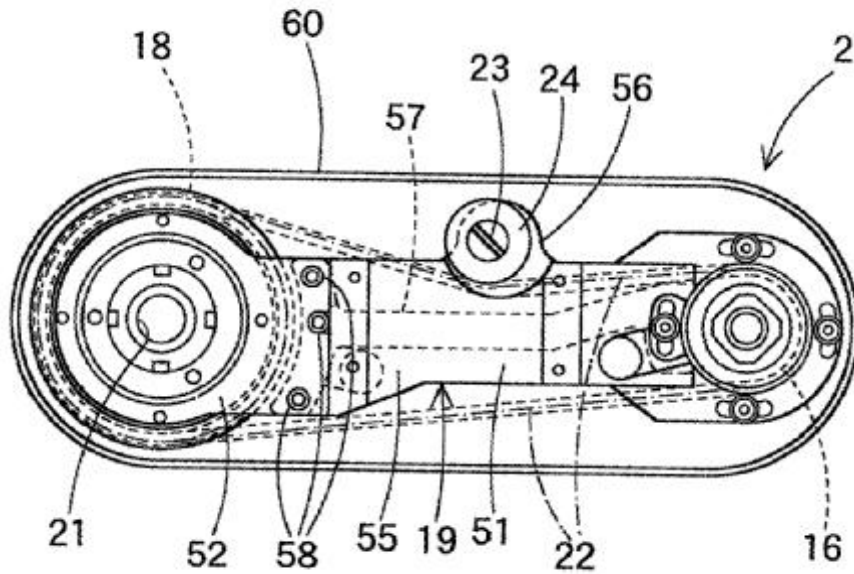
Illustrative example of subject matter classified in this group:

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

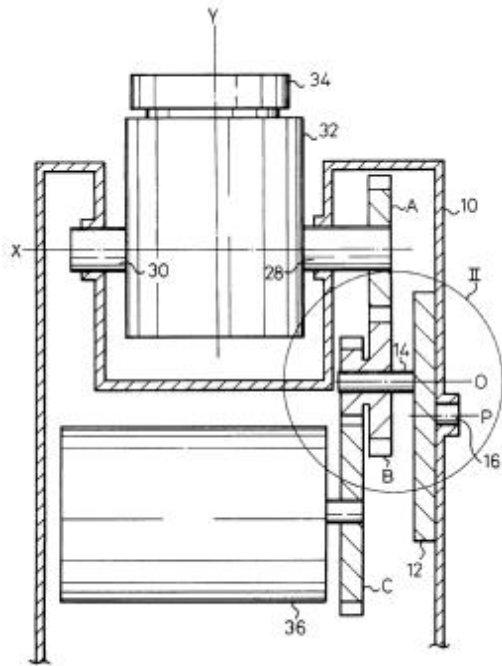
Gearings for conveying rotary motion by endless flexible members	F16H 7/00
--	---------------------------

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}

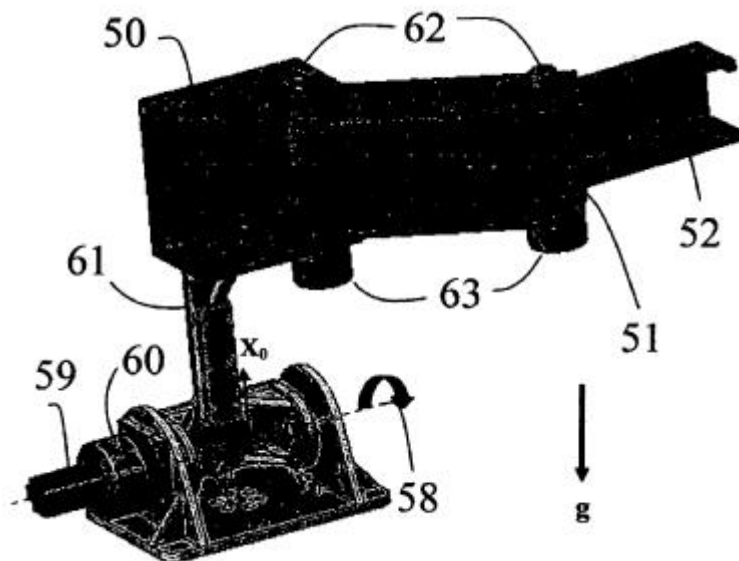
Definition statement

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

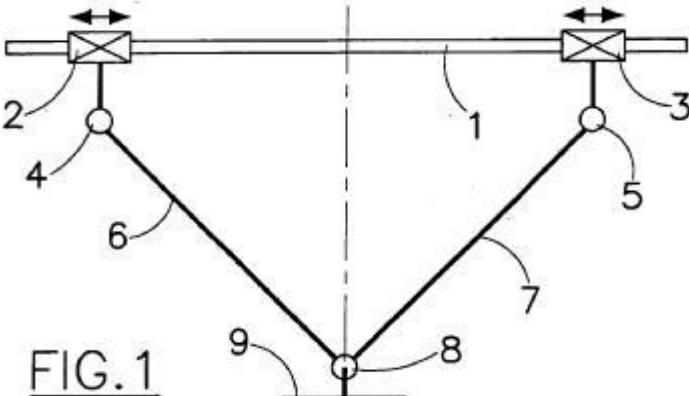
{with articulated links}

Definition statement

This place covers:

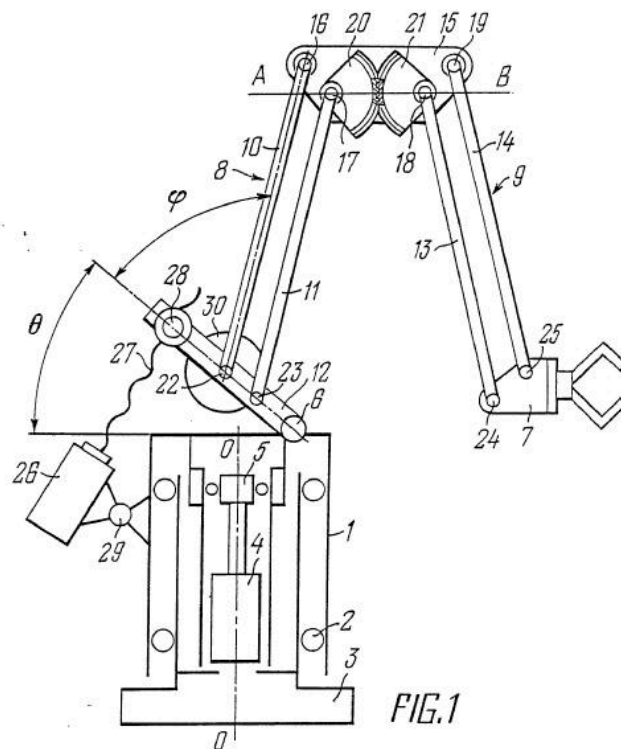
Manipulators having rods or bar for transmitting the motion from an actuator to the working head.

WO 02085580



B25J 9/1065**{with parallelograms}****Definition statement***This place covers:*

Illustrative example of subject matter classified in this group:

**Special rules of classification**

A single parallelogram is sufficient for classification in this group.

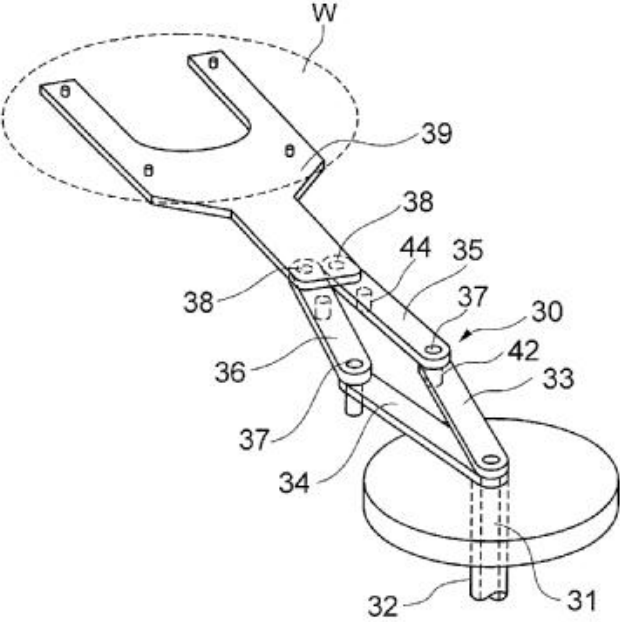
B25J 9/107

{of the froglegs type}

Definition statement

This place covers:

Illustrative example of subject matter classified in this group:



References

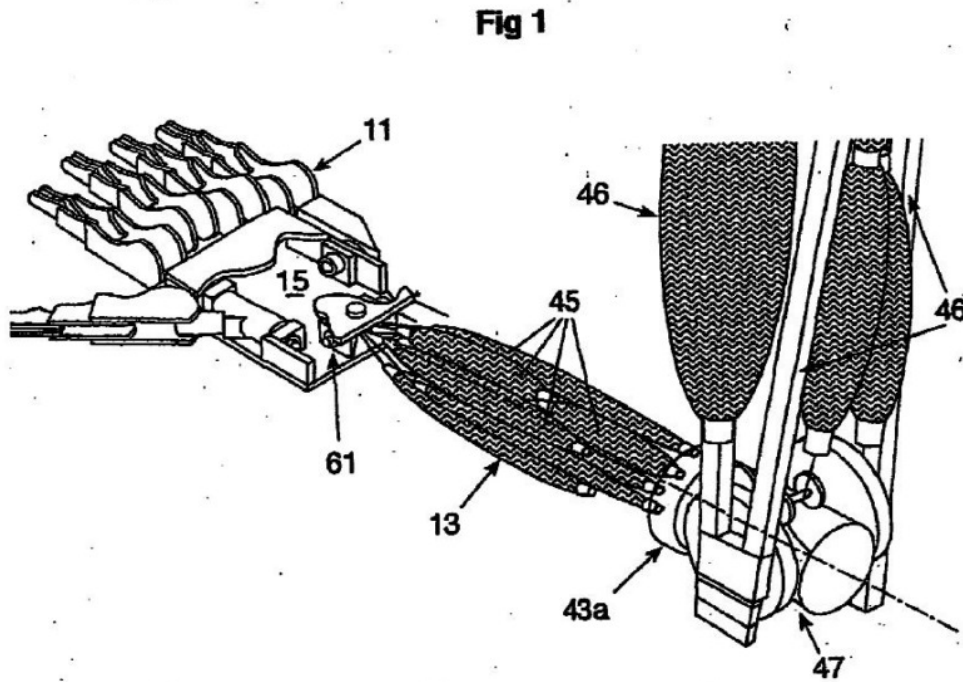
Informative references

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	H01L 21/67739
Apparatus specially adapted for handling semiconductor, the wafers being placed on a robot blade, or gripped by a gripper for conveyance	H01L 21/68707

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	F15B 15/103
--	-----------------------------

Special rules of classificationFluid 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

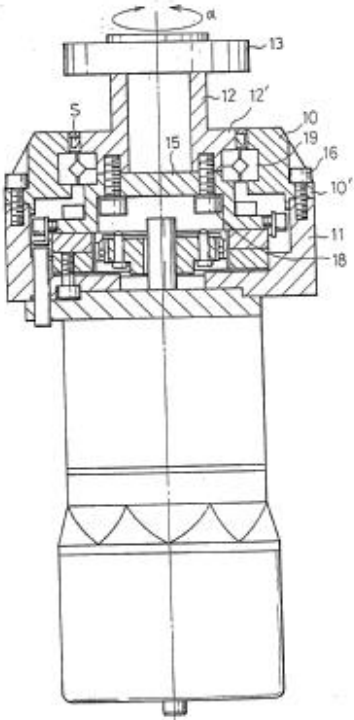
{Bearings specially adapted therefor (bearings in general [F16C](#))}

Definition statement

This place covers:

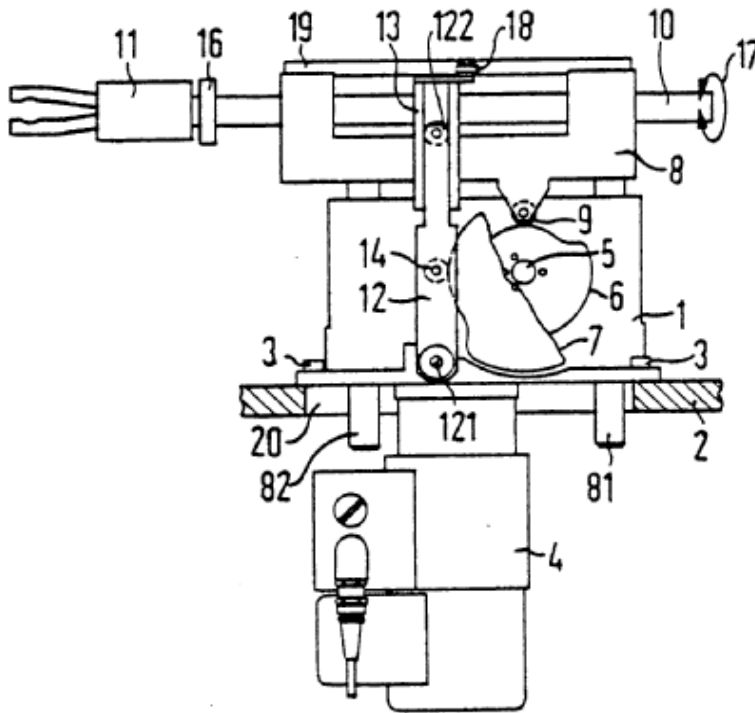
Illustrative example of subject matter classified in [B25J 9/108](#)

EP 0300050



B25J 9/109**{comprising mechanical programming means, e.g. cams}****Definition statement***This place covers:*

Illustrative example of subject matter classified in this group:

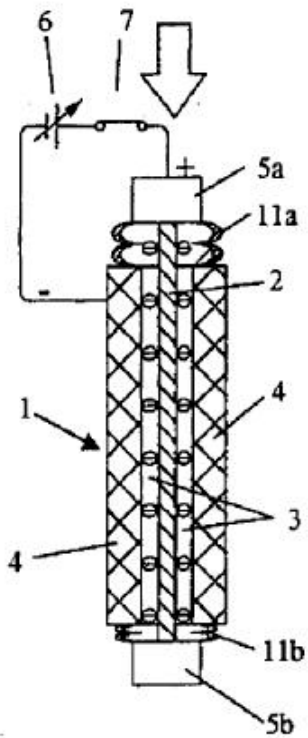
**Glossary of terms***In this place, the following terms or expressions are used with the meaning indicated:*

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	F03G 7/012
----------------------------	----------------------------

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.

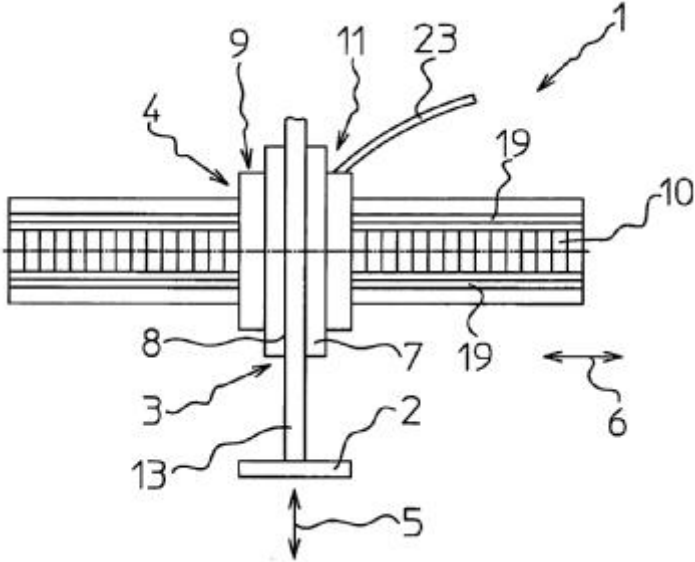
B25J 9/123

{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:

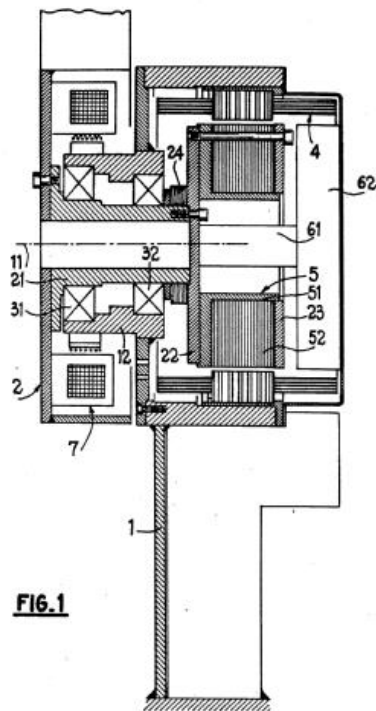
Linear motors	H02K 41/02
---------------	----------------------------

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:*

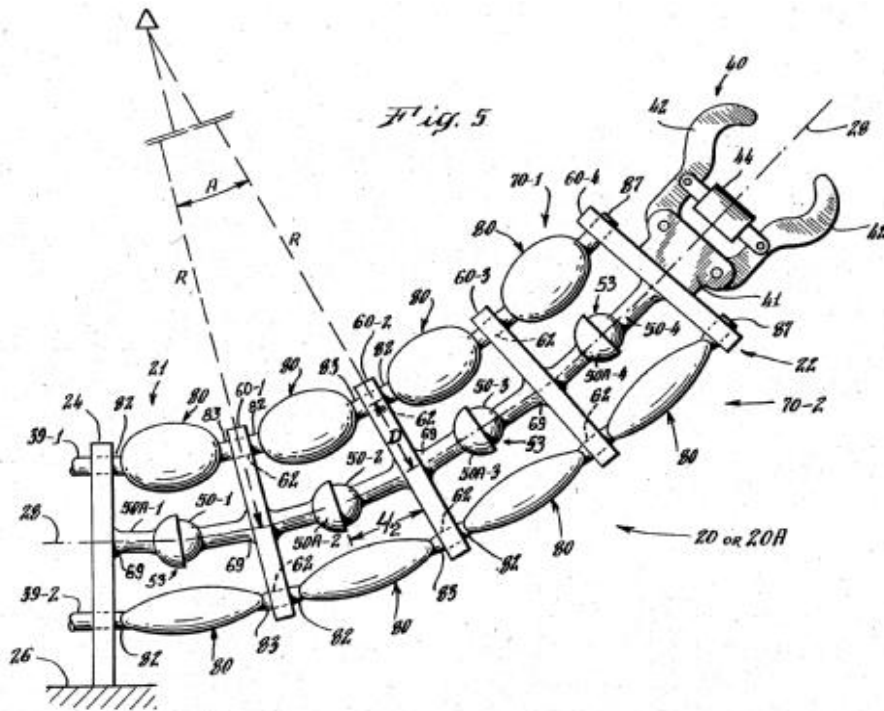
Illustrative example of subject matter classified in this group:

**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	F15B 15/103
---	-----------------------------

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

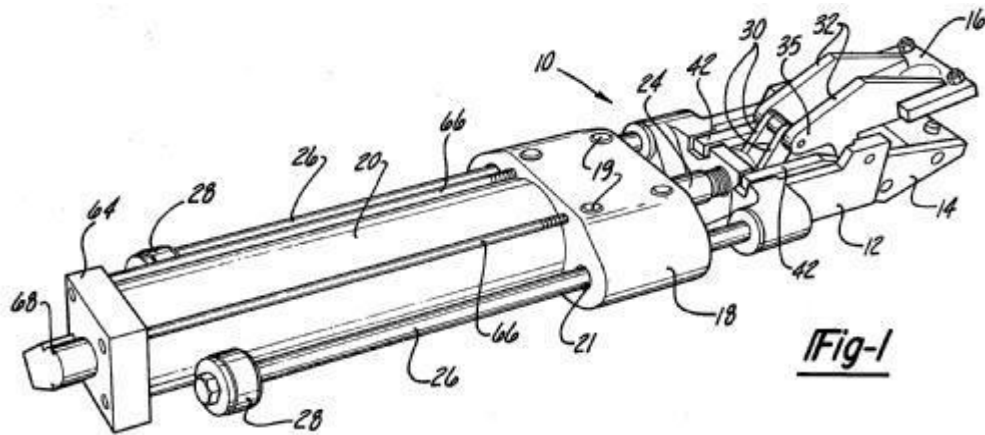
{Linear actuators}

Definition statement

This place covers:

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

US 4473249



B25J 9/146

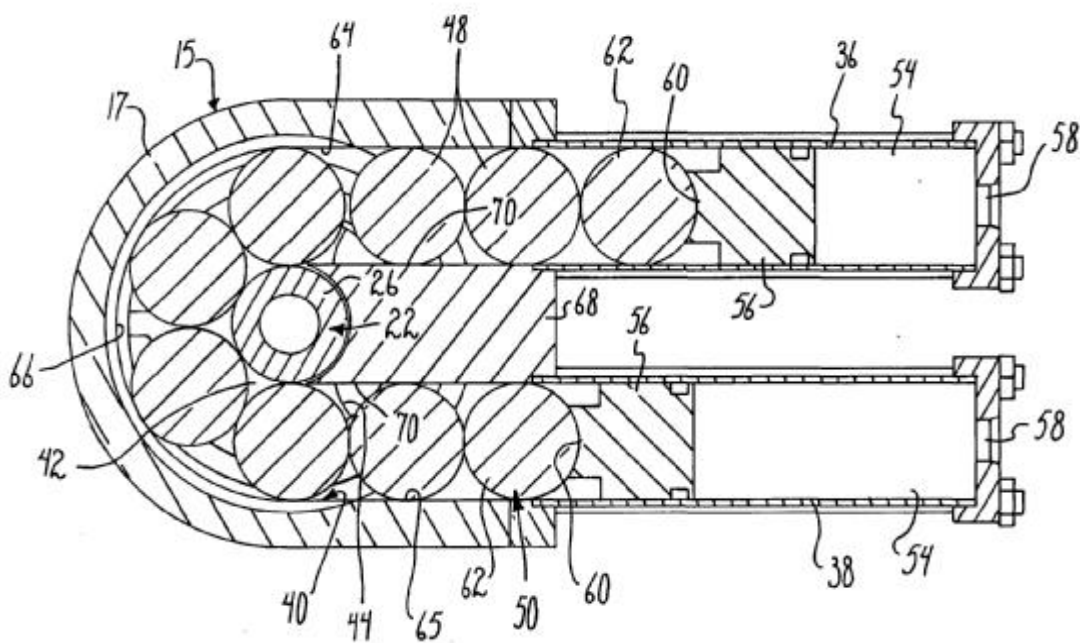
{Rotary actuators}

Definition statement

This place covers:

Illustrative example of subject matter classified in [B25J 9/146](#)

US 2011094325



B25J 9/148

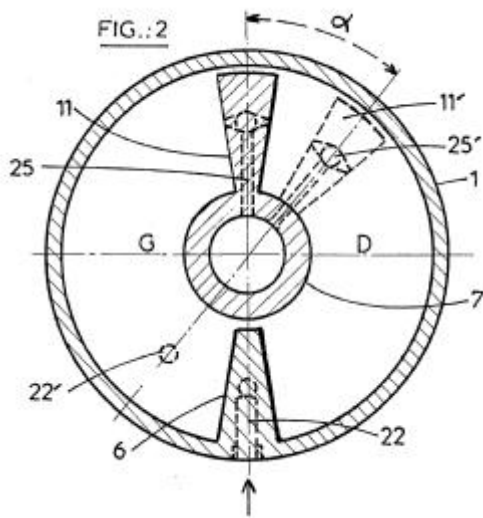
{of the oscillating vane-type (in general [F15B 15/12](#))}

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

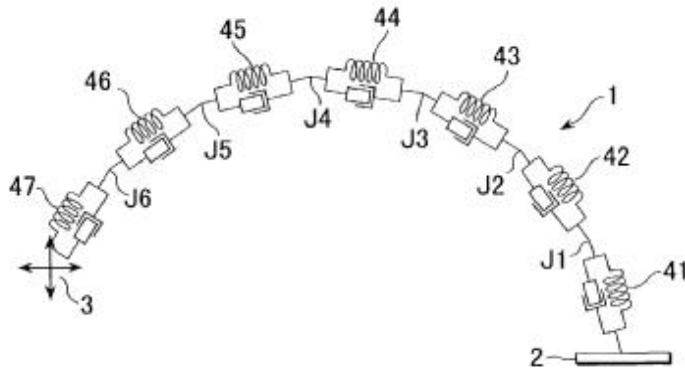
{Simulation of manipulator lay-out, design, modelling of manipulator}

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

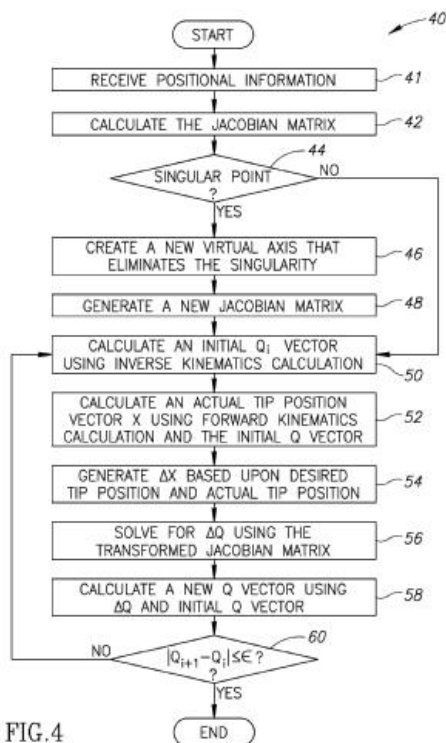
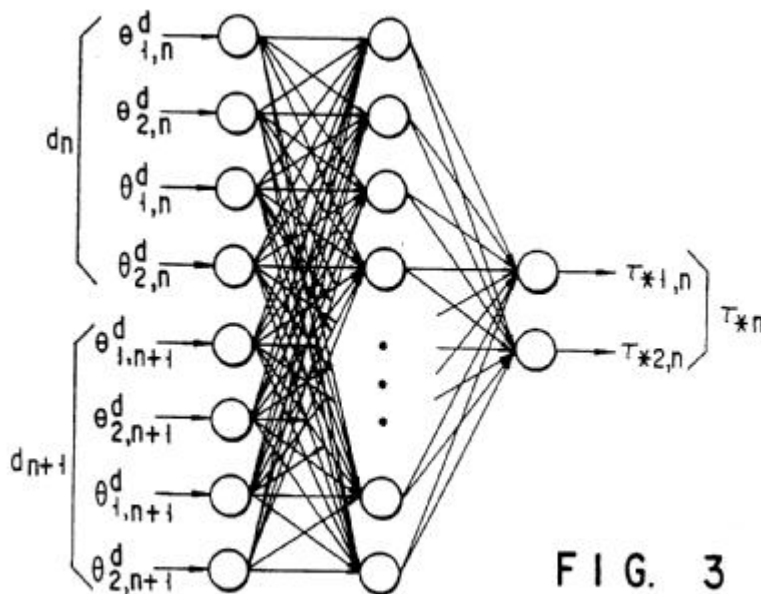


FIG. 4

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](#)

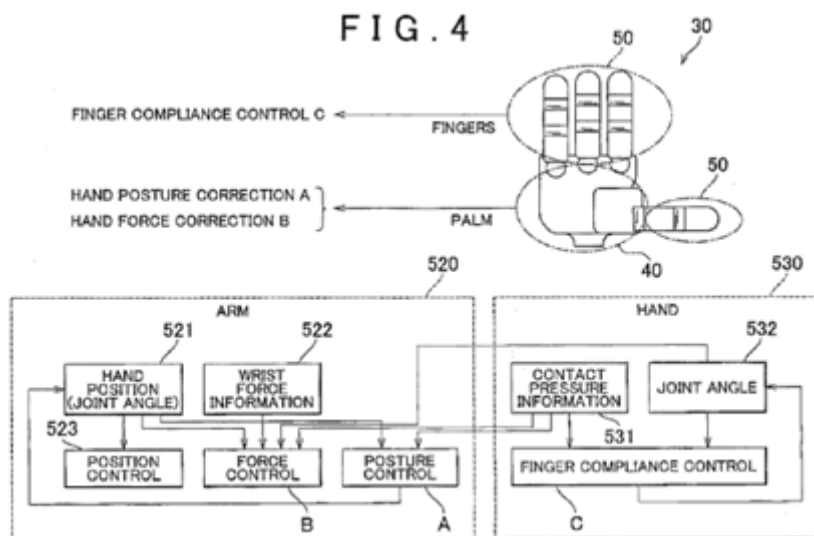
US 5566275

**FIG. 3****References****Informative references***Attention is drawn to the following places, which may be of interest for search:*

Computer systems based on biological models	G06N 3/00
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	G06N 3/008
Using neural network models	G06N 3/02

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

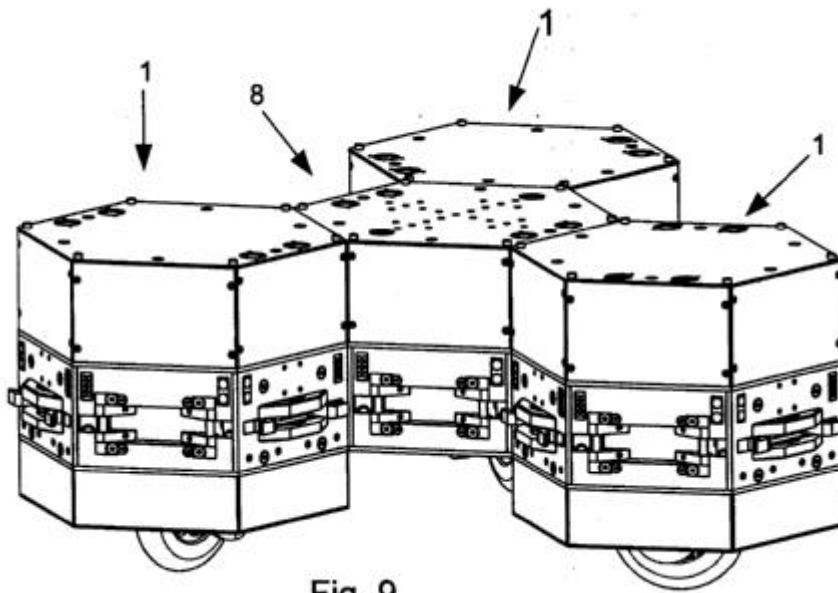


Fig. 9

B25J 9/162

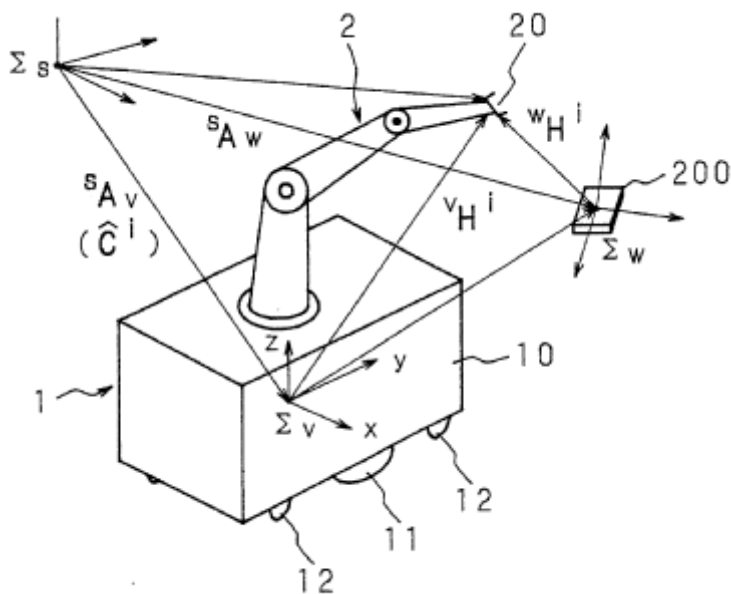
{Mobile manipulator, movable base with manipulator arm mounted on it}

Definition statement

This place covers:

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

US 5542028



B25J 9/1623

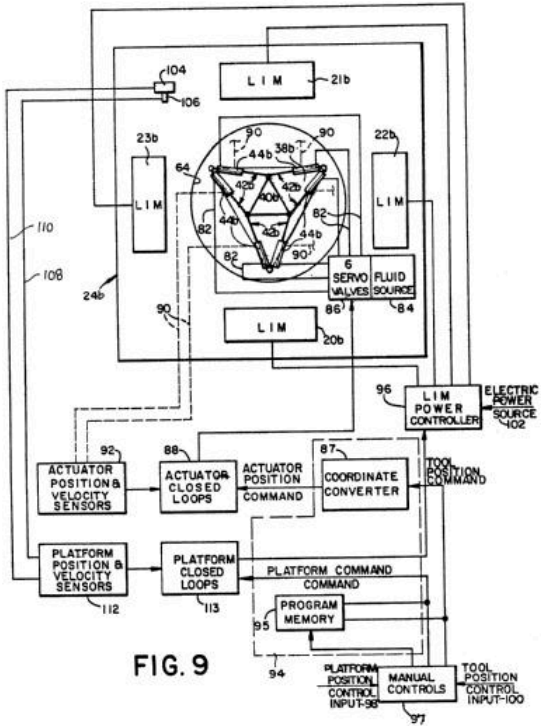
{Parallel manipulator, Stewart platform, links are attached to a common base and to a common platform, plate which is moved parallel to the base}

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

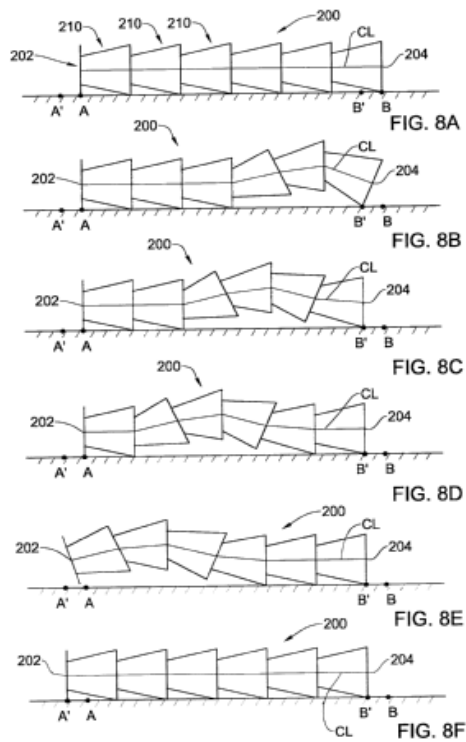
{Truss-manipulator for snake-like motion}

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.

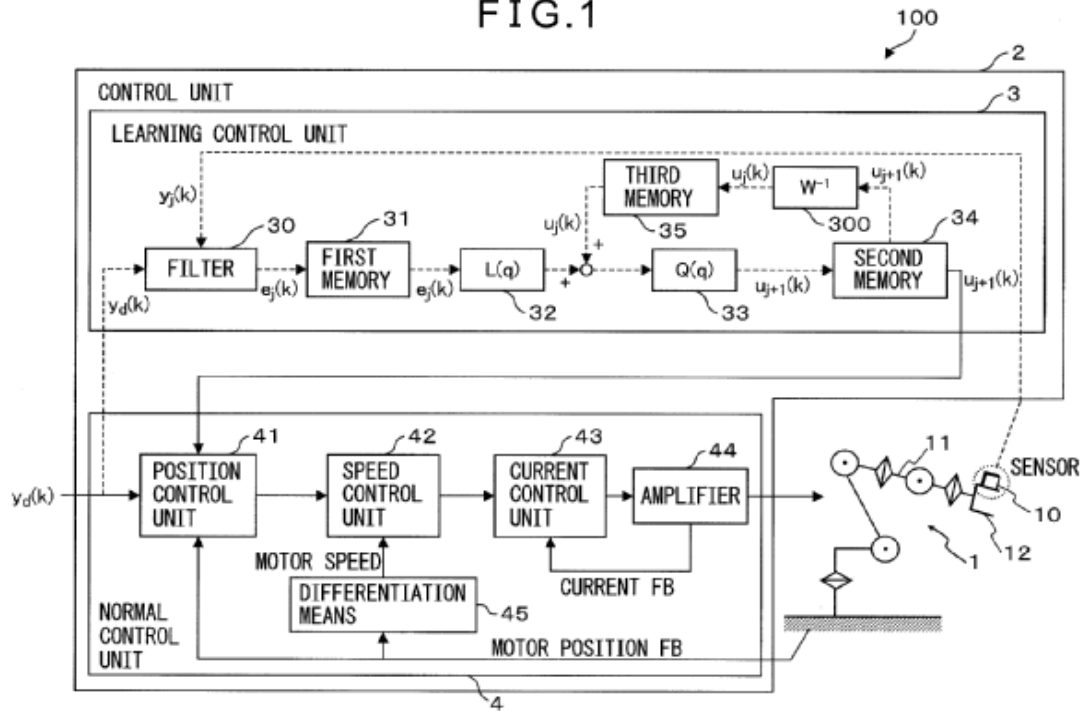
In a rule based expert system, the knowledge base is represented by an IF-THEN structure, that relates given information of fact in the IF part (so called antecedent, premise or condition) to some action in the THEN part (so called conclusion, consequence or action).

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

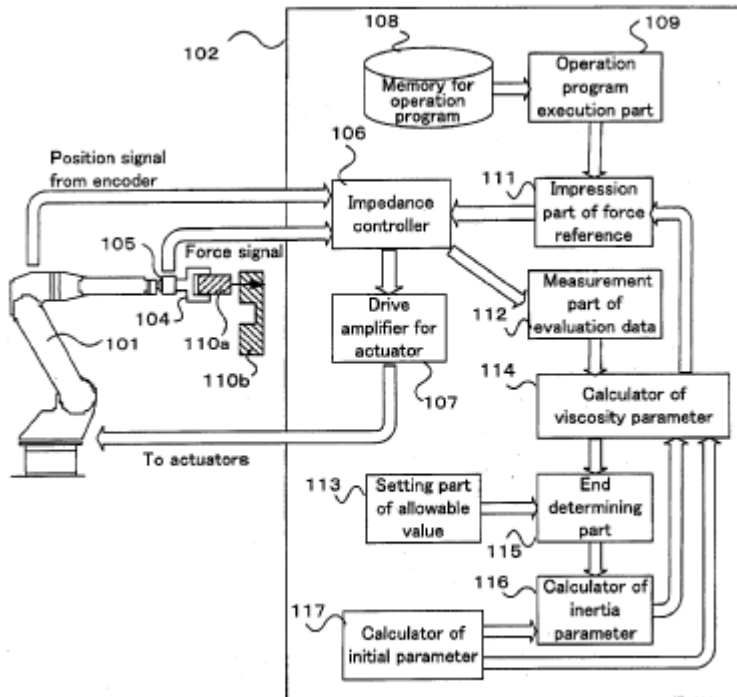
{compliant, force, torque control, e.g. combined with position control}

Definition statement

This place covers:

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

EP 2314426



B25J 9/1635

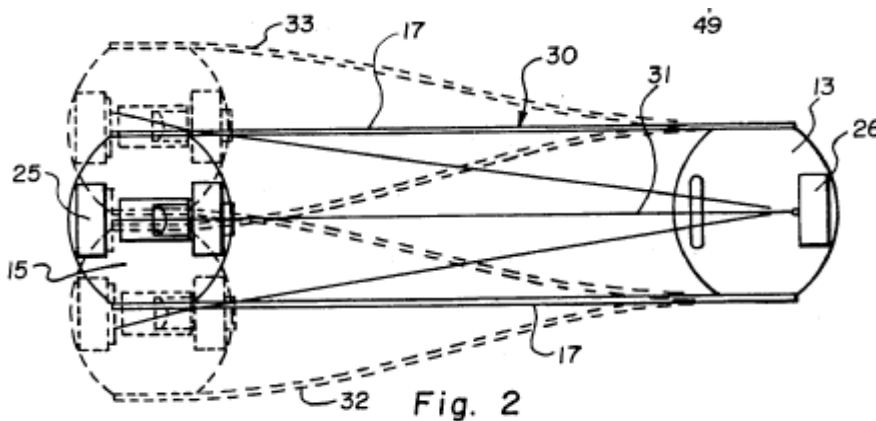
{flexible-arm control}

Definition statement

This place covers:

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

US 5049797



B25J 9/1638

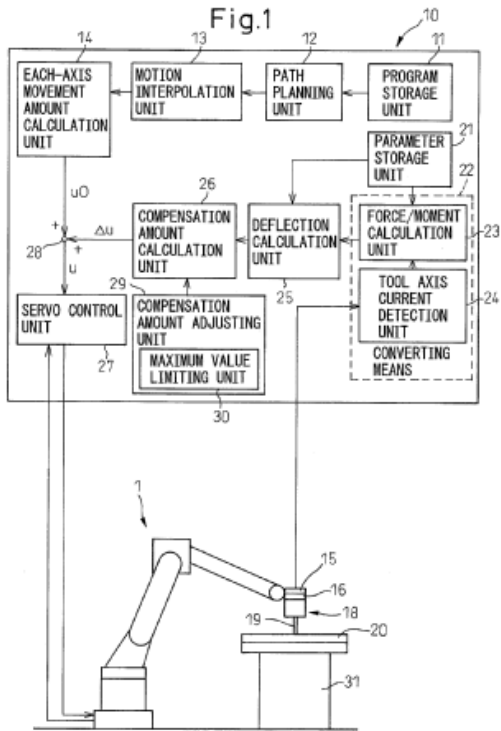
{compensation for arm bending/inertia, pay load weight/inertia}

Definition statement

This place covers:

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

US 2008297092



B25J 9/1641

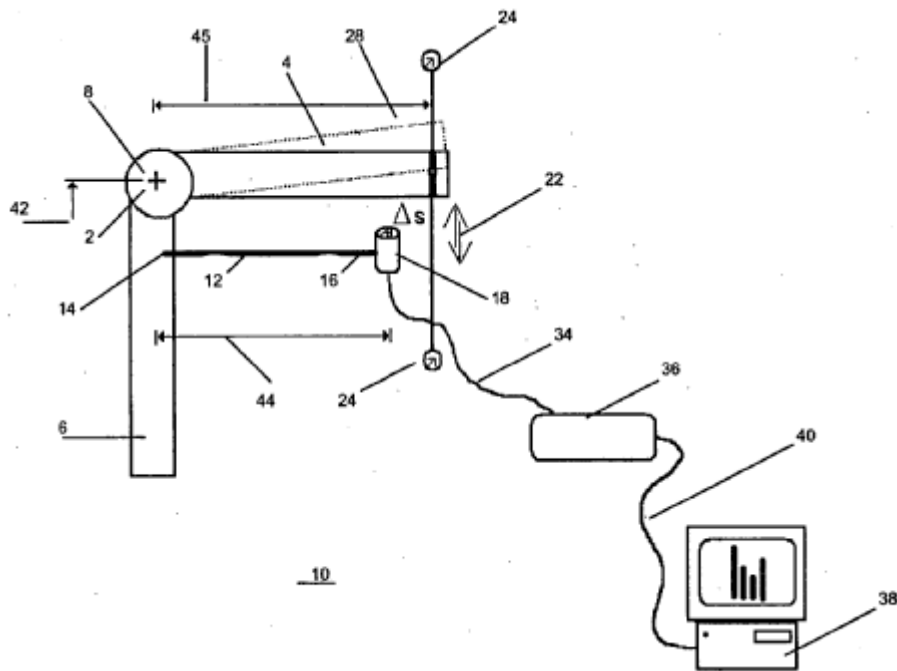
{compensation for backlash, friction, compliance, elasticity in the joints}

Definition statement

This place covers:

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

EP 1607193



B25J 9/1643

{redundant control}

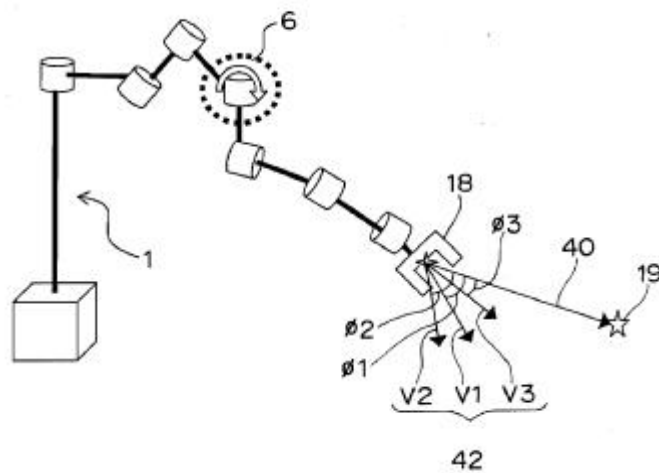
Definition statement

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

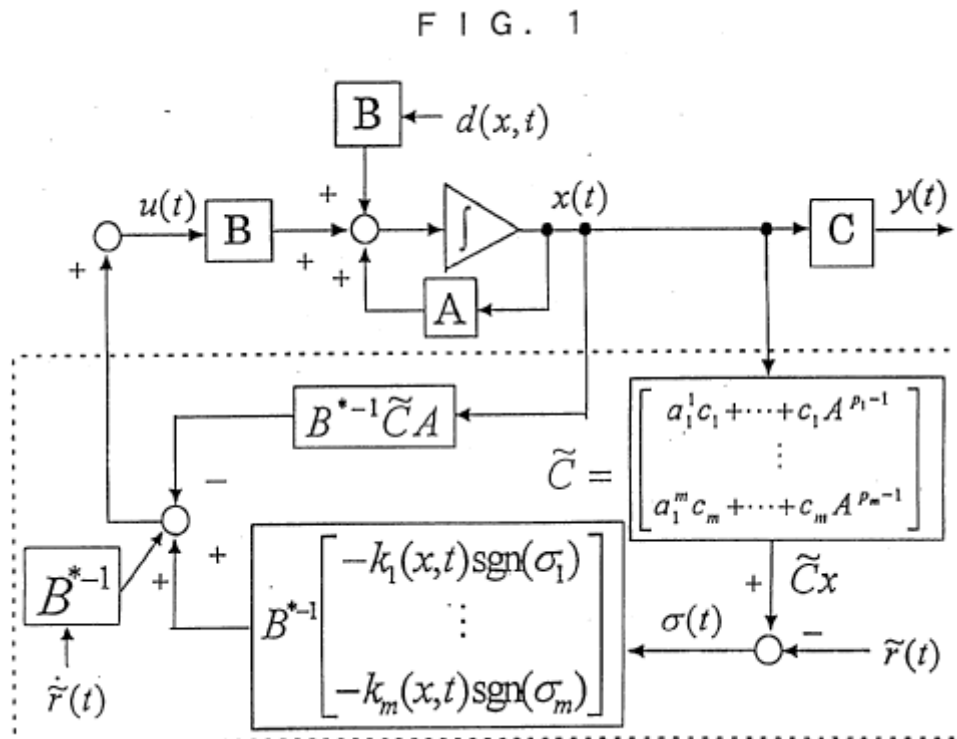
{variable structure system, sliding mode control}

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

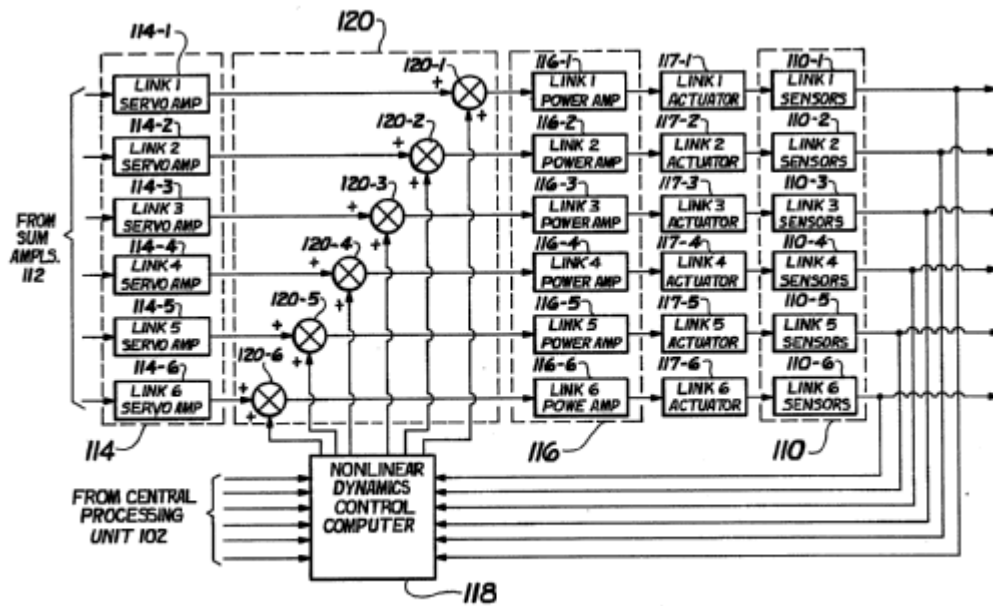


Fig-5

3/6

B25J 9/1651

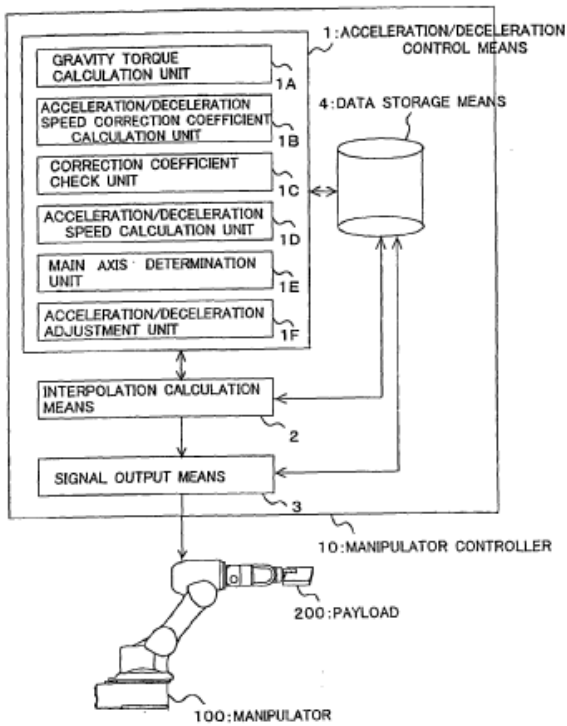
{acceleration, rate control}

Definition statement

This place covers:

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

EP 1702726



B25J 9/1653

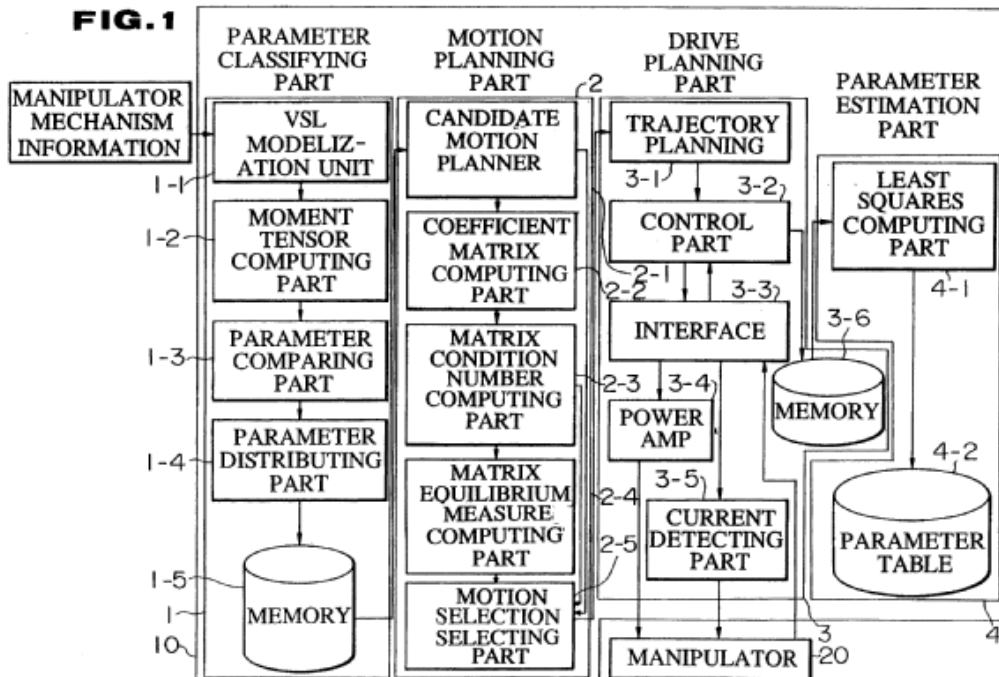
{parameters identification, estimation, stiffness, accuracy, error analysis}

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

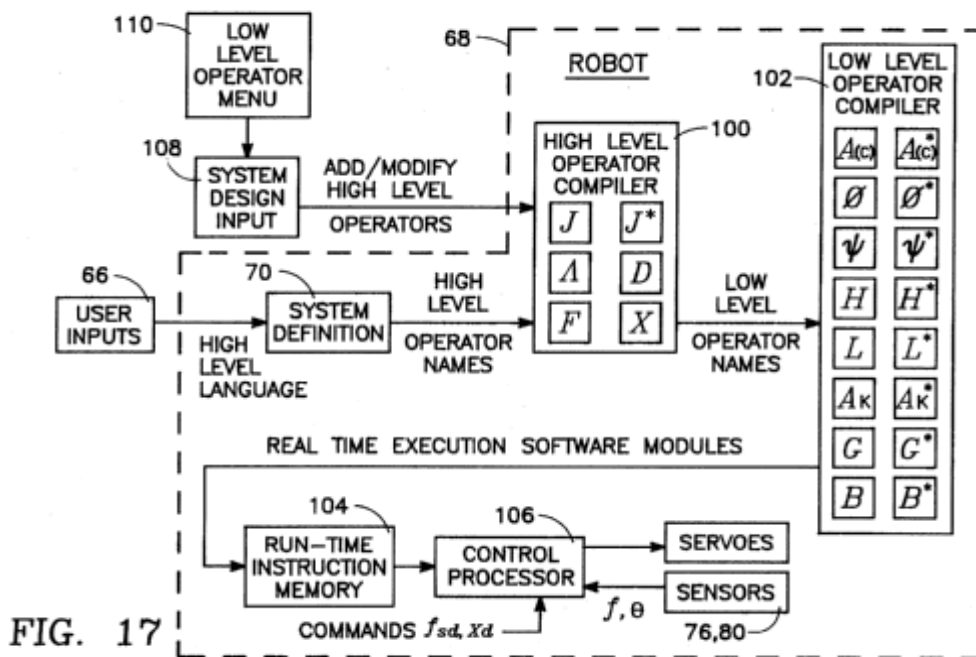
{characterised by programming language}

Definition statement

This place covers:

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

US 5519814



B25J 9/1661

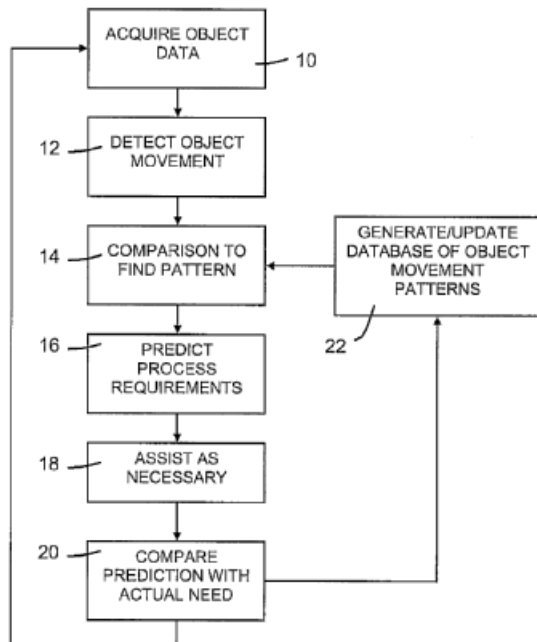
{characterised by task planning, object-oriented languages}

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

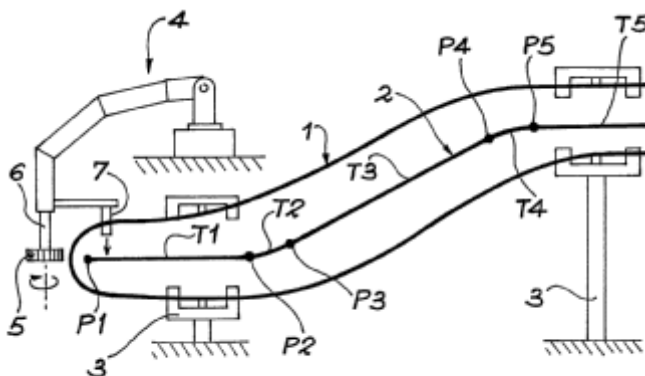
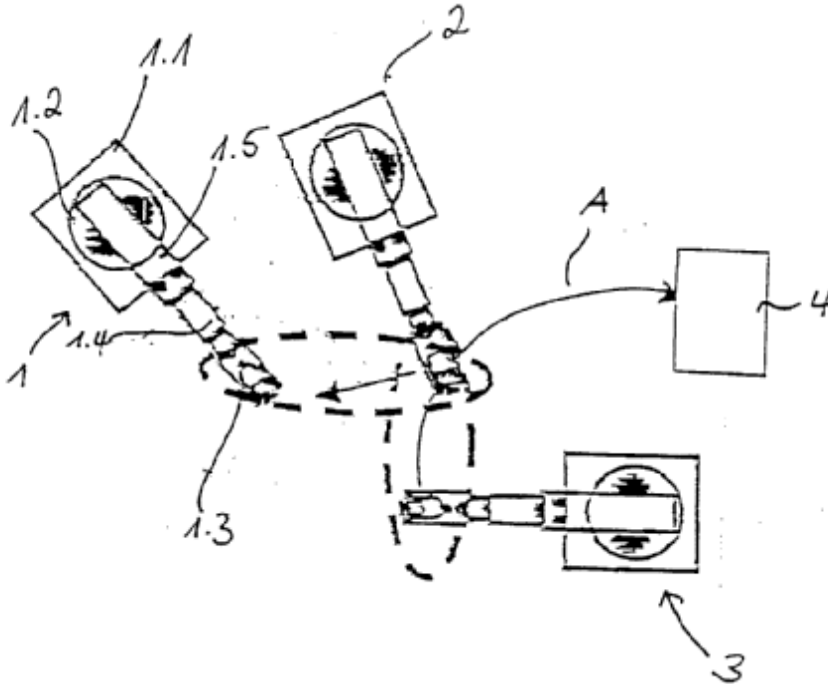


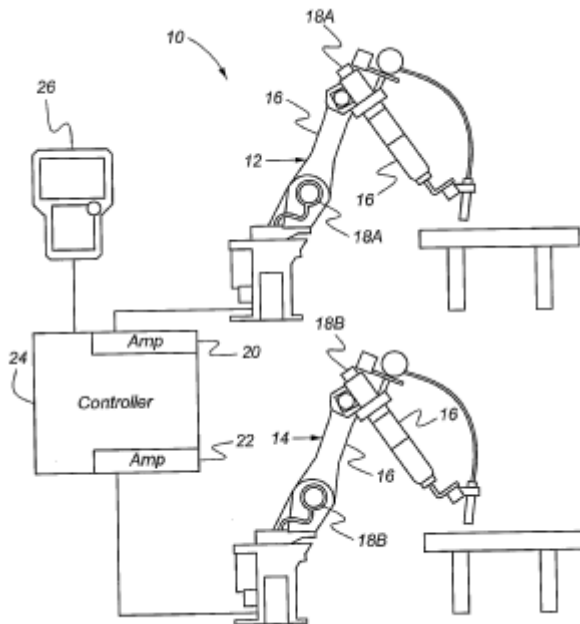
FIG. 2

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

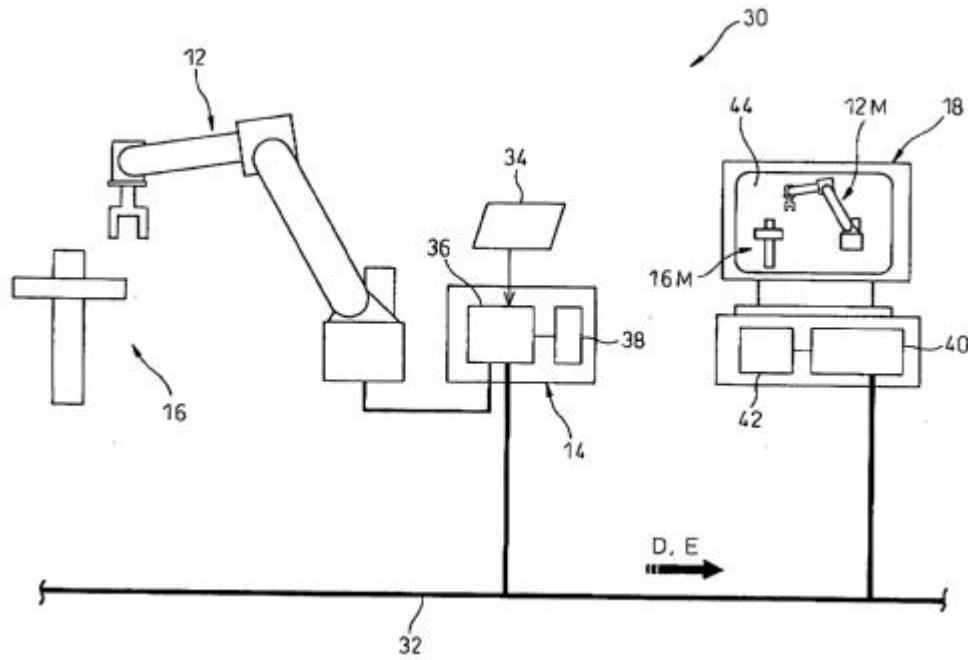
{characterised by simulation, either to verify existing program or to create and verify new program, CAD/CAM oriented, graphic oriented programming systems}

Definition statement

This place covers:

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

EP 1759817



B25J 9/1674

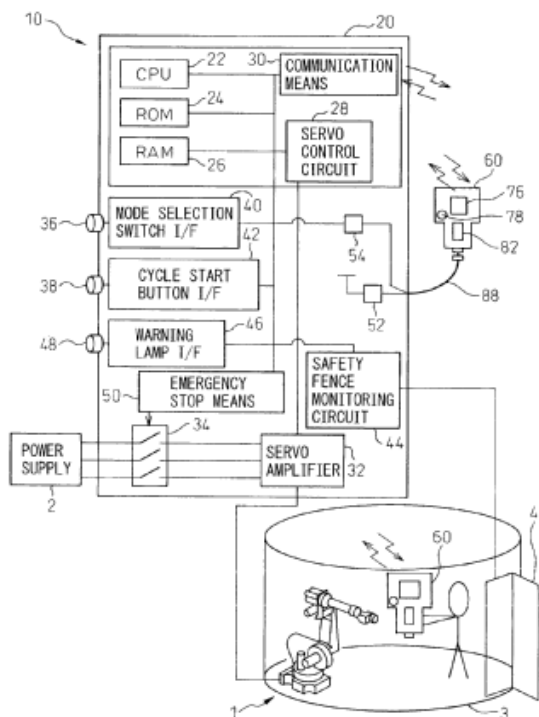
{characterised by safety, monitoring, diagnostic}

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

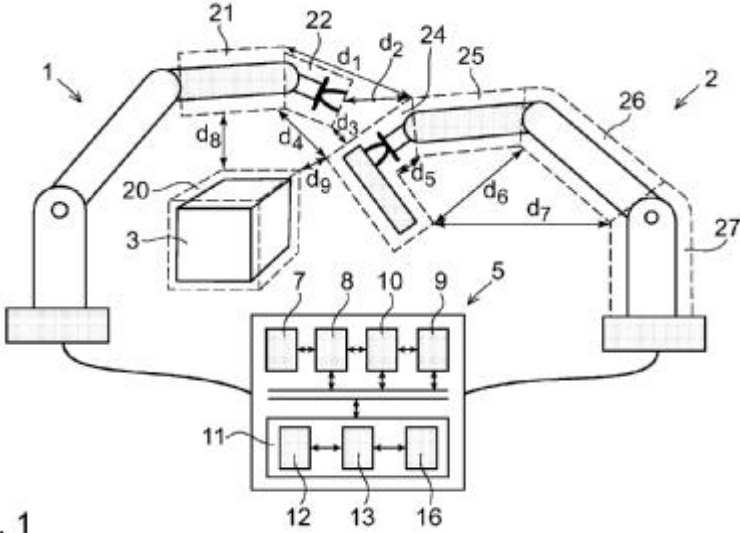


Fig. 1

B25J 9/1679

{characterised by the tasks executed}

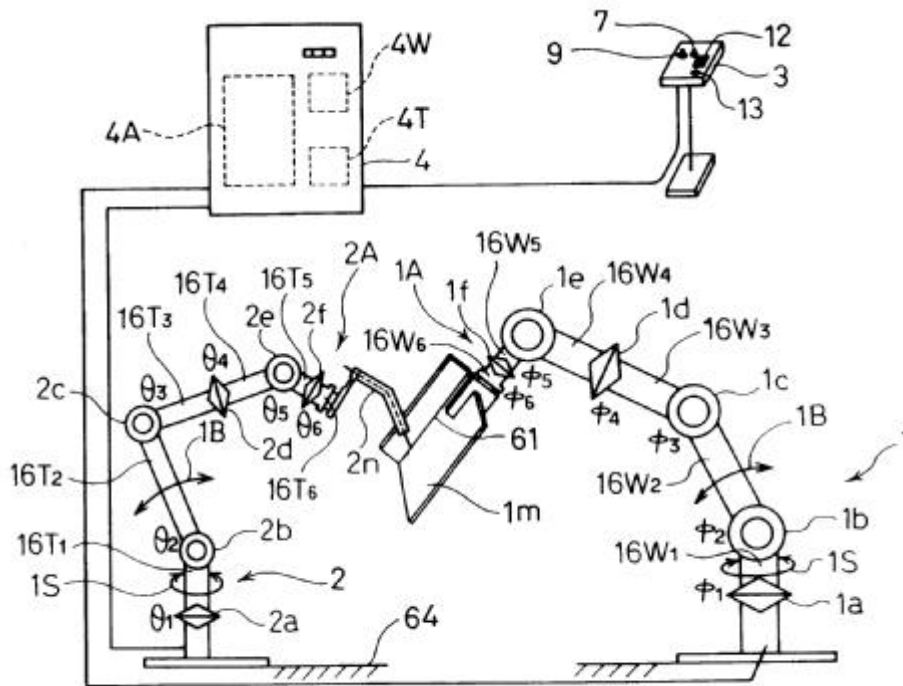
Definition statement

This place covers:

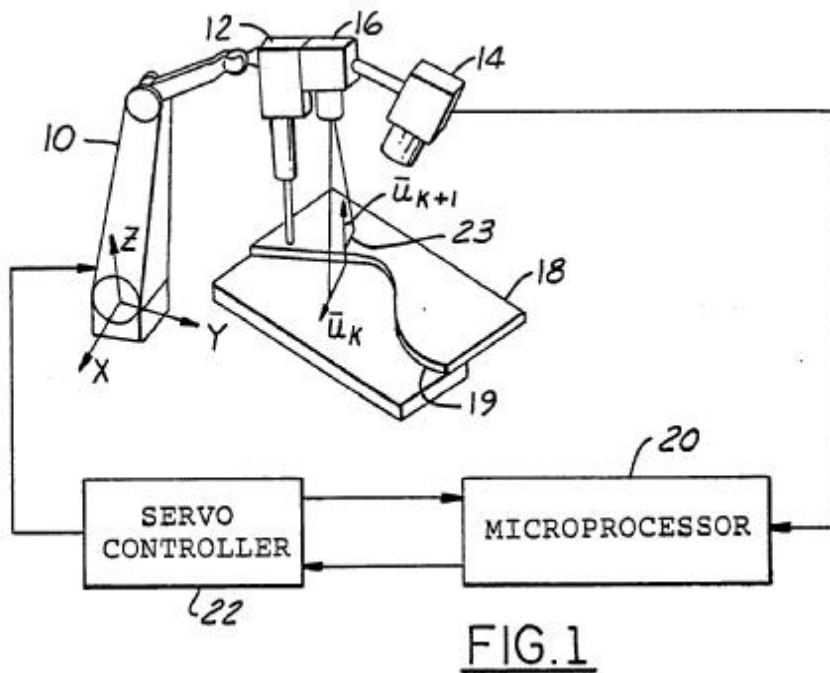
Different control systems dedicated to a specific task of the manipulator.

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

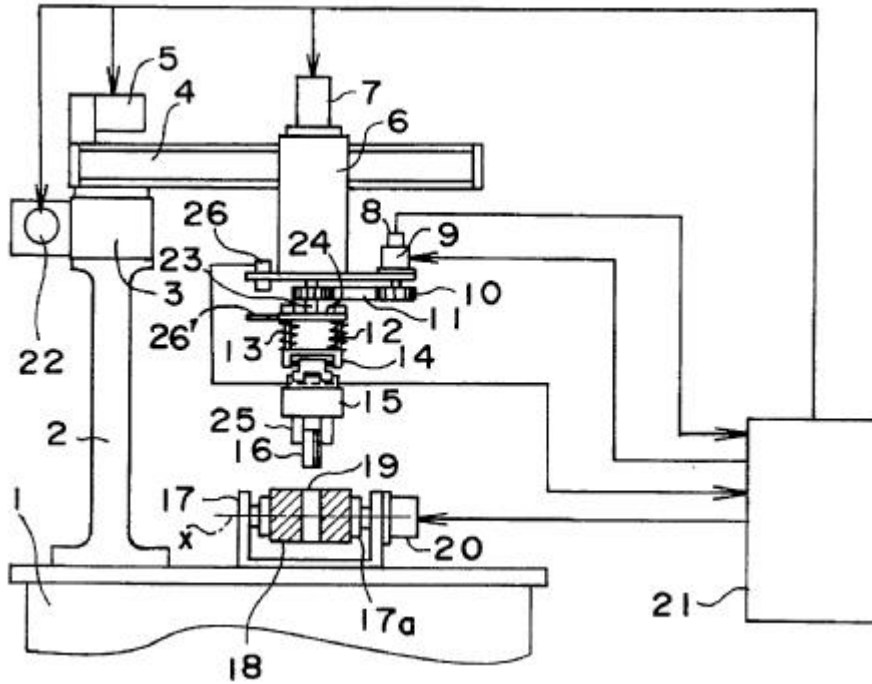
{Assembly, peg and hole, palletising, straight line, weaving pattern movement}

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

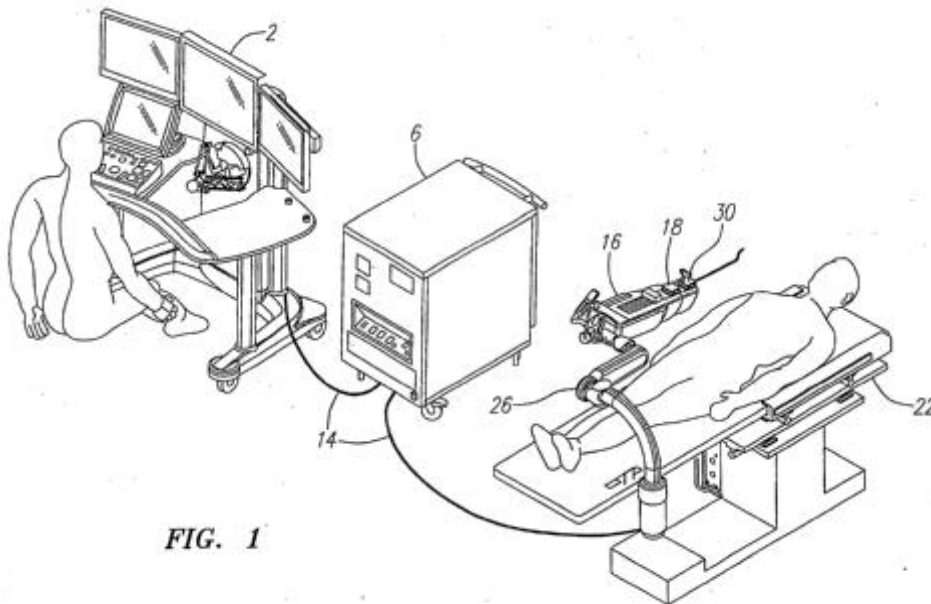
{Teleoperation}

Definition statement

This place covers:

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

WO 2007136803



Special rules of classification

Leader-follower 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

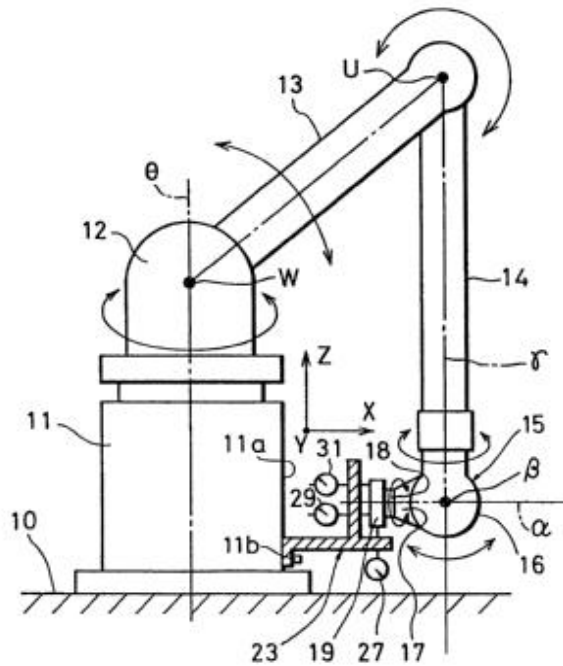
{Calibration of manipulator}

Definition statement

This place covers:

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

EP 0223862



B25J 9/1694

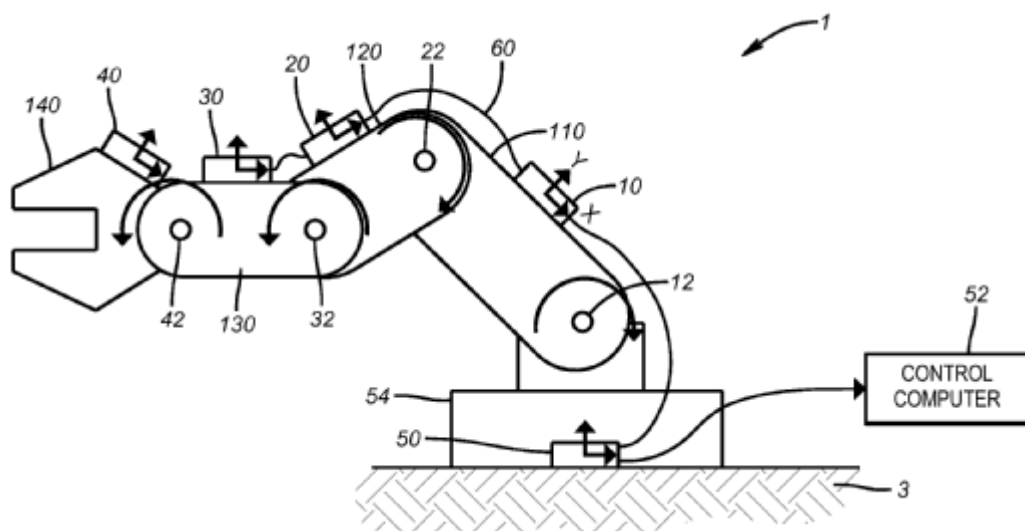
{characterised by use of sensors other than normal servo-feedback from position, speed or acceleration sensors, perception control, multi-sensor controlled systems, sensor fusion}

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

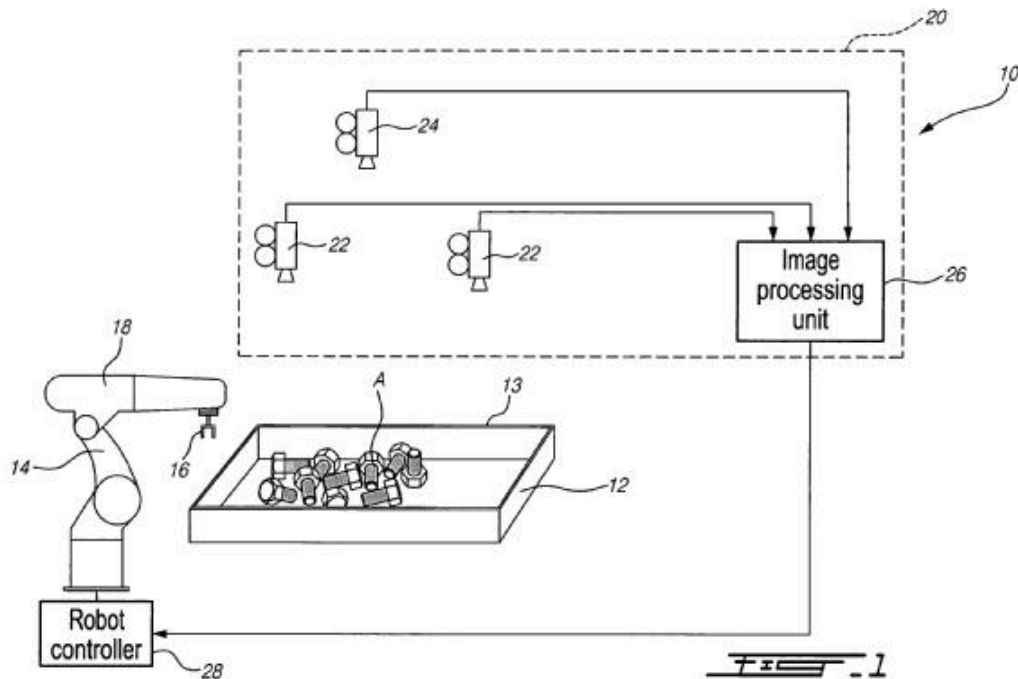
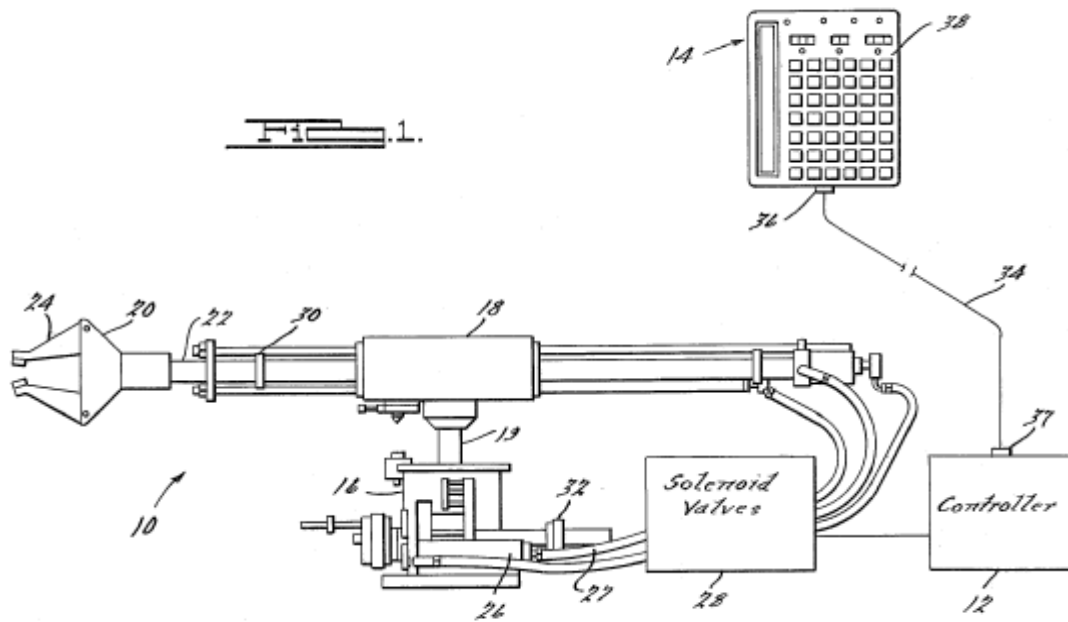
**References****Informative references***Attention is drawn to the following places, which may be of interest for search:*

Image feed-back for automatic industrial control, e.g. robot with camera	G06T 1/0014
Image analysis	G06T 7/00

Special rules of classificationDetails 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.

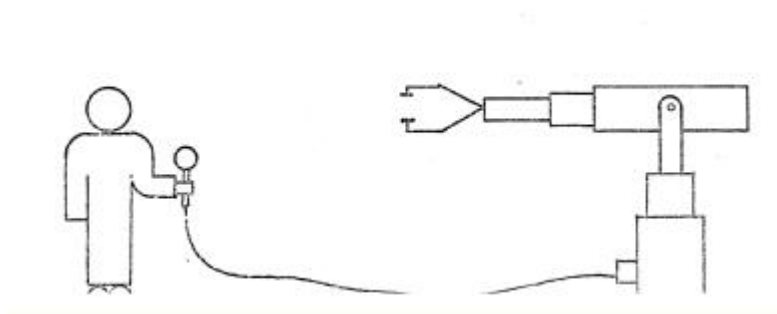
B25J 13/003

{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	G10L 15/00
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Synonyms and Keywords

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

B25J 13/02

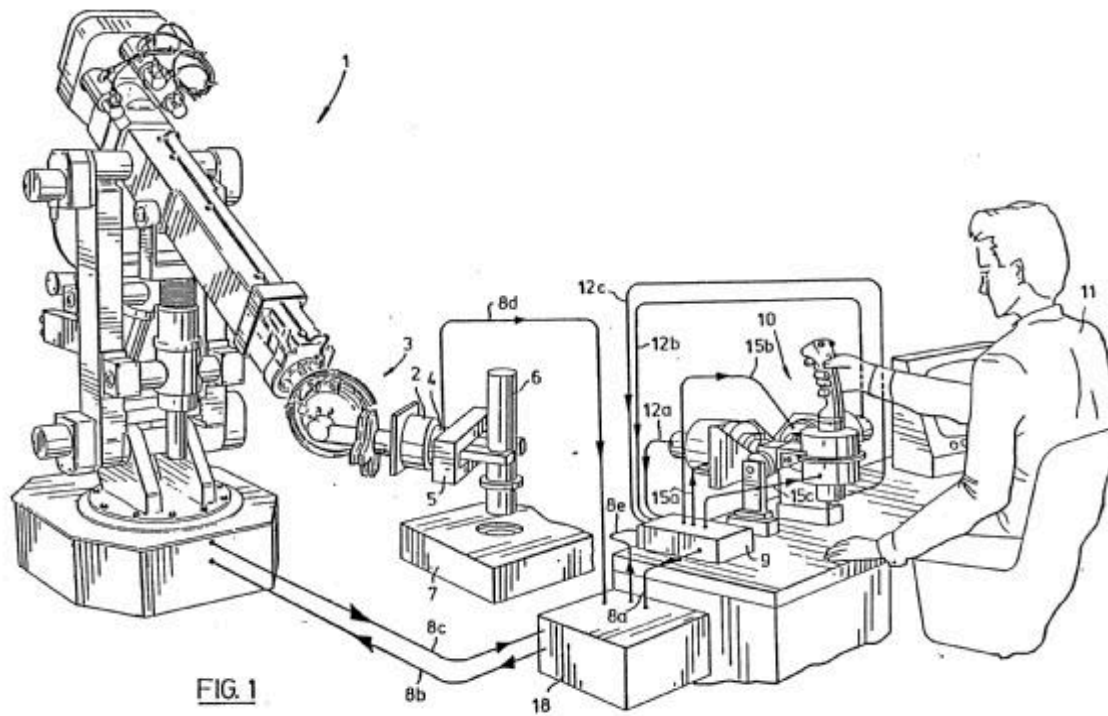
Hand grip control means {(handles or pedals for crane control [B66C 13/56](#); for measuring the force applied to control members [G01L 5/22](#); hand-held casings for switching devices, e.g. joy-sticks [H01H 9/0214](#))}

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
--

G05G 9/047

B25J 13/04

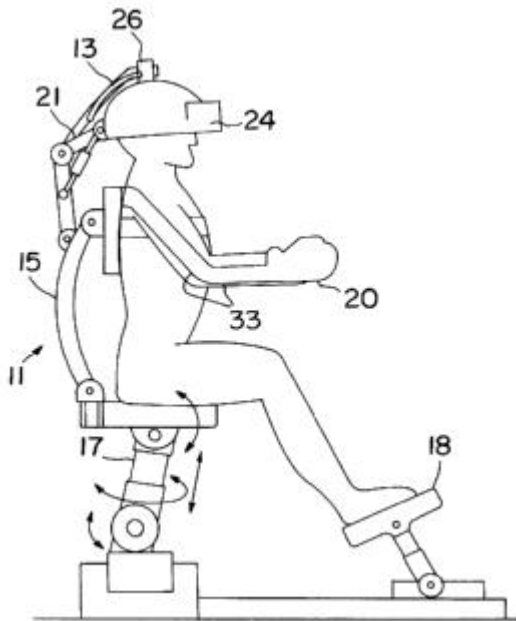
Foot-operated control means

Definition statement

This place covers:

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

US 6016385



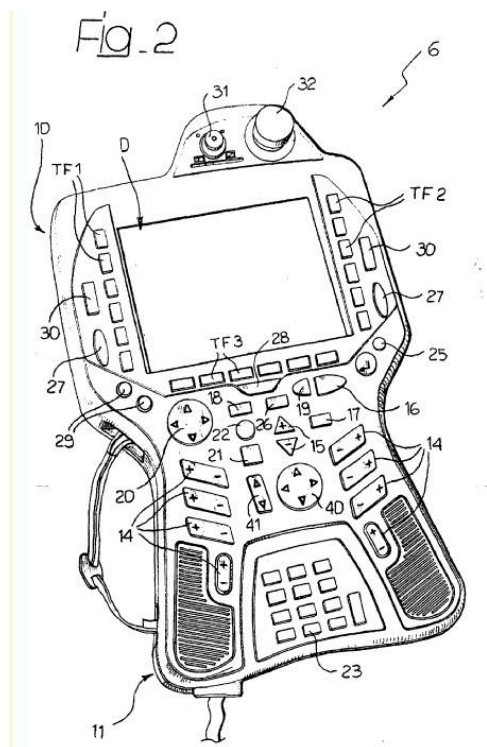
B25J 13/06

Control stands, e.g. consoles, switchboards

Definition statement

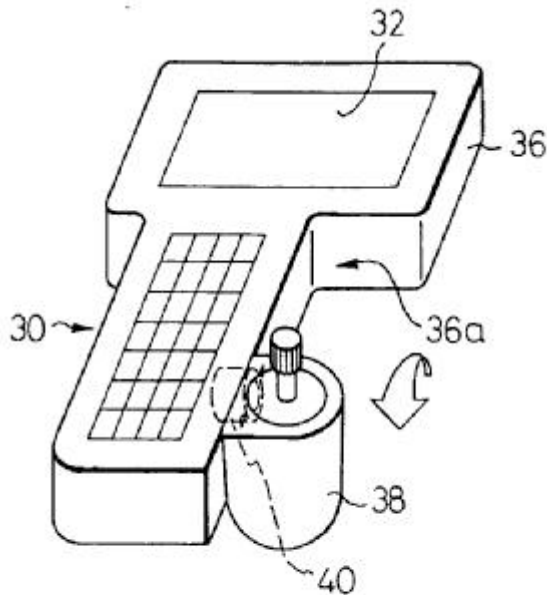
This place covers:

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

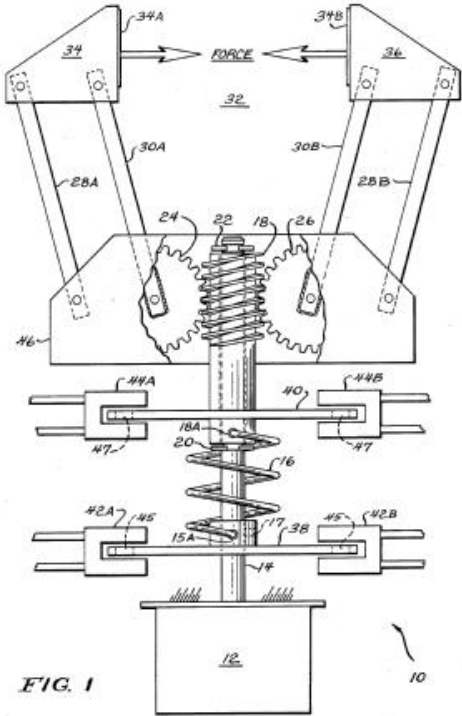
{Grasping-force detectors (in general [G01L 5/16](#), [G01L 5/22](#))}

Definition statement

This place covers:

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

US 4600357



B25J 13/083

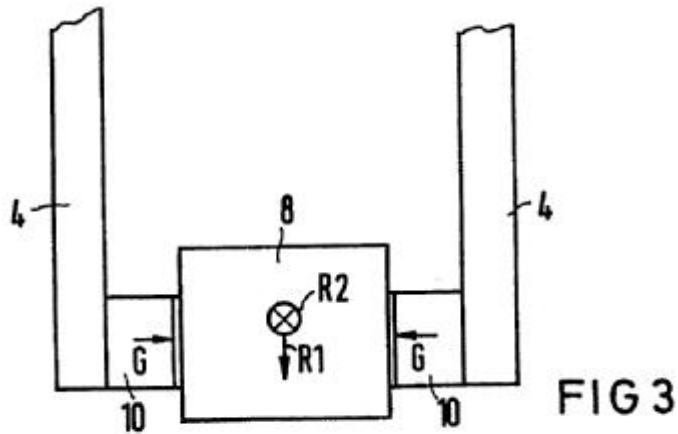
{fitted with slippage detectors}

Definition statement

This place covers:

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

DE 3332147



B25J 13/084

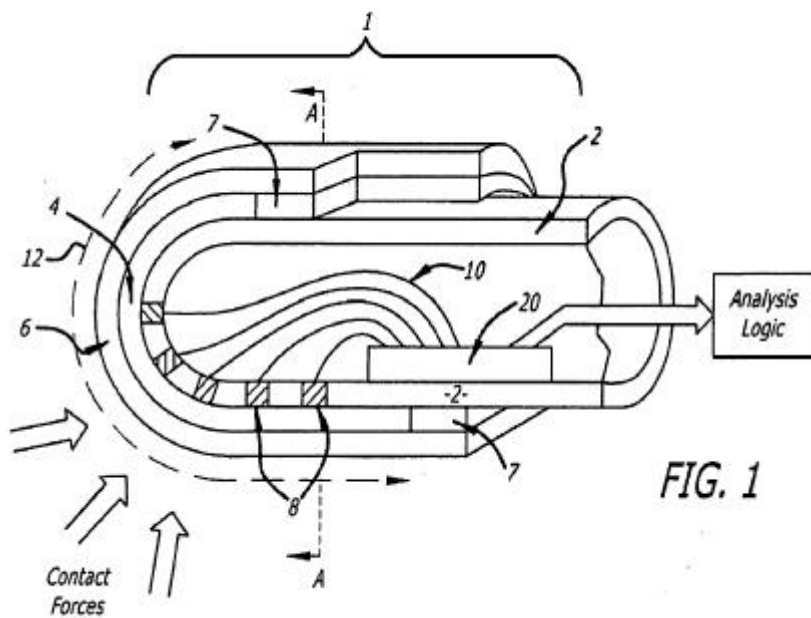
{Tactile sensors (in general [G01L 5/16](#), [G01L 5/22](#))}

Definition statement

This place covers:

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

WO 2009023334



B25J 13/085

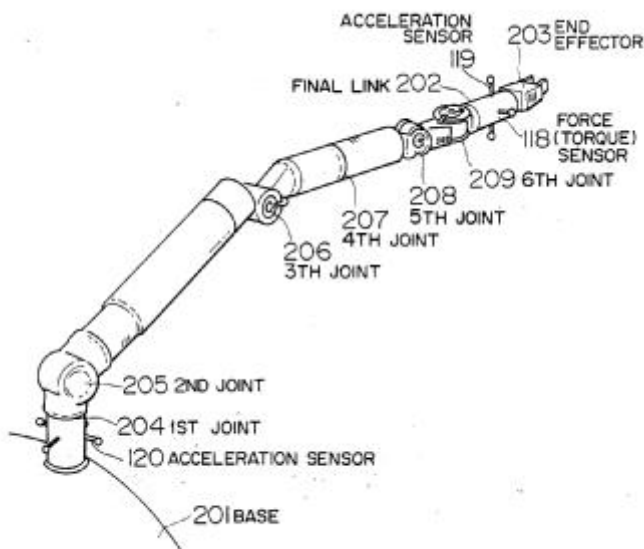
{Force or torque sensors ([B25J 13/082](#), [B25J 13/084](#) take precedence)}

Definition statement

This place covers:

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

DE 3810691



B25J 13/086

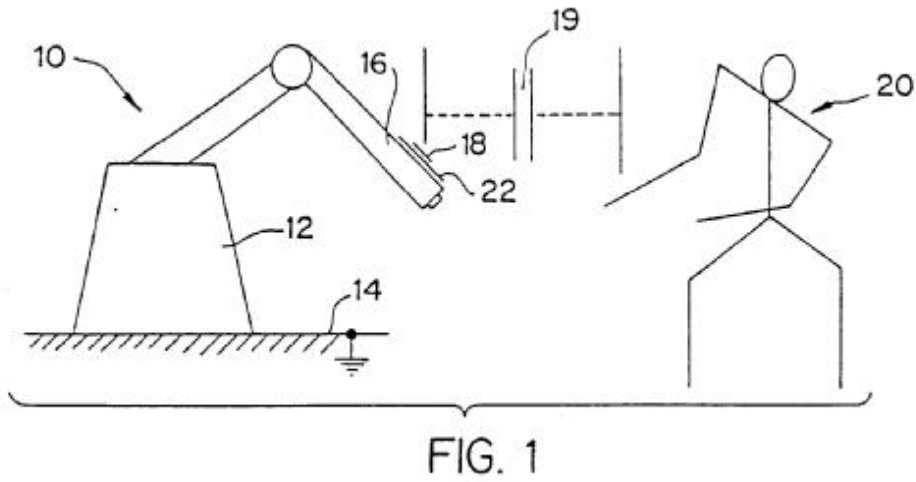
{Proximity sensors}

Definition statement

This place covers:

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

EP 0518836



B25J 13/087

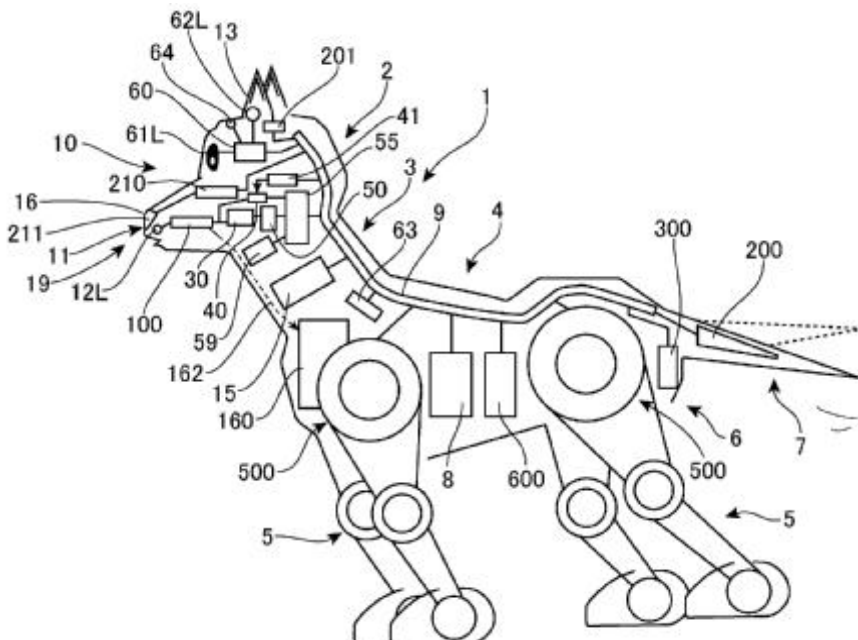
{for sensing other physical parameters, e.g. electrical or chemical properties}

Definition statement

This place covers:

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

WO 2011077730



B25J 13/088

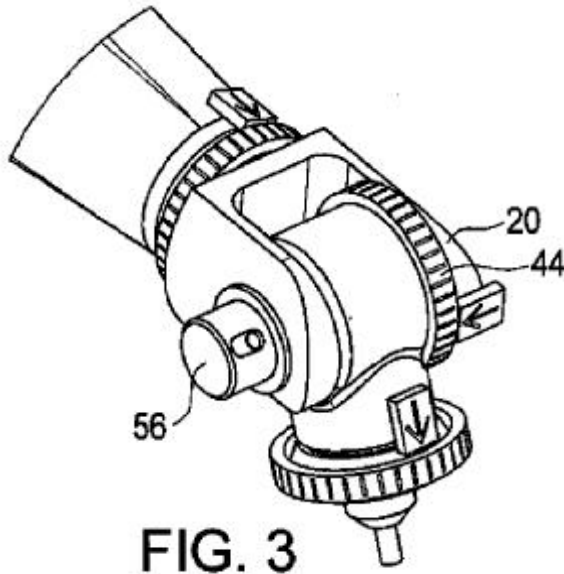
{with position, velocity or acceleration sensors}

Definition statement

This place covers:

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

US 2011098852



B25J 13/089

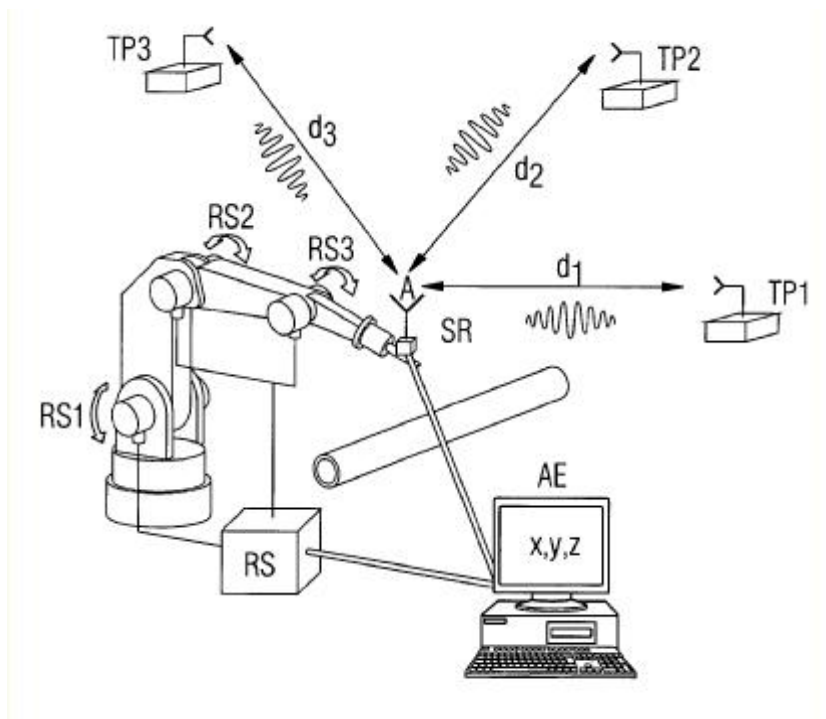
{Determining the position of the robot with reference to its environment}

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

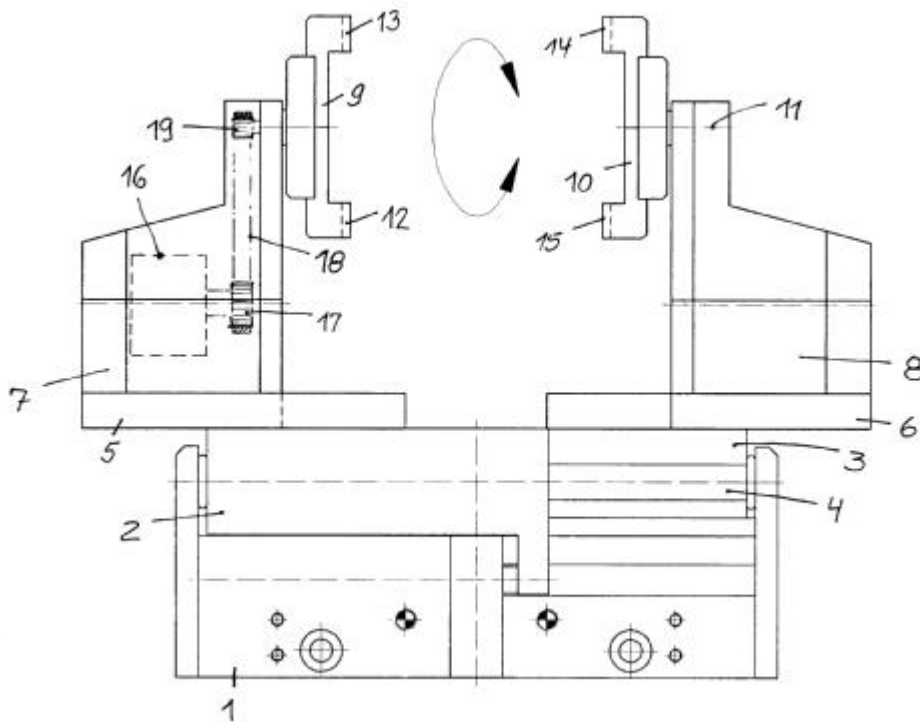
{with provision for adjusting the gripped object in the hand}

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

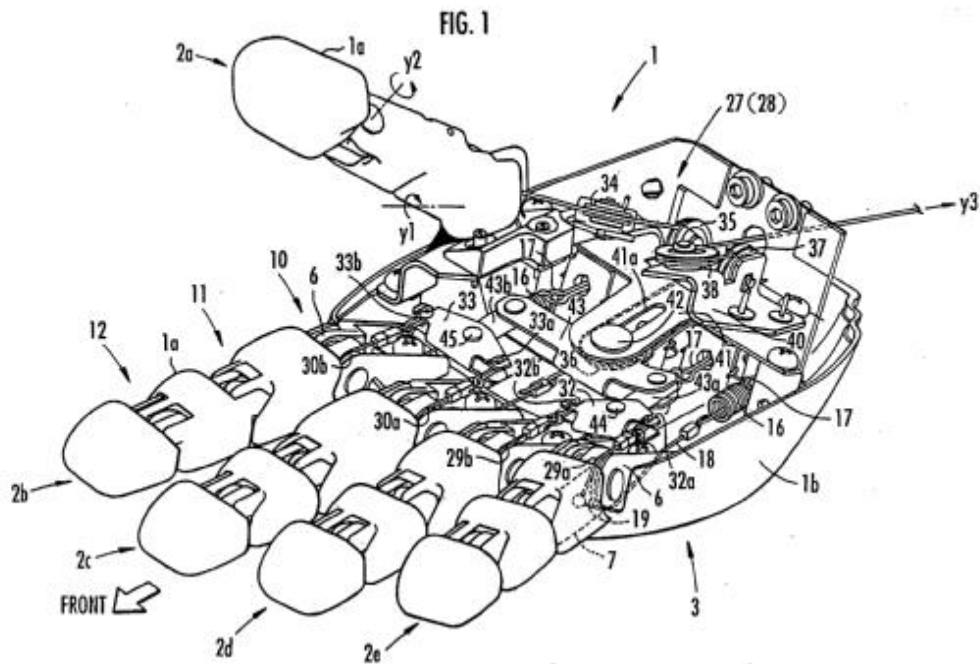
{comprising multi-articulated fingers, e.g. resembling a human hand}

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	A61F 2/583
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B25J 15/0019

{End effectors other than grippers}

Definition statement

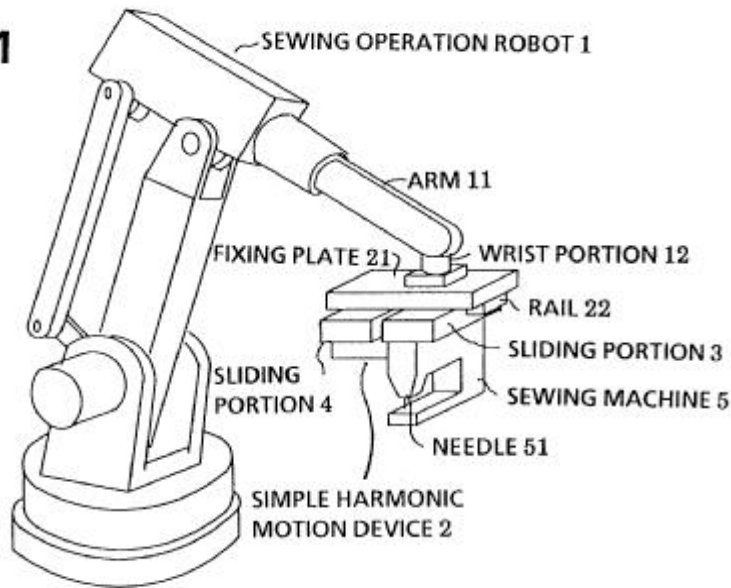
This place covers:

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



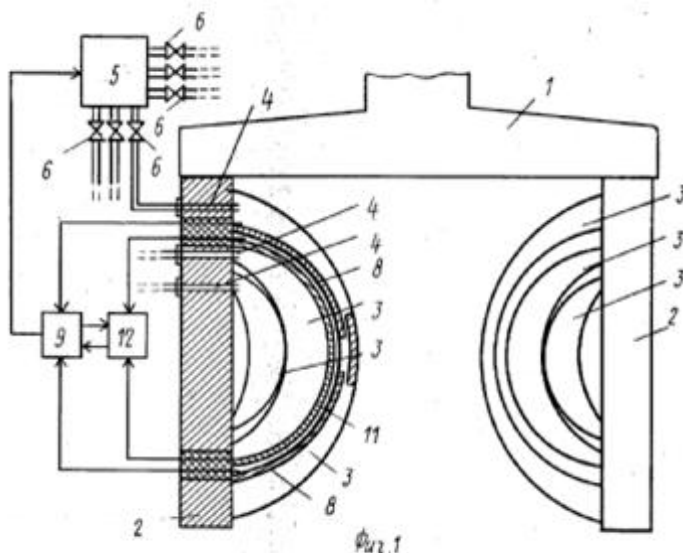
B25J 15/0023

{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	B65G 47/908
--	-----------------------------

B25J 15/0028

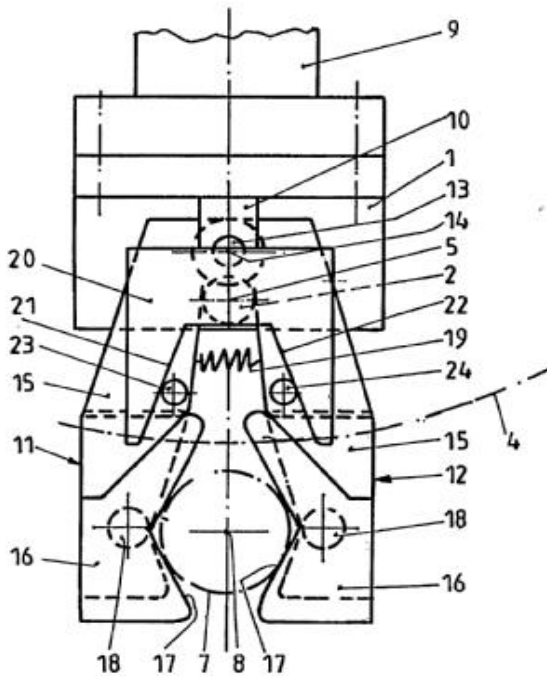
{with movable, e.g. pivoting gripping jaw surfaces}

Definition statement

This place covers:

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

DE 4400354



References

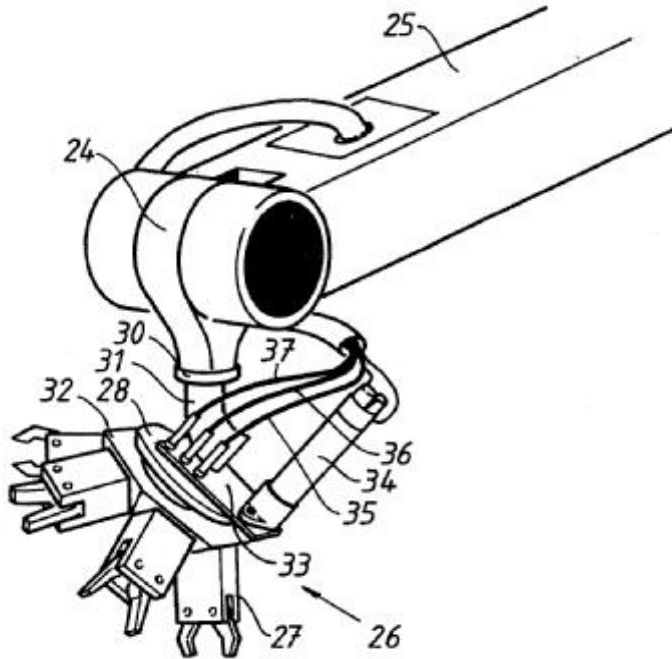
Limiting references

This place does not cover:

Grippers with jaw surfaces comprising actuating means for moving the gripped objects	B25J 15/0004
--	------------------------------

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:*

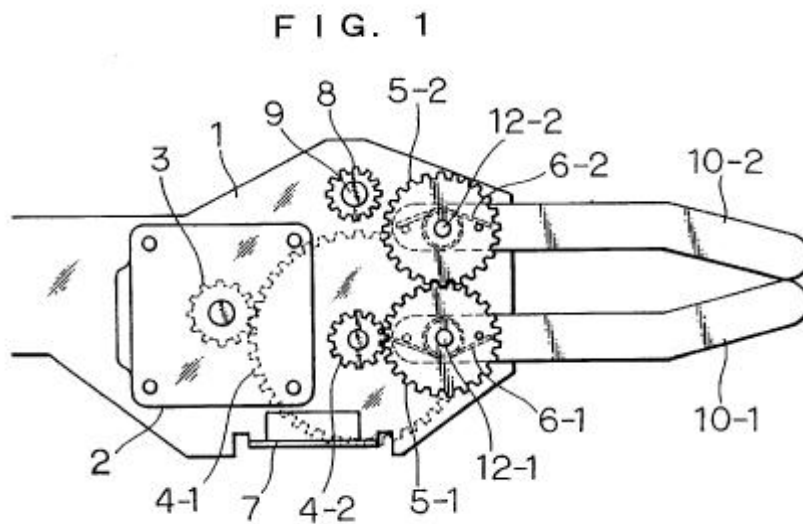
Grippers having actuators for moving holding elements, sensors and a feedback loop for correcting an error on the position, speed or force of the holding elements.

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

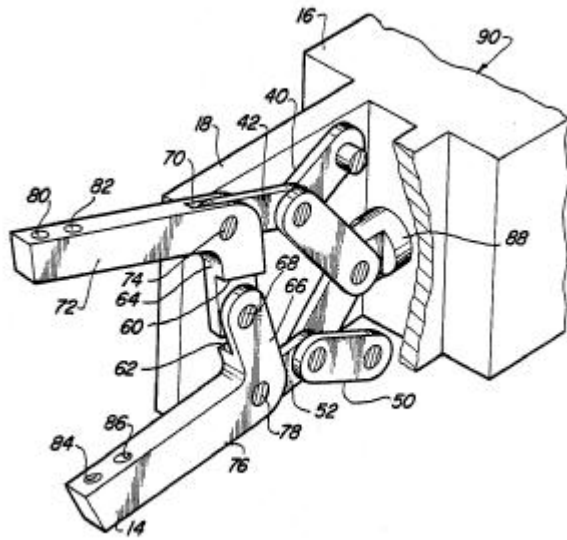
Grippers having pivoting fingers or jaws.

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

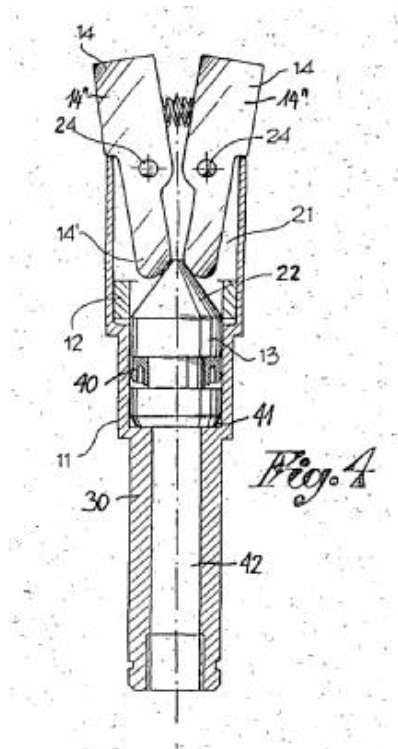
{actuated by cams}

Definition statement

This place covers:

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

DE 29806798 U

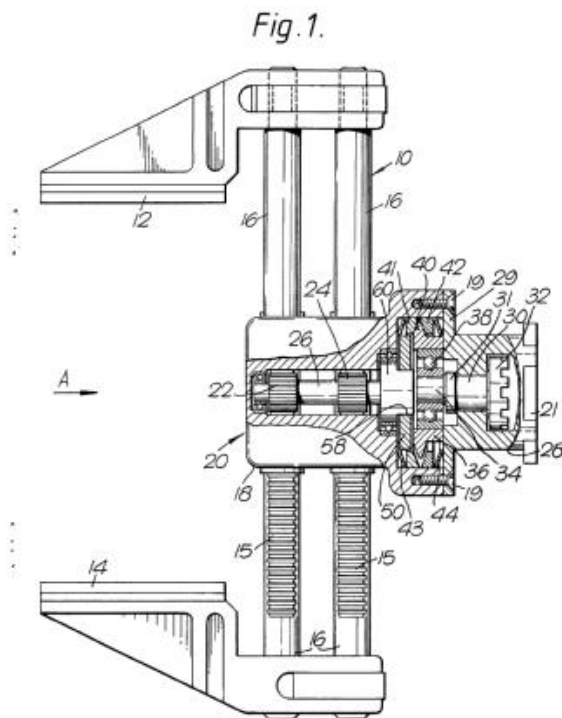


B25J 15/0253**{comprising parallel grippers}****Definition statement***This place covers:*

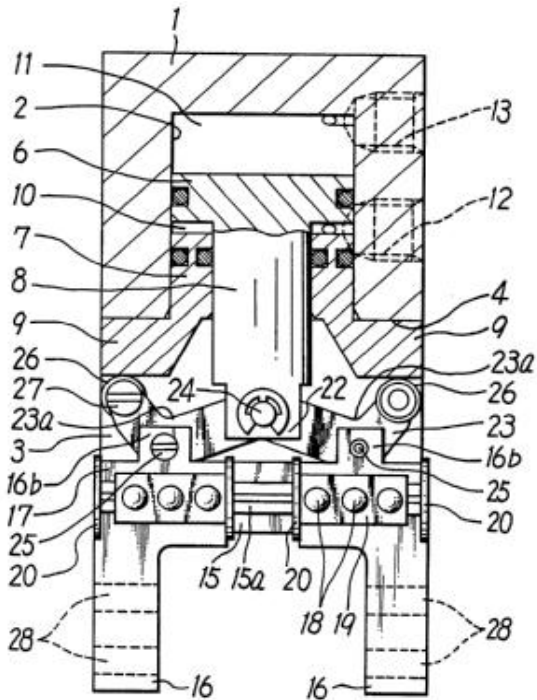
Grippers having fingers or jaws moving in translation.

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

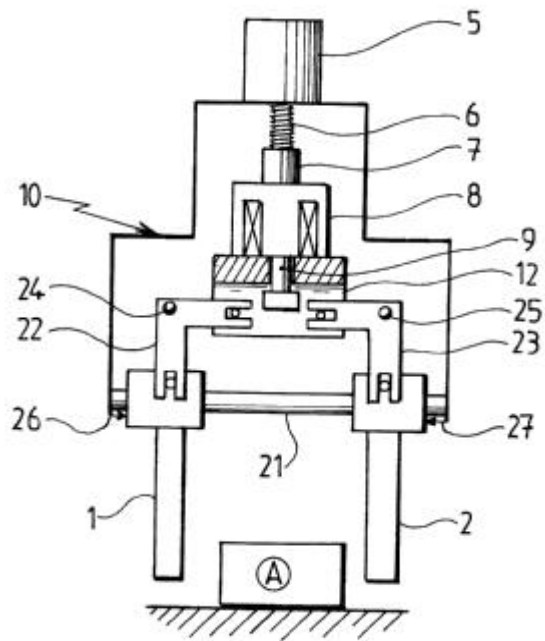
{comprising linear guide means}

Definition statement

This place covers:

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

FR 2816232



B25J 15/028

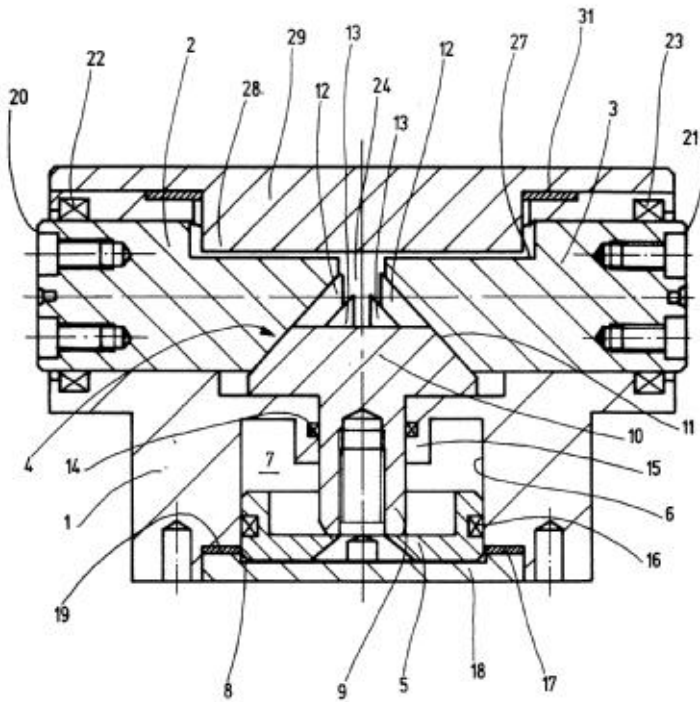
{actuated by cams}

Definition statement

This place covers:

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

DE 19604649



B25J 15/04

with provision for the remote detachment or exchange of the head or parts thereof

Definition statement

This place covers:

Illustrative example of subject matter classified in this group:

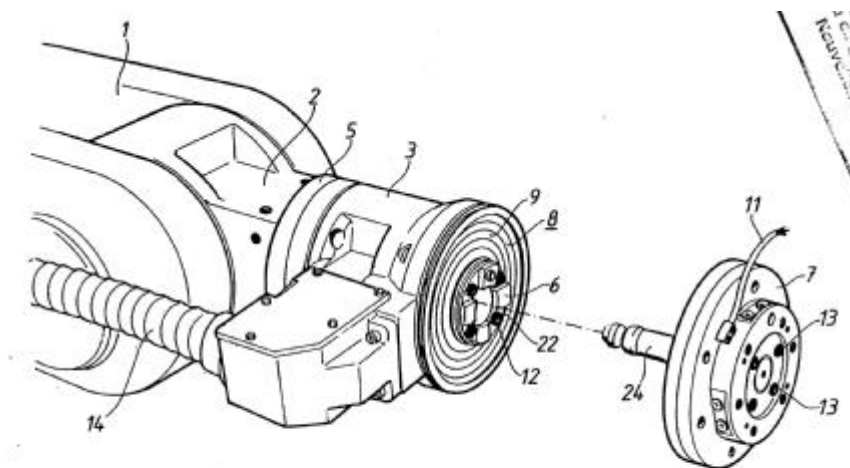


FIG. 4

B25J 15/0475

{Exchangeable fingers}

Definition statement

This place covers:

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

EP 1785238

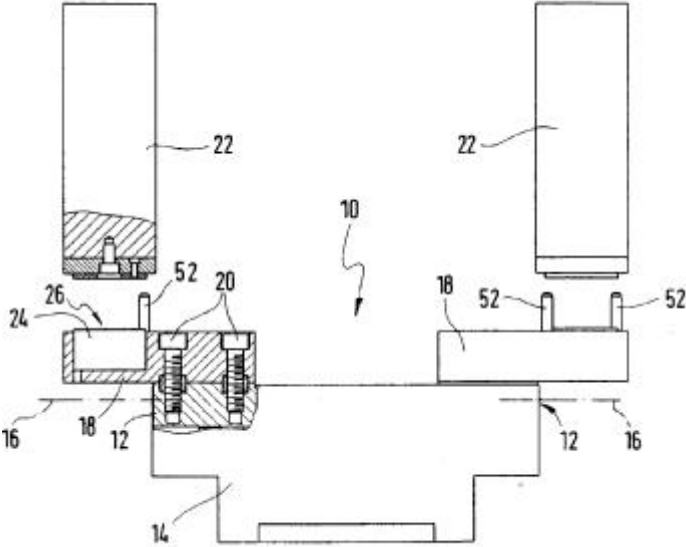
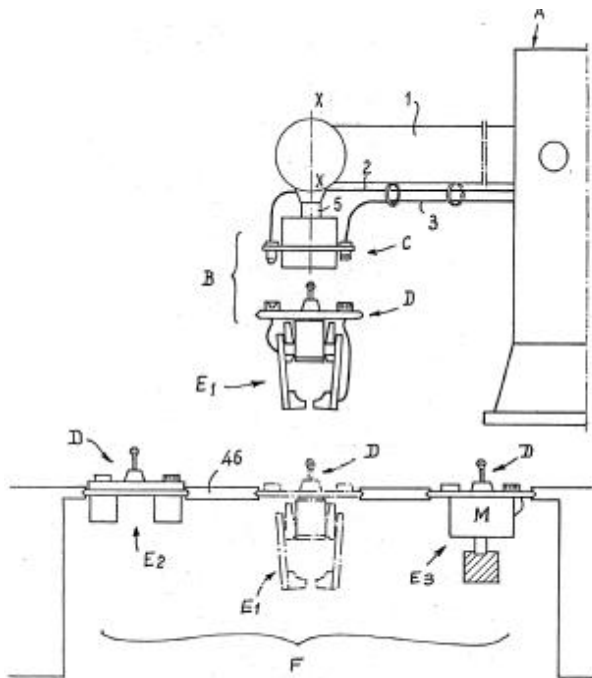


Fig. 1

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:*

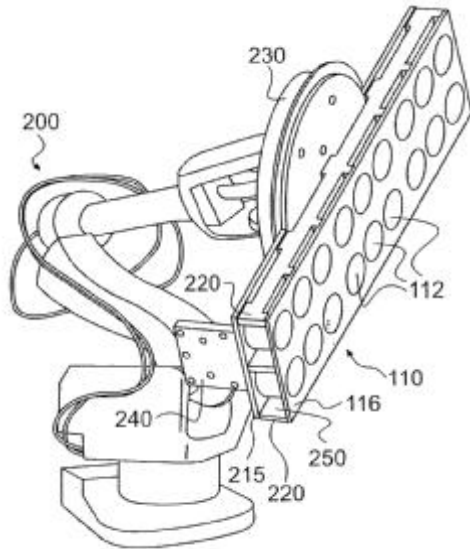
Grippers holding an object by suction or magnetic force.

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](#)

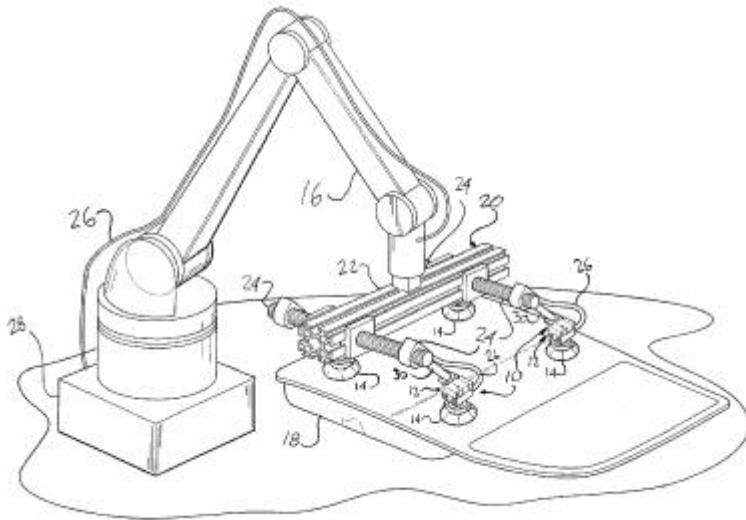
DE 102009015345

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

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

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

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

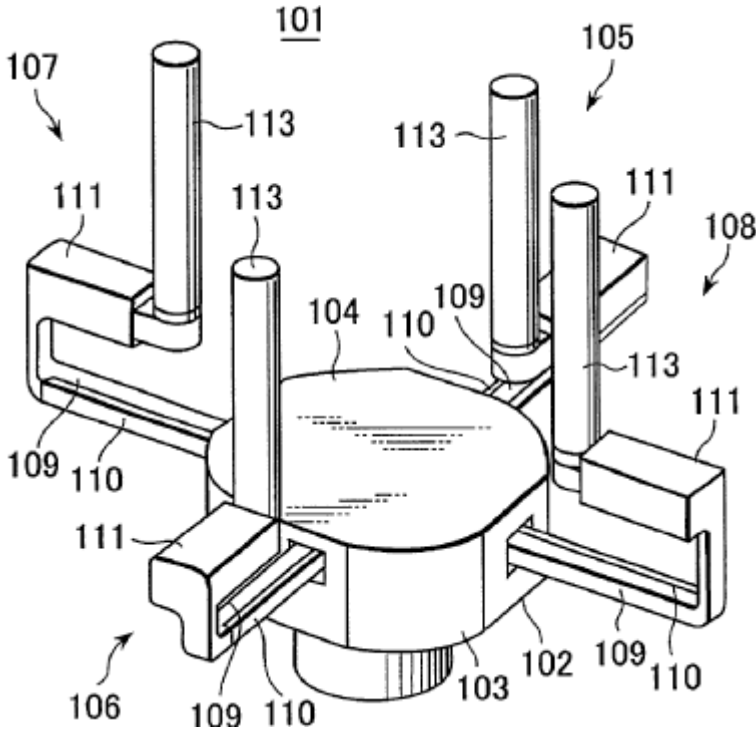
with three or more finger members {(B25J 15/0009 takes precedence)}

Definition statement

This place covers:

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

US 2003102640



B25J 15/103

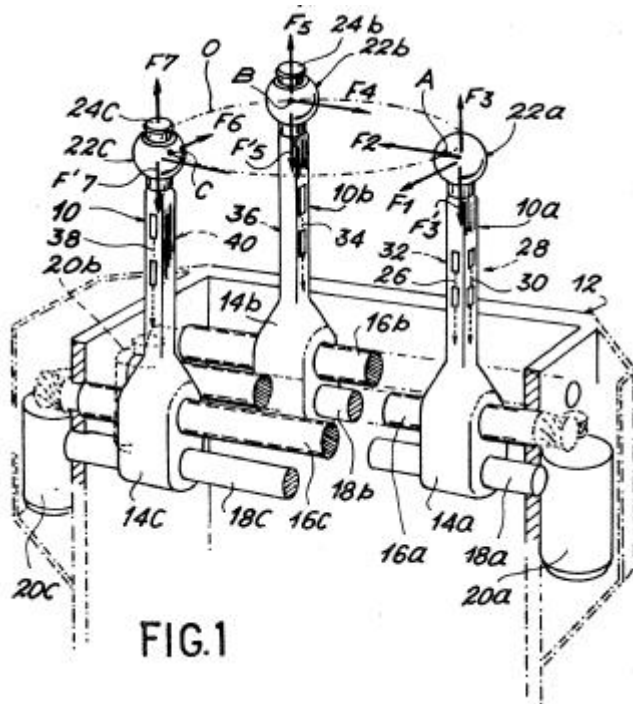
{for gripping the object in three contact points}

Definition statement

This place covers:

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

FR 2551389



B25J 15/106

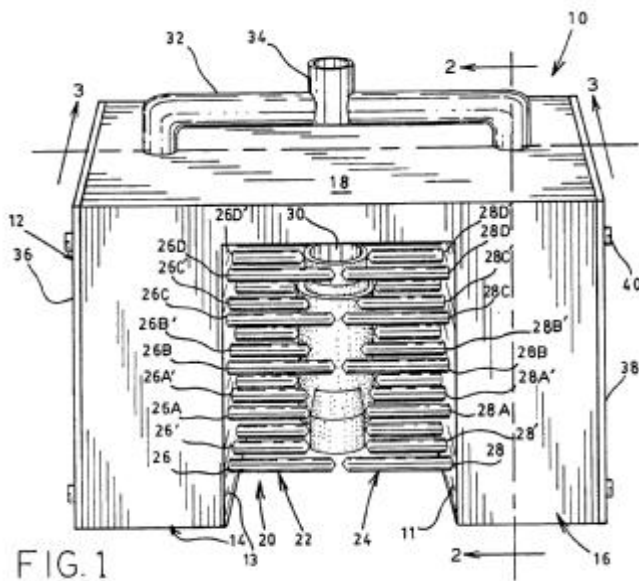
{moving in parallel relationship}

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	B25B 1/2421
--	-----------------------------

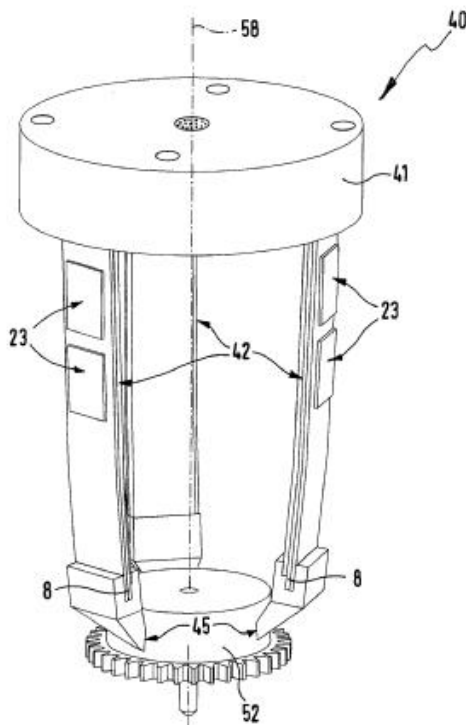
B25J 15/12

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	B65G 47/908
---	-----------------------------

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

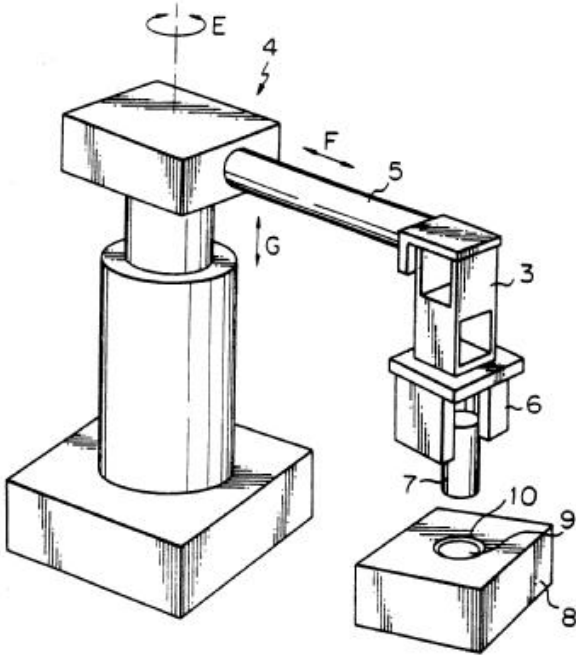
{Compliance devices}

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	B23P 19/02
Machines for aligning articles to be assembled	B23P 19/10

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

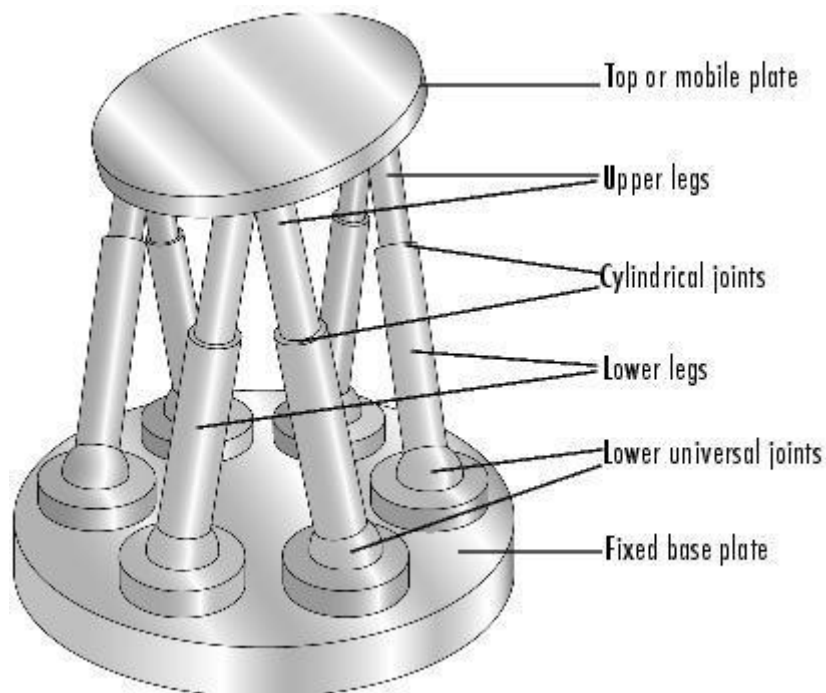
{comprising a Stewart mechanism}

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	B25J 9/106
Control of parallel manipulators	B25J 9/1623
Other type of 3D parallel kinematics manipulators	B25J 17/0266

Informative references

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

Machine tools having parallel kinematics	B23Q 1/5462
Gearings comprising primarily only links or levers, with movements in three dimensions	F16H 21/46

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

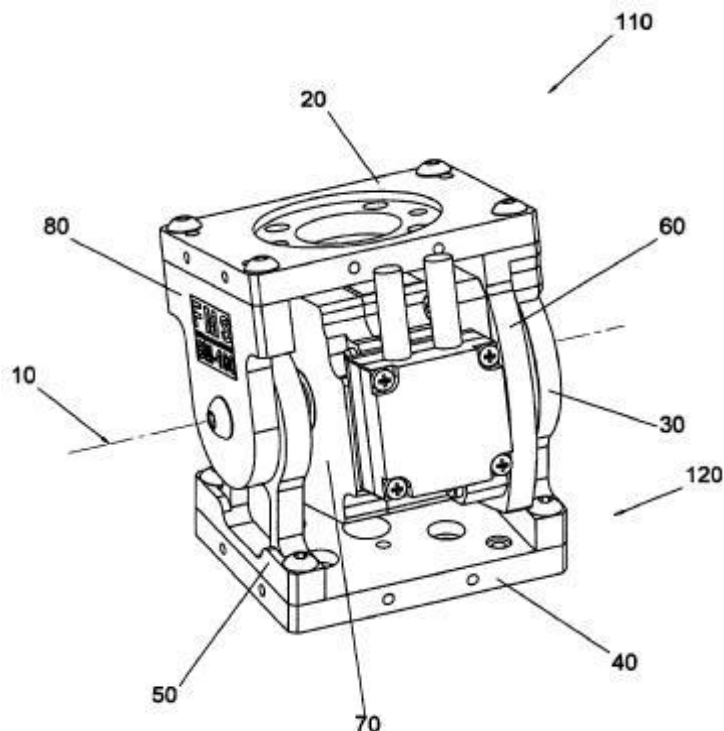
{One-dimensional joints}

Definition statement

This place covers:

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

DE 202011004164 U

**B25J 17/025**

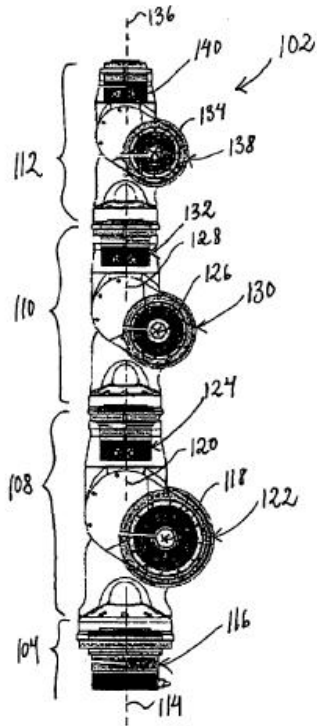
{mounted in series}

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

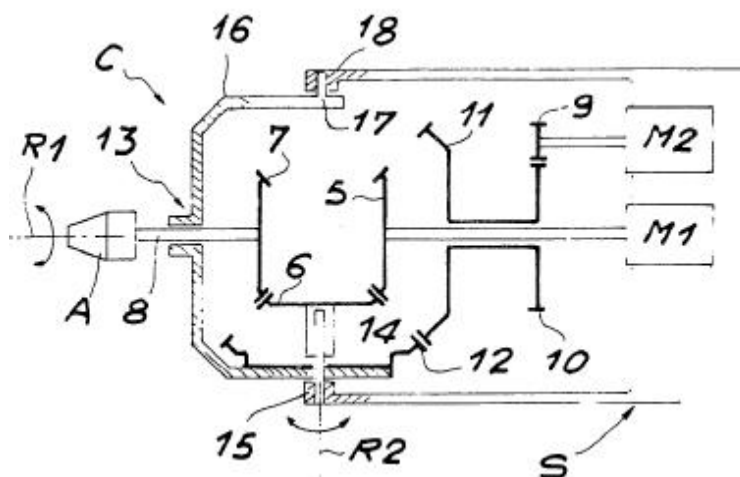
{Two-dimensional joints}

Definition statement

This place covers:

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

EP 0309329



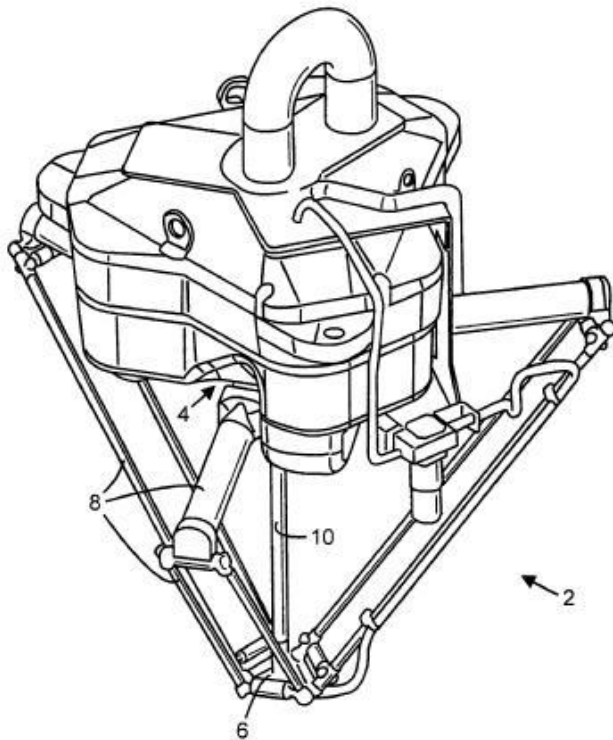
B25J 17/0266

{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)	B25J 9/106
Control of parallel manipulators	B25J 9/1623
Stewart mechanism (6 linears actuators linked to the base and the platform by universal joints and allowing 6 degrees of freedom for the platform)	B25J 17/0216

Informative references

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

Machine tools having parallel kinematics	B23Q 1/5462
Gearings comprising primarily only links or levers, with movements in three dimensions	F16H 21/46

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

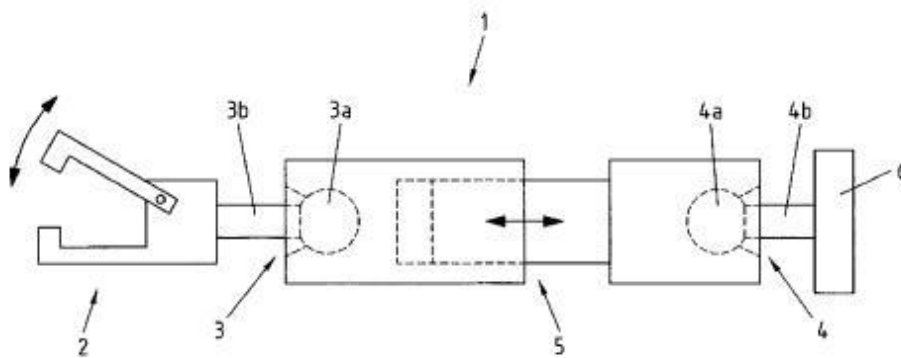
{Universal joints, e.g. Hooke, Cardan, ball joints}

Definition statement

This place covers:

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

WO 2007063006



B25J 17/0283

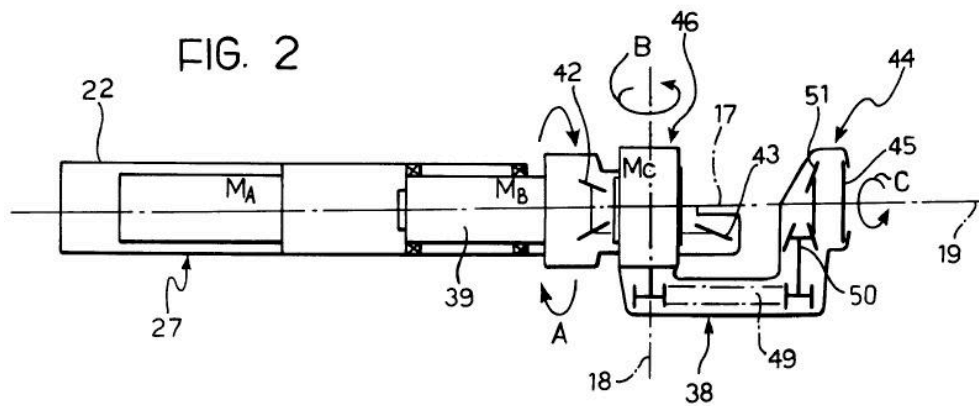
{Three-dimensional joints}

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

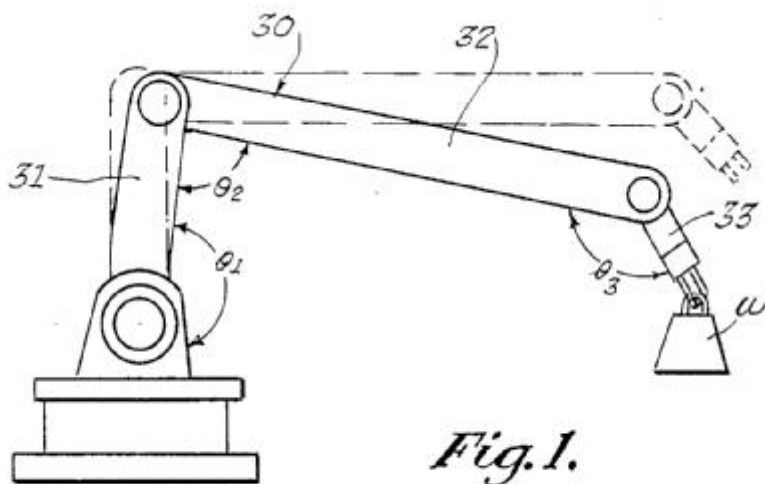
{comprising beam bending compensation means}

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	B23Q 11/001
--	-----------------------------

Special rules of classification

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

B25J 18/007

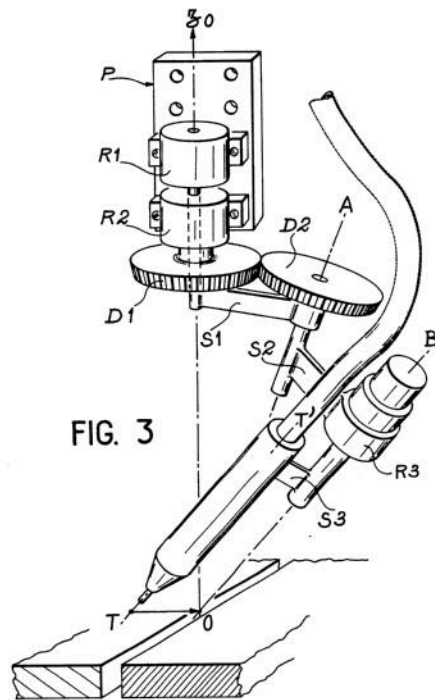
{the end effector rotating around a fixed point}

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

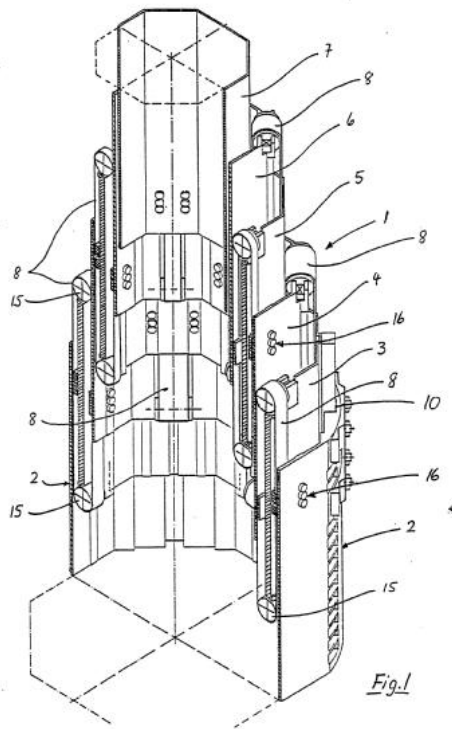
Definition statement

This place covers:

This group covers manipulator arms having a variable length.

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

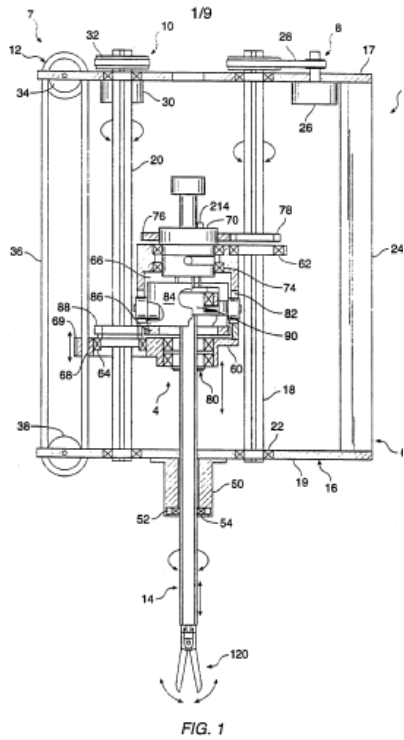
Illustrative example of subject matter classified in this group:

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

Telescopic jib-cranes	B66C 23/701
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B25J 18/04**rotatable****Definition statement***This place covers:*Illustrative example of subject matter classified in [B25J 18/04](#)

WO 9639944



Special rules of classification

SCARA robots should additionally be classified in [B25J 9/042](#).

B25J 18/06**flexible****Definition statement**

This place covers:

Illustrative example of subject matter classified in this group:

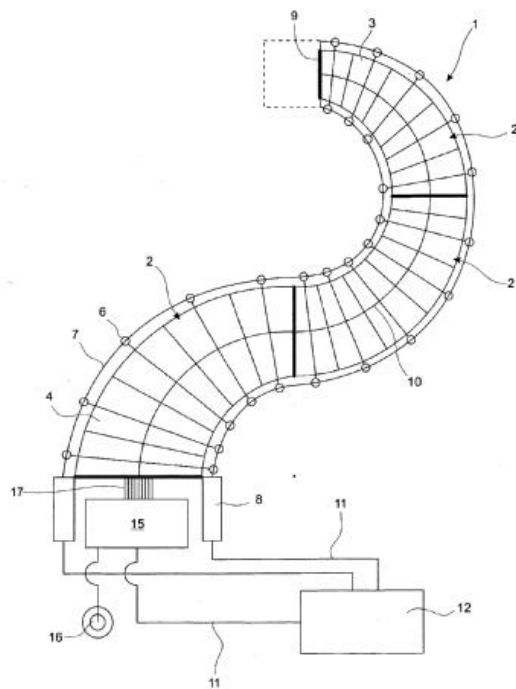


Fig. 1

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](#))

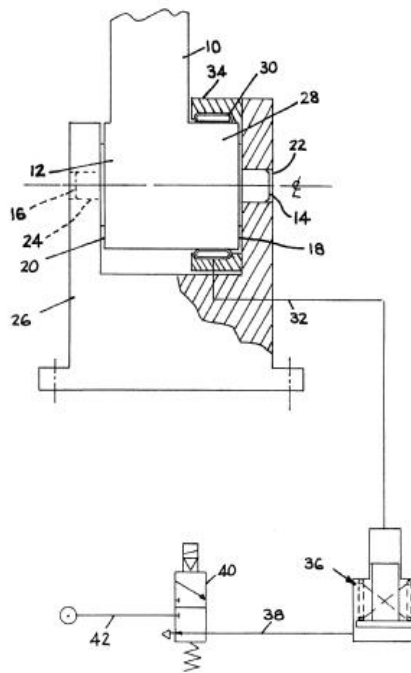
Definition statement

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.

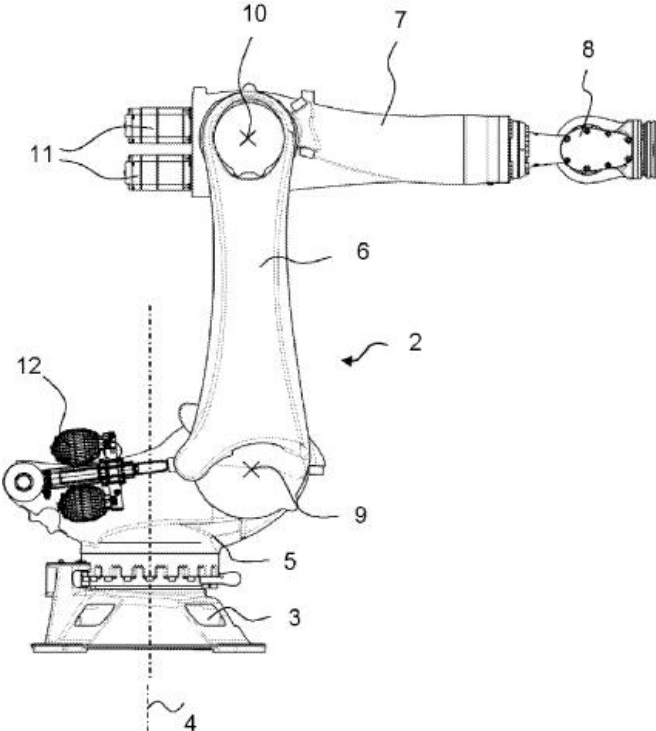
B25J 19/0012

{using fluidic devices}

Definition statement

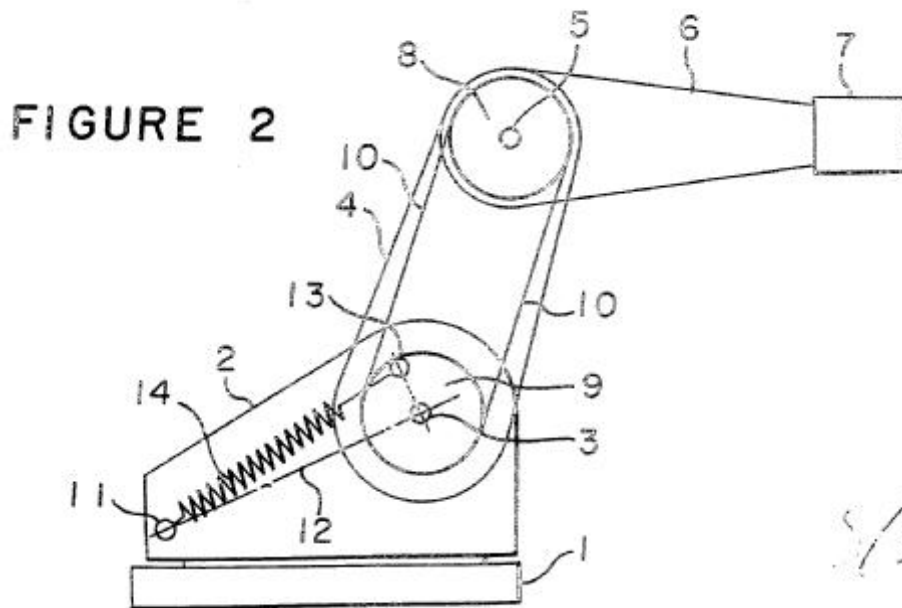
This place covers:

Illustrative example of subject matter classified in this group:



B25J 19/0016**{using springs}****Definition statement***This place covers:*

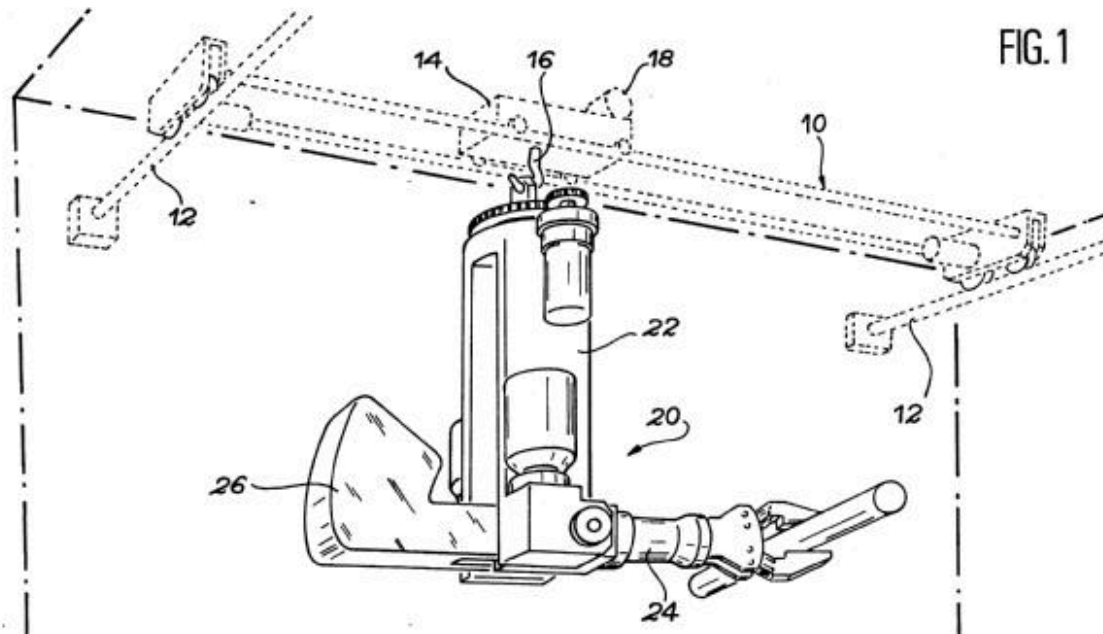
Illustrative example of subject matter classified in this group:

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

Springs; shock-absorbers; means for damping vibration	F16F
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B25J 19/002**{using counterweights}****Definition statement***This place covers:*

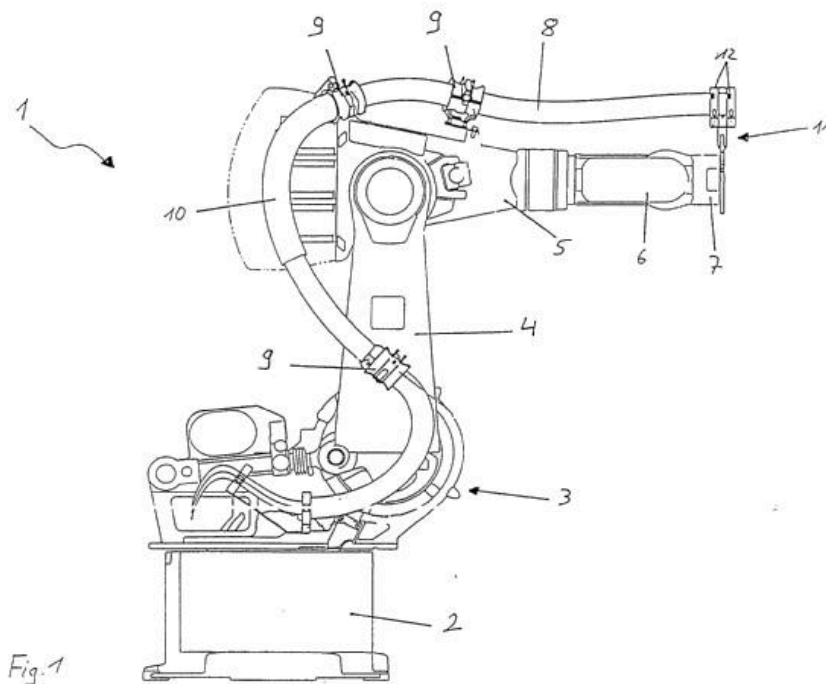
Illustrative example of subject matter classified in this group:

**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	B66C 13/12
Supports for pipes, cables or protective tubing	F16L 3/00
Arrangements of electric cables or lines between relatively-movable parts	H02G 11/00

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",

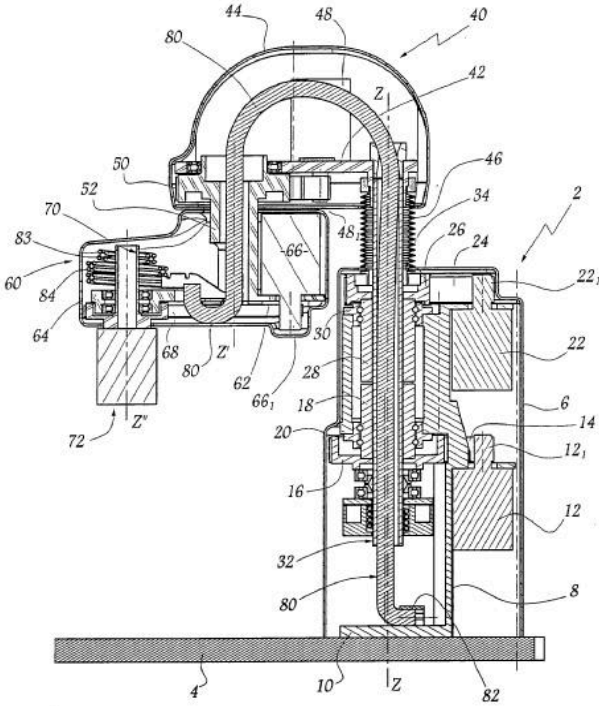
B25J 19/0029

{arranged within the different robot elements}

Definition statement

This place covers:

Illustrative example of subject matter classified in this group:



B25J 19/0037

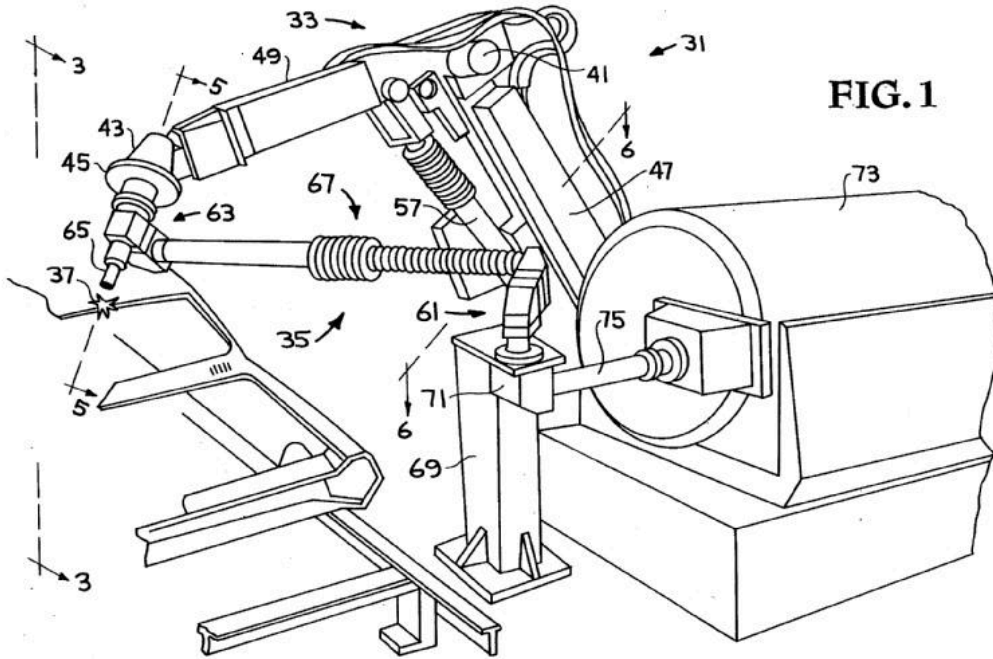
{comprising a light beam pathway, e.g. laser}

Definition statement

This place covers:

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

US 4667081



References

Informative references

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

Robots for moving a laser beam	B23K 26/0884
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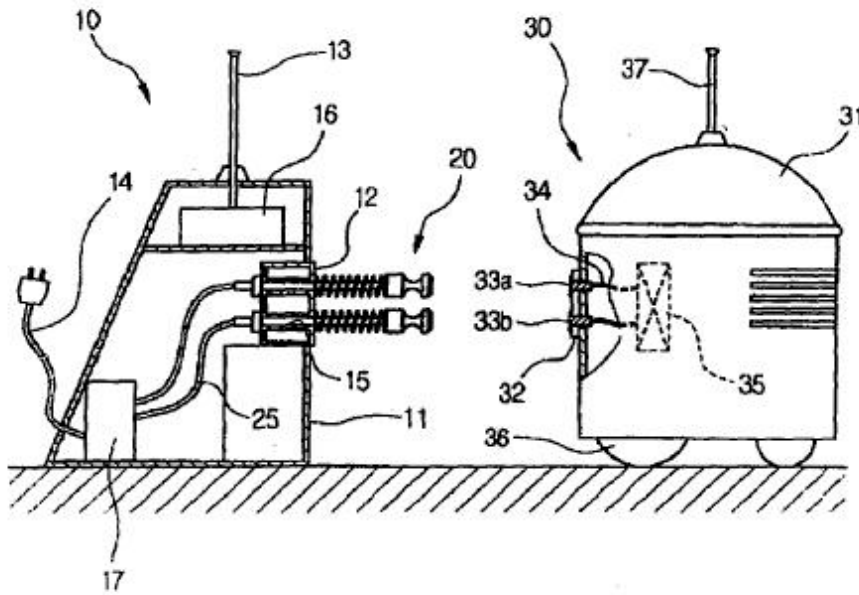
B25J 19/005

{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"

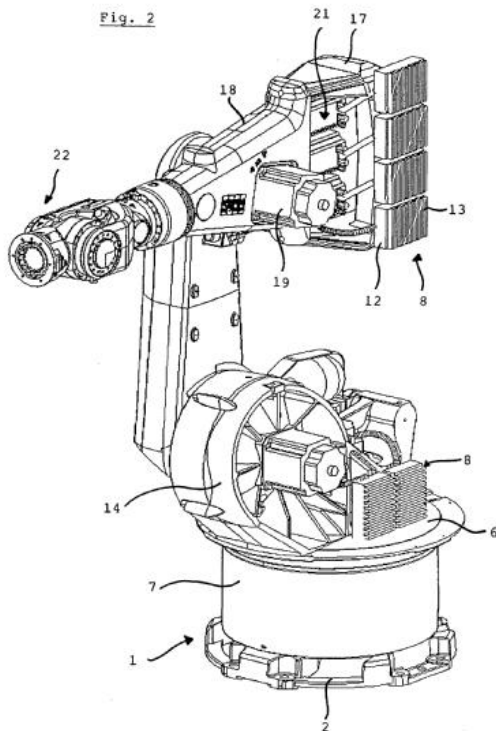
B25J 19/0054

{Cooling means}

Definition statement

This place covers:

Illustrative example of subject matter classified in this group:



B25J 19/0058

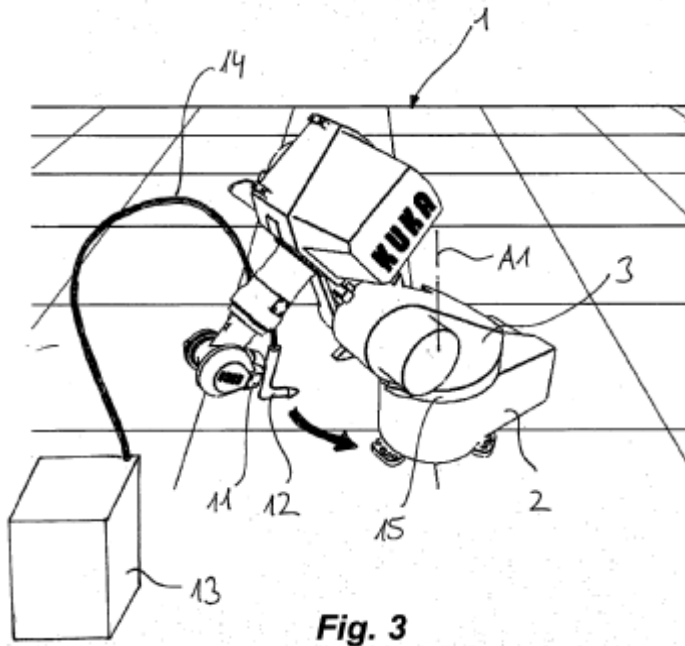
{Means for cleaning manipulators, e.g. dust removing means}

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	B25J 19/0075
---	------------------------------

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

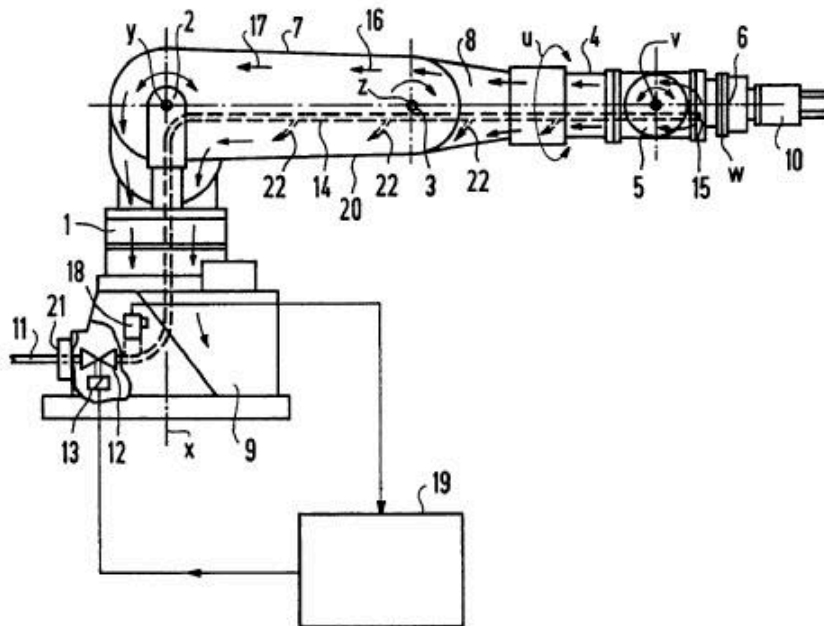
Informative references

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

Protective coverings for parts of machine tools	B23Q 11/08
---	----------------------------

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

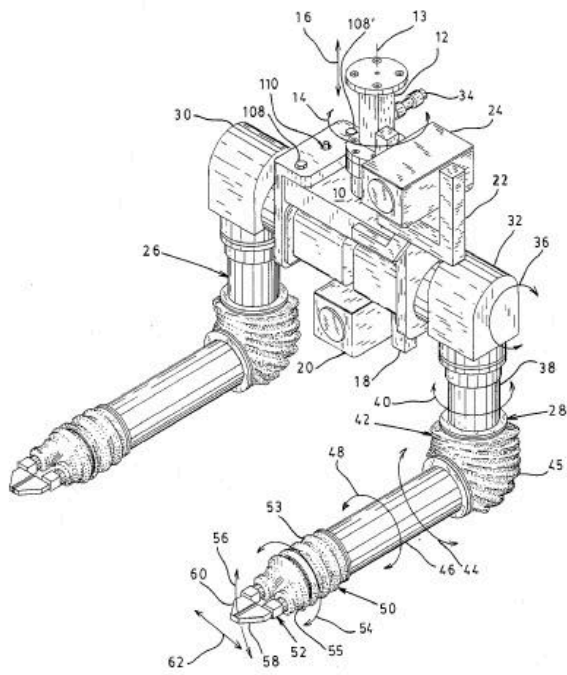


FIG. 1

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"

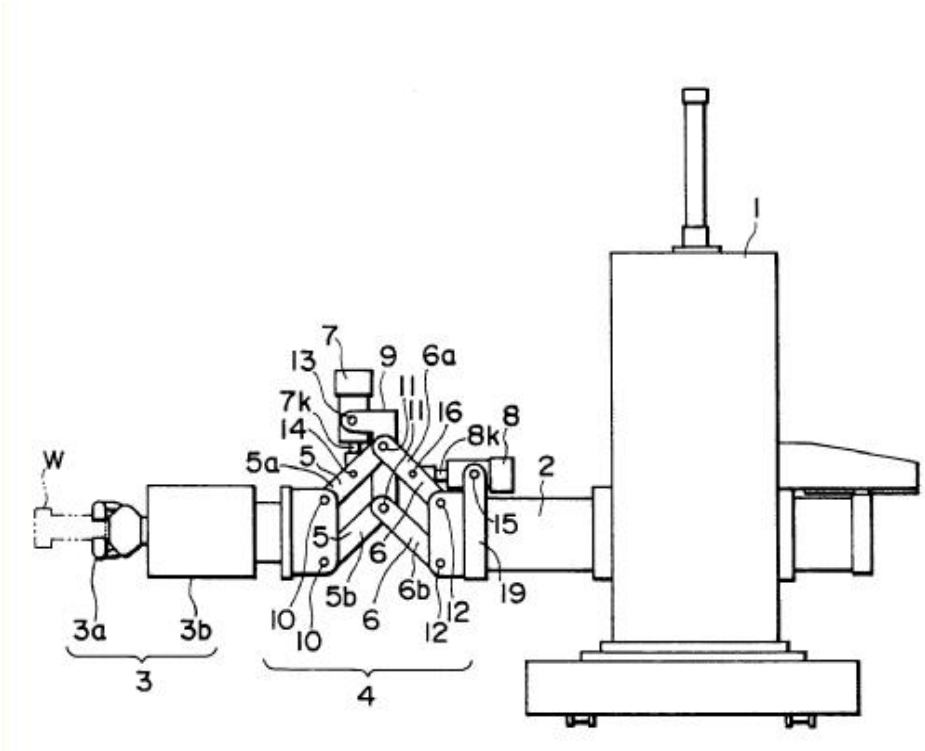
B25J 19/0091

{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	B25J 13/08
--	----------------------------

B25J 19/021

{Optical sensing devices}

Definition statement

This place covers:

Sensors having optical components.

B25J 19/022

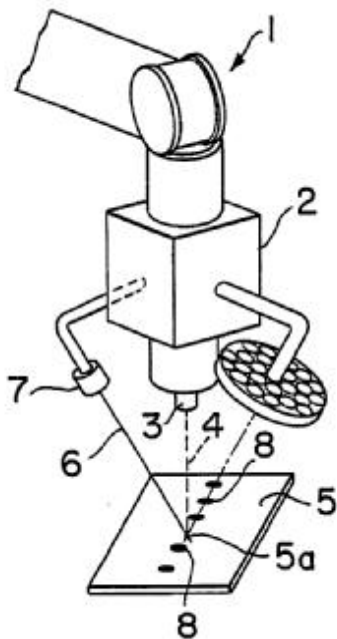
{using lasers}

Definition statement

This place covers:

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

EP 0339560



B25J 19/023

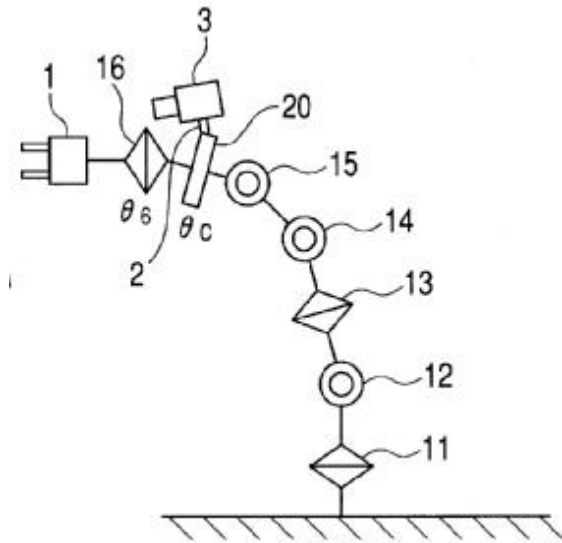
{including video camera means}

Definition statement

This place covers:

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

US 2010298978



B25J 19/025

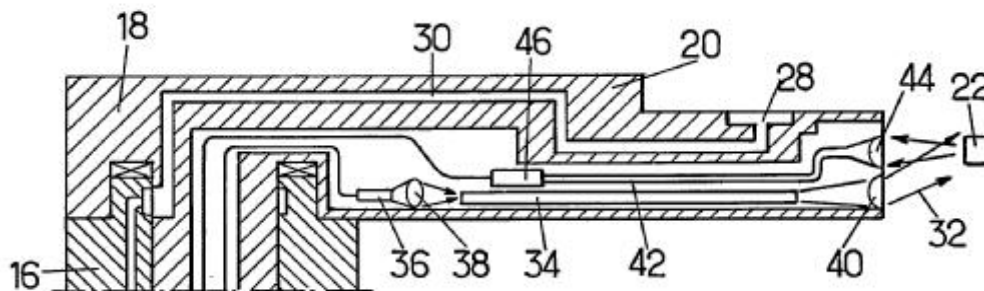
{including optical fibres}

Definition statement

This place covers:

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

FR 2664525



B25J 19/026

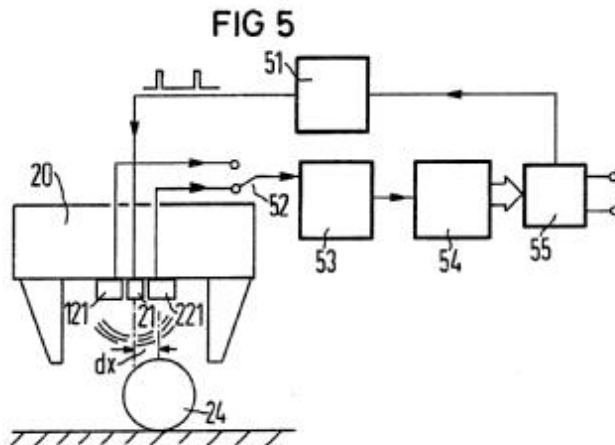
{Acoustical sensing devices}

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

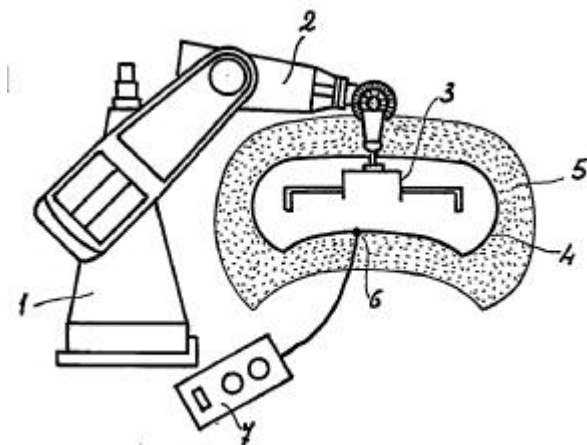
{Electromagnetic sensing devices}

Definition statement

This place covers:

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

FR 2663105



B25J 19/028

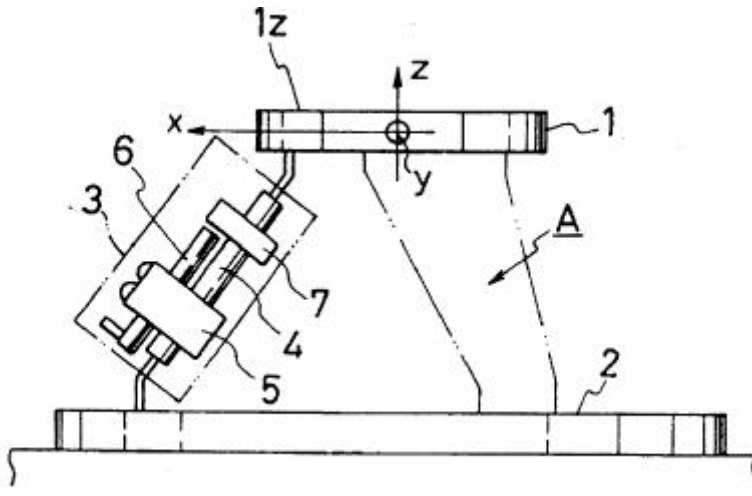
{Piezoresistive or piezoelectric sensing devices}

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

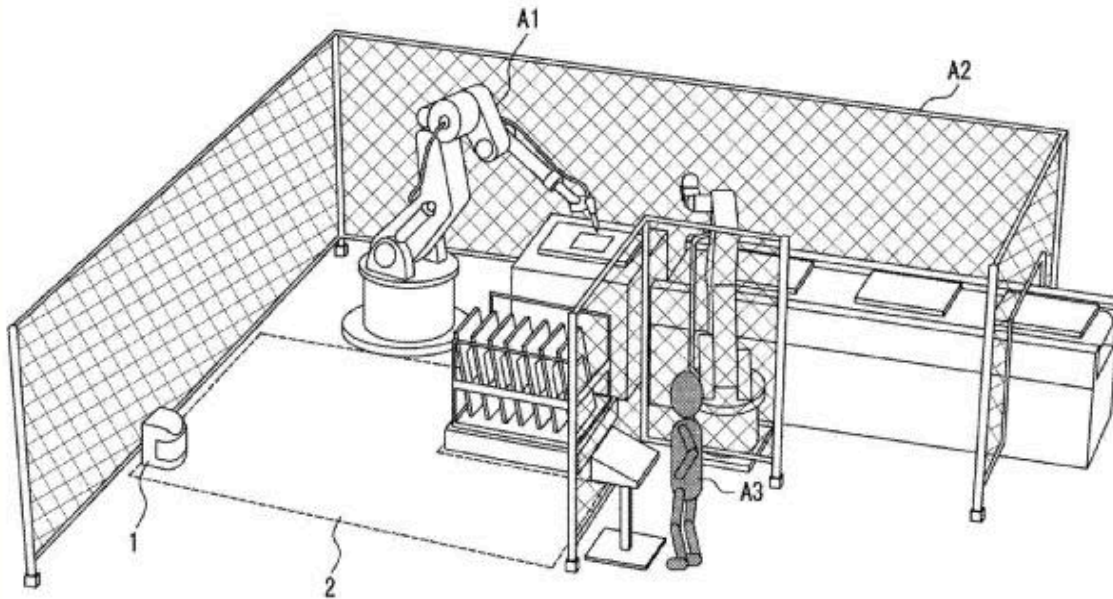
Definition statement

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	F16P 1/00
Safety devices acting in conjunction with the control or operation of the machine	F16P 3/00

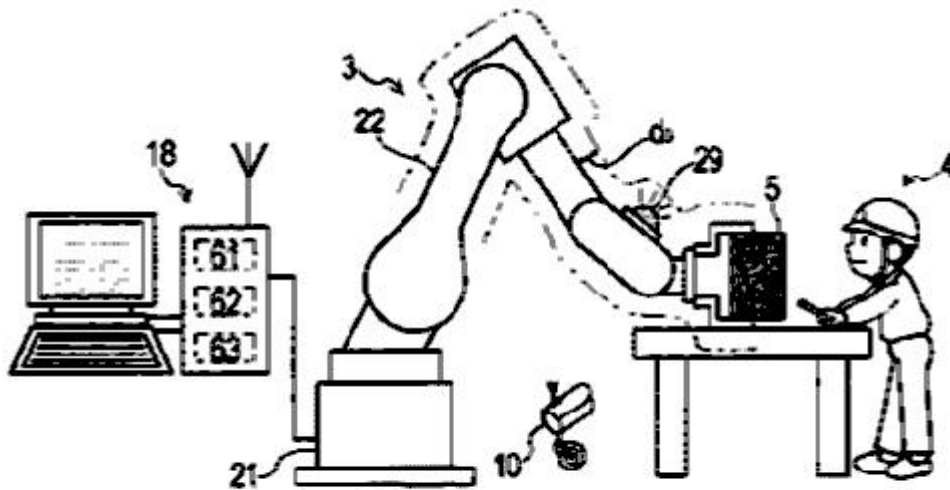
B25J 19/061

{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

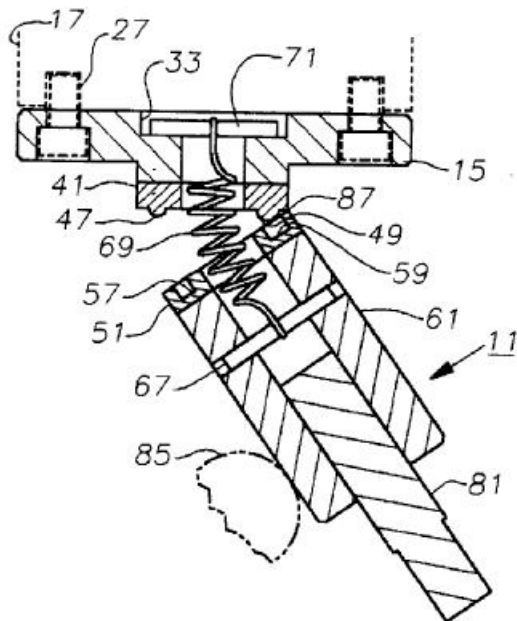


Fig. 5

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

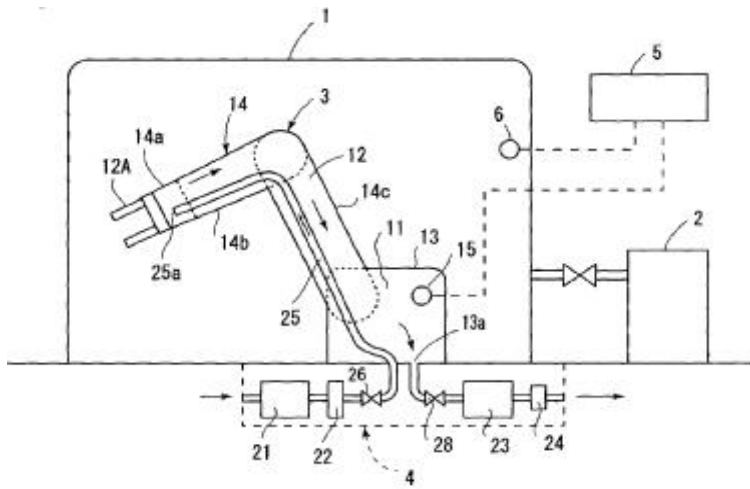
{Clean rooms}

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

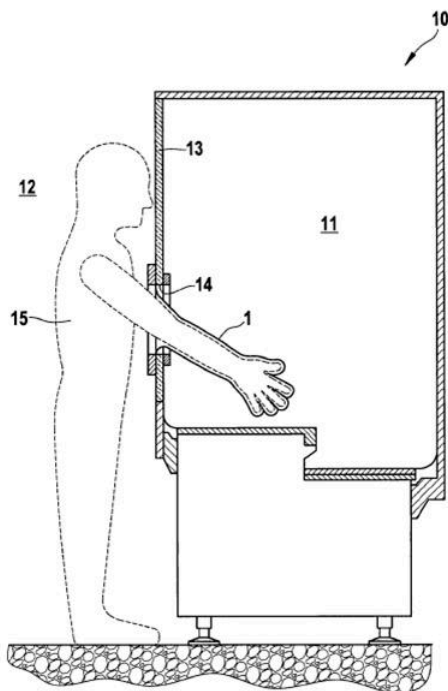


Fig. 1

References

Informative references

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

Baby incubators	A61G 11/00
Microbiological incubators	C12M 1/005
Apparatus providing an anaerobic atmosphere	C12M 1/045

Synonyms and Keywords

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

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