

## B21C

### MANUFACTURE OF METAL SHEETS, WIRE, RODS, TUBES OR PROFILES, OTHERWISE THAN BY ROLLING; AUXILIARY OPERATIONS USED IN CONNECTION WITH METAL-WORKING WITHOUT ESSENTIALLY REMOVING MATERIAL

#### Definition statement

*This place covers:*

The methods and devices for working metal as follows:

Metal drawing (covered by [B21C 1/00](#) - [B21C 19/00](#))

Metal extrusion (covered by [B21C 23/00](#) - [B21C 35/00](#))

Methods for manufacturing metal sheets, bars, wires tubes or the like. (covered by [B21C 37/00](#))

Devices for cleaning metal products adapted for use with machines of this subclass (covered by [B21C 43/00](#))

Separating mandrels from work (covered by [B21C 45/00](#))

Winding-up, coiling, winding-off metal wire or metal band (covered by [B21C 47/00](#))

Devices for temporarily accumulating material (covered by [B21C 49/00](#))

Measuring, gauging, indicating, counting, marking devices adapted for use with subclasses [B21B](#) - [B21F](#) (covered by [B21C 51/00](#))

Other subject-matter concerning the manufacture of metal sheets, wire, rods, tubes or profiles otherwise than by rolling as well as other subject-matter concerning auxiliary operations used in connection with metal-working without essentially removing material (covered by [B21C 99/00](#)).

#### References

##### Limiting references

*This place does not cover:*

Working or processing of sheet metal or metal tubes, rods or profiles	<a href="#">B21D</a>
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##### Informative references

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

Methods for manufacturing metal sheets, bars, wires tubes or the like by rolling	<a href="#">B21B</a>
Devices for cleaning metal sheet from scale, i.e. descaling, in combination with rolling	<a href="#">B21B 45/00</a>
Making forged or pressed products	<a href="#">B21K</a>
Soldering, welding	<a href="#">B23K</a>
Other working of metal, combined operations	<a href="#">B23P</a>
Transport or storage devices, e.g. conveyors for loading	<a href="#">B65G</a>
Handling thin or filamentary material, e.g. sheets, webs, cables	<a href="#">B65H</a>

Devices for cleaning in general	<a href="#">C08B</a>
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## B21C 1/00

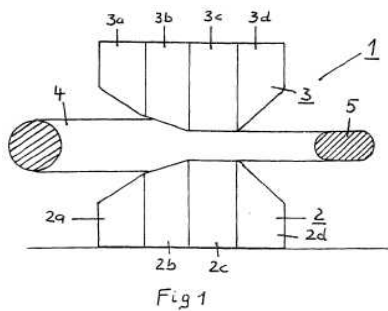
### Manufacture of metal sheets, metal wire, metal rods, metal tubes by drawing

#### Definition statement

*This place covers:*

Methods, devices and drives for metal drawing.

Metal drawing consists in reducing the cross-section of a work piece (e.g. reducing the diameter of a metal rod or wire) by forcing it through a die. Metal drawing differs from extrusion by the lower rate of reduction.



#### References

##### Informative references

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

Profiling tools for metal drawing tools, dies and mandrels	<a href="#">B21C 3/00</a>
Pointing	<a href="#">B21C 5/00</a>
Cooling, heating or lubricating drawing material	<a href="#">B21C 9/00</a>

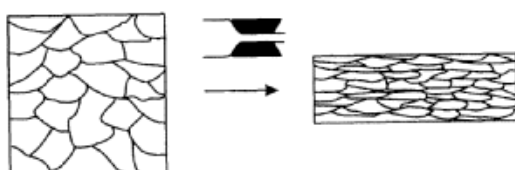
## B21C 1/003

{Drawing materials of special alloys so far as the composition of the alloy requires or permits special drawing methods or sequences}

#### Definition statement

*This place covers:*

All aspects relating to drawing special alloys with the purpose, for example, of modifying the physical properties of such alloys, and all special drawing methods.



**References**

**Informative references**

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

Modifying the physical properties by deformation during manufacturing of ferrous alloys rods or wires	<a href="#">C21D 8/065</a>
Changing the physical structure of non-ferrous metals or alloys by heat treatment or by hot or cold working	<a href="#">C22F 1/00</a>
Ropes or cables built-up from metal wires, e.g. of section wires around a hemp core, the wires being characterised by an anticorrosive or adhesion promoting coating	<a href="#">D07B 1/0666</a>

**B21C 1/006**

{using vibratory energy}

**Definition statement**

This place covers:

All aspects relating to drawing metal sheets, metal wire, metal rods, metal tubes applying vibratory energy, for example, to the mandrel and/or the dies.

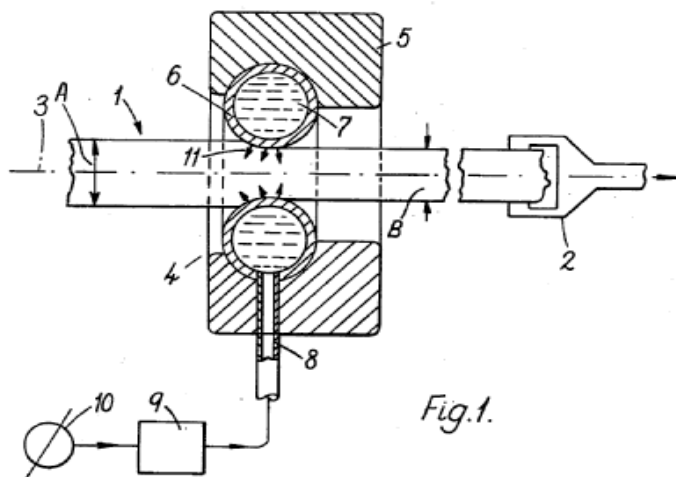
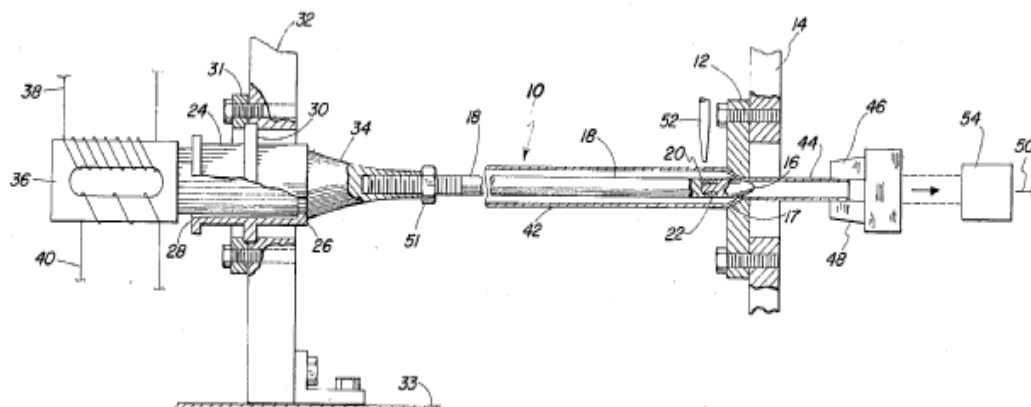


Fig. 1.

## B21C 1/02

Drawing metal wire or like flexible metallic material by drawing machines or apparatus in which the drawing action is effected by drums

### Definition statement

*This place covers:*

All aspects relating to the drawing action effected by drums.

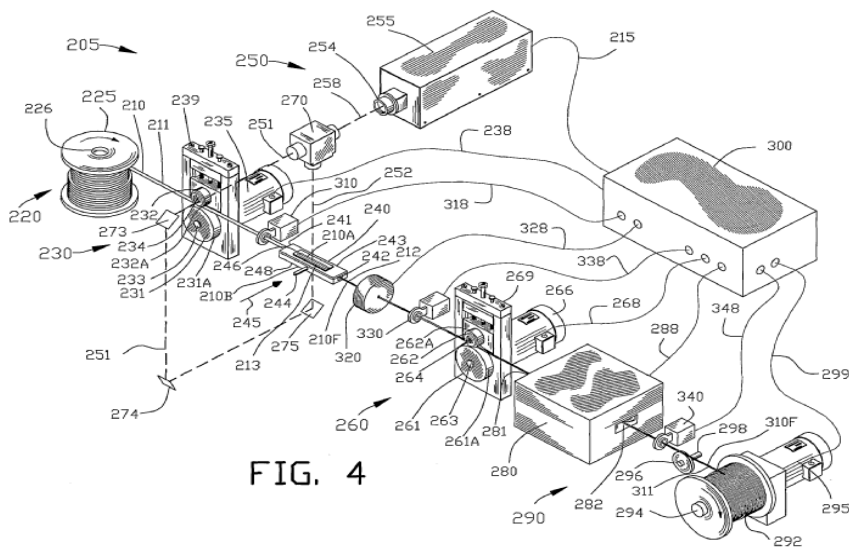
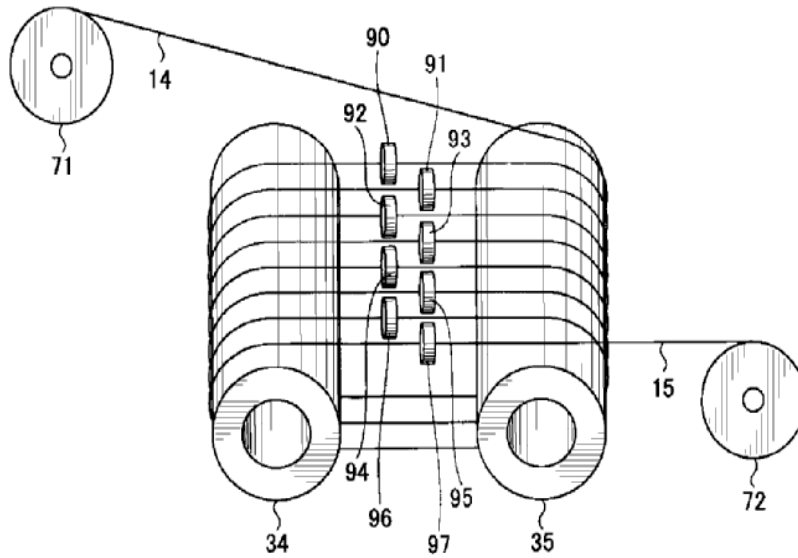


FIG. 4

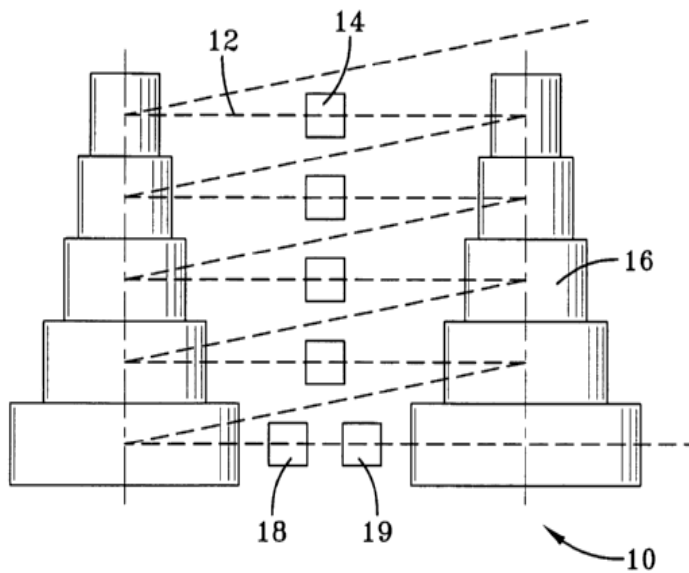
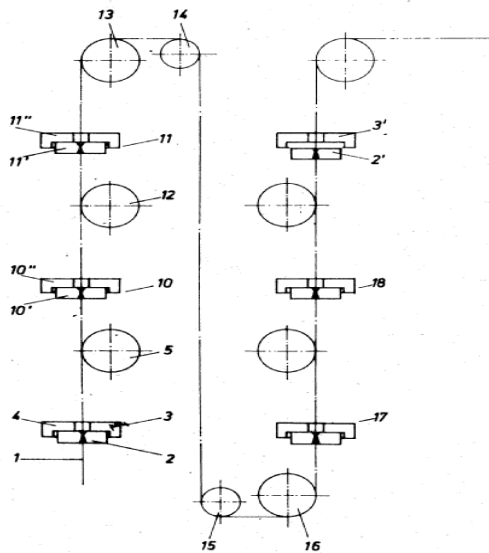
## B21C 1/04

with two or more dies operating in series

### Definition statement

*This place covers:*

All aspects relating to drawing dies operating in series.



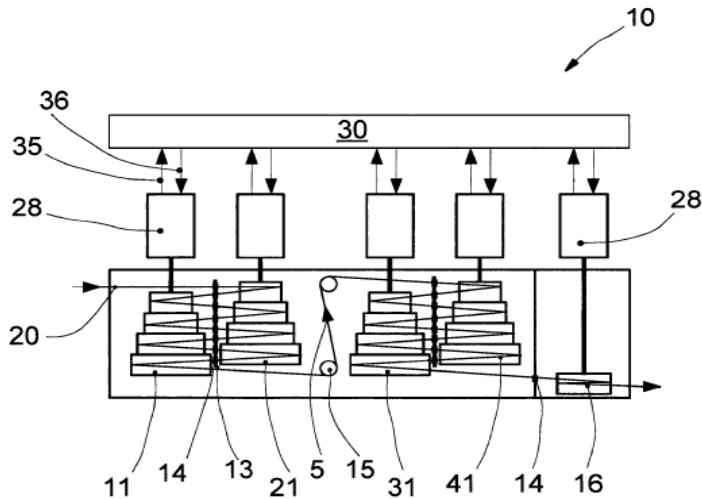
## B21C 1/06

in which the material slips on the drums

### Definition statement

*This place covers:*

All aspects relating to wire drawing devices and methods whereby positive slip insures that all portions of the wire are taut and that there is adequate frictional force exerted on the wire by the drums to pull the wire through the dies.



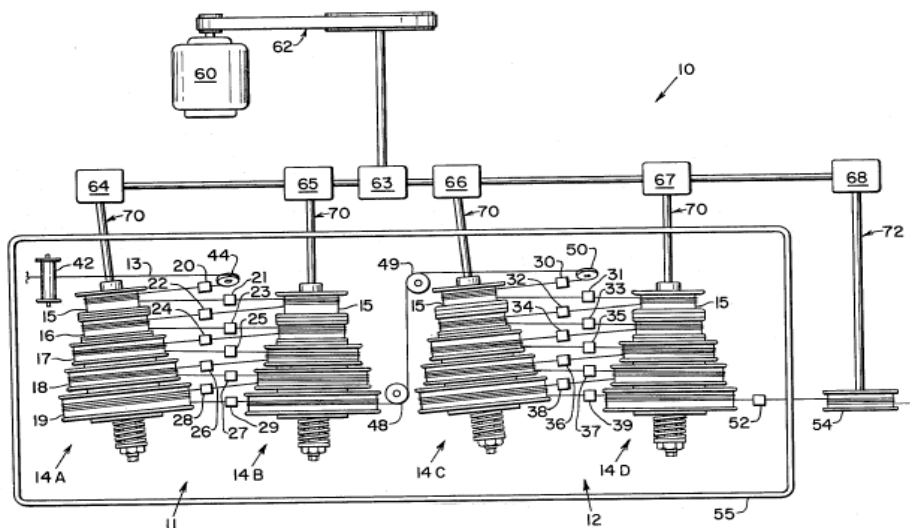
## B21C 1/08

in which the material does not slip on the drums

### Definition statement

*This place covers:*

All aspects relating to wire drawing devices and methods whereby wire slips on the drawing drums are eliminated.



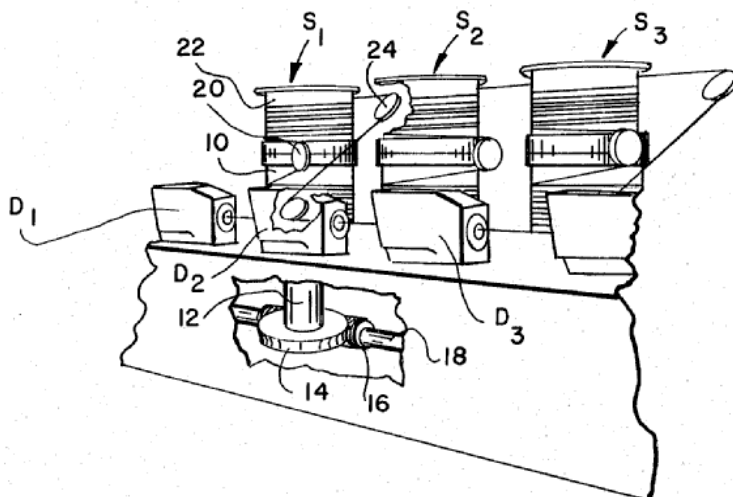
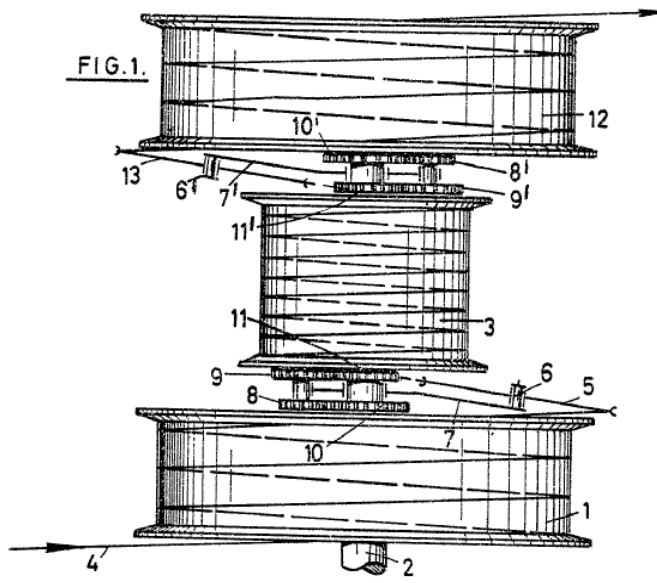
## B21C 1/10

with accumulation of material between consecutively-arranged dies

### Definition statement

*This place covers:*

All aspects relating to wire drawing devices and methods whereby a certain amount of wire is accumulated in order, for example, to allow steady operation of the machine, even though the speeds of the various drums are not in exact proportion to the elongation of the wire.



### References

#### Informative references

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

Devices for temporarily storing filamentary material during forwarding, e.g. for buffer storage	<a href="#">B65H 51/20</a>
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## B21C 1/12

**Regulating or controlling speed of drawing drums, e.g. to influence tension;  
Drives; Stop or relief mechanisms**

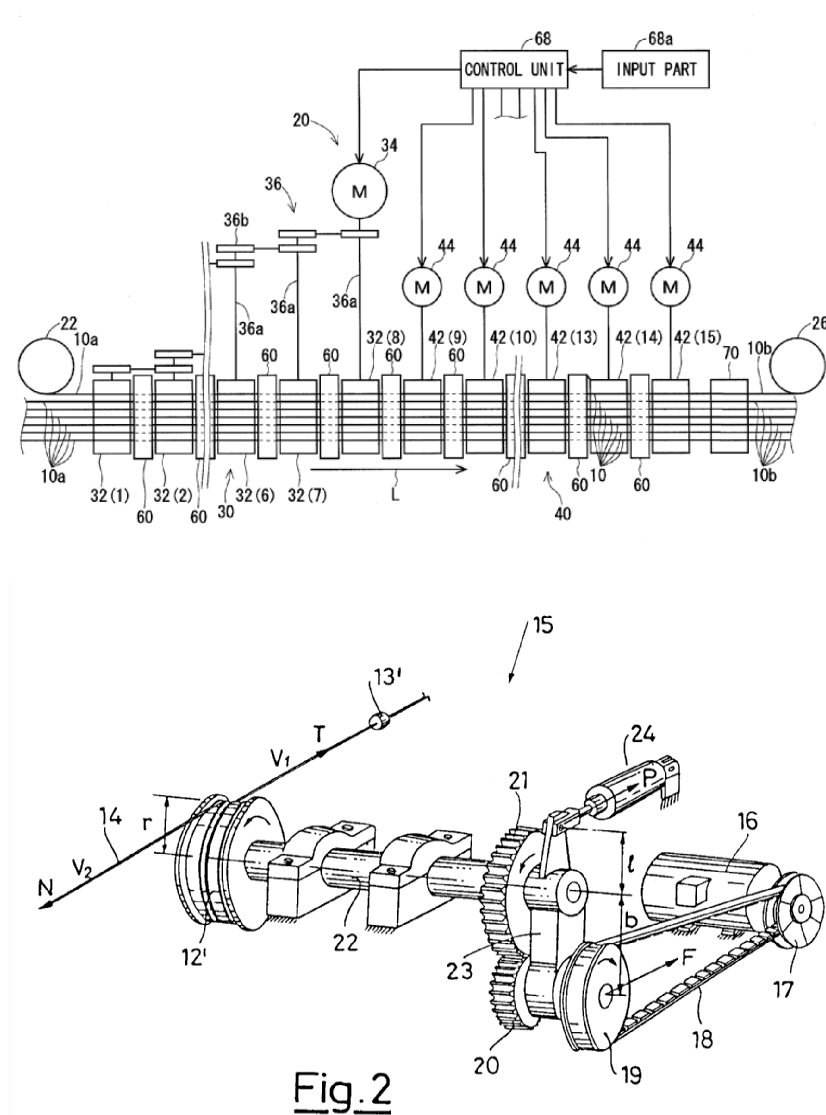
### Definition statement

*This place covers:*

All aspects relating to wire drawing devices and methods, whereby drums are controlled to apply the correct tension on the wire.

Details of drives for drums.

Stop or relief mechanisms.



### References

#### Informative references

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

Couplings for drums	<a href="#">B21C 1/14</a>
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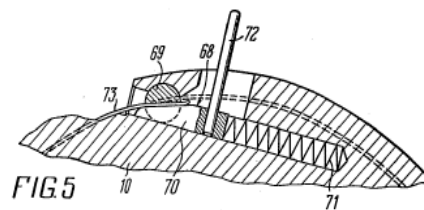
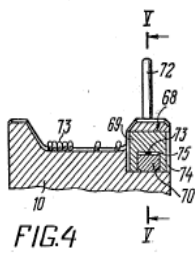
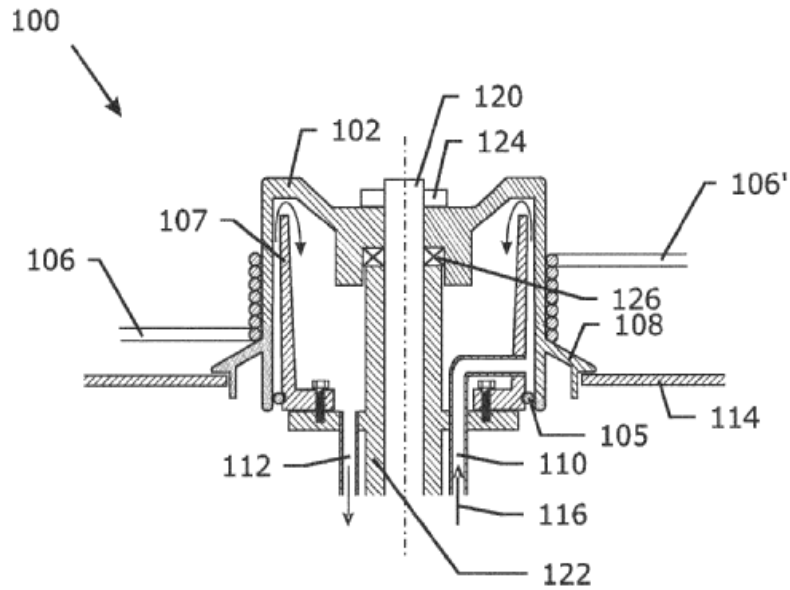
## B21C 1/14

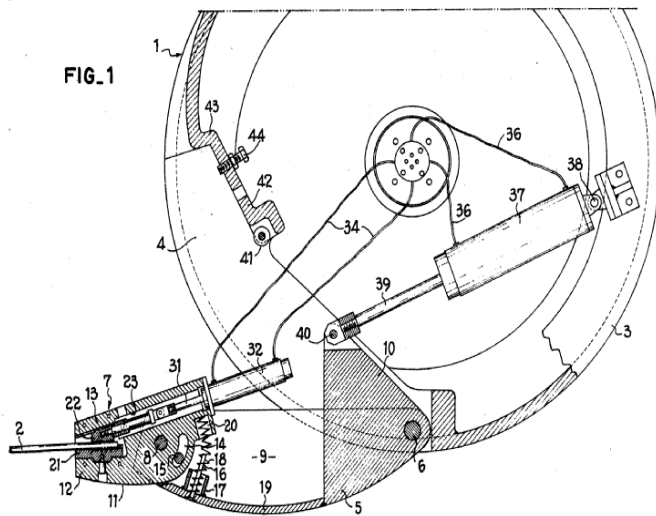
**Drums, e.g. capstans; Connection of grippers thereto; Grippers specially adapted for drawing machines or apparatus of the drum type; Couplings specially adapted for these drums**

### Definition statement

*This place covers:*

All aspects relating to wire drawing capstans and gripping means cooperating with said capstans.





**References**

**Informative references**

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

Capstans or winches in general	<a href="#">B66D</a>
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**B21C 1/16**

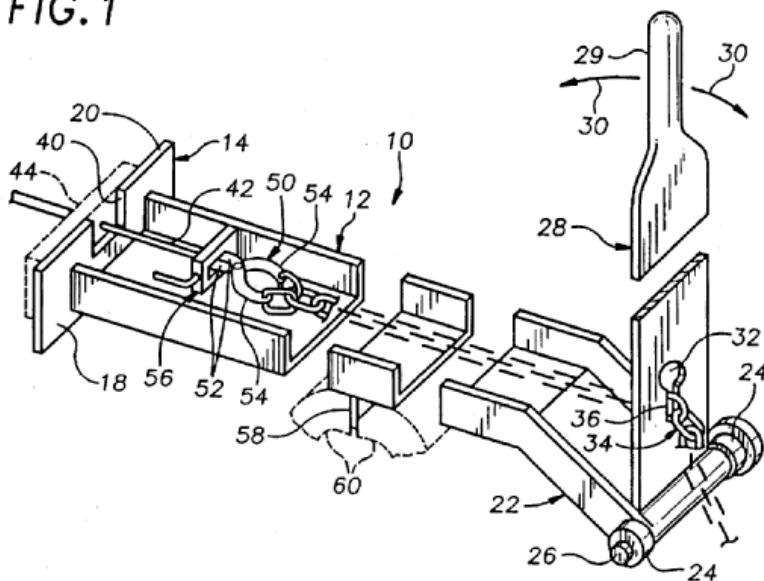
**Metal drawing by machines or apparatus in which the drawing action is effected by other means than drums, e.g. by a longitudinally-moved carriage pulling or pushing the work or stock for making metal sheets, bars, or tubes**

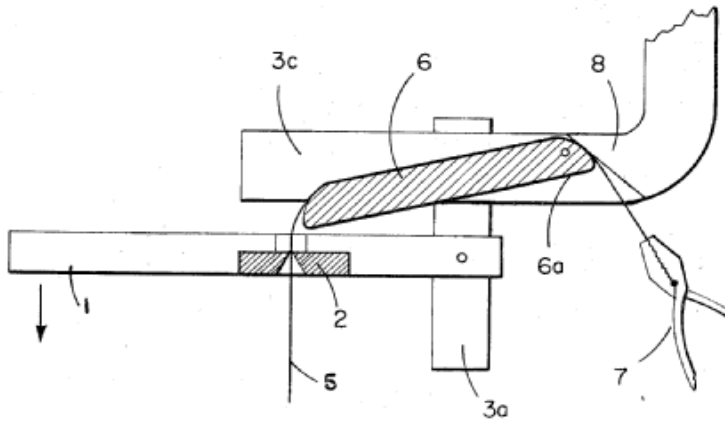
**Definition statement**

*This place covers:*

All aspects relating to metal drawing devices and methods not provided in the sub-groups.

**FIG. 1**





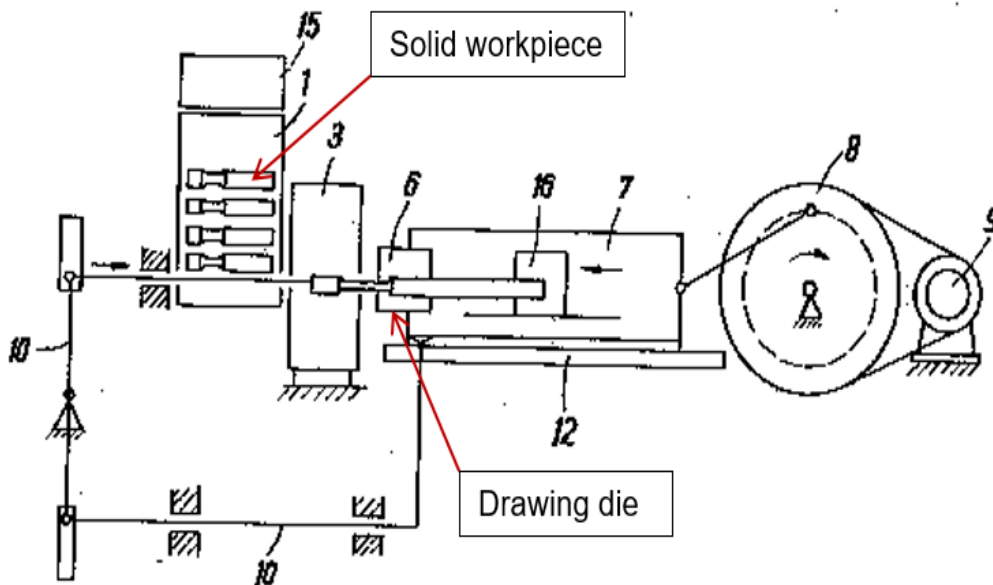
## B21C 1/18

from stock of limited length ([B21C 1/22](#) takes precedence)

### Definition statement

*This place covers:*

All aspects relating to drawing devices and methods from solid stocks of limited length.



### References

#### Limiting references

*This place does not cover:*

Metal drawing by machines specially adapted for making tubular articles	<a href="#">B21C 1/22</a>
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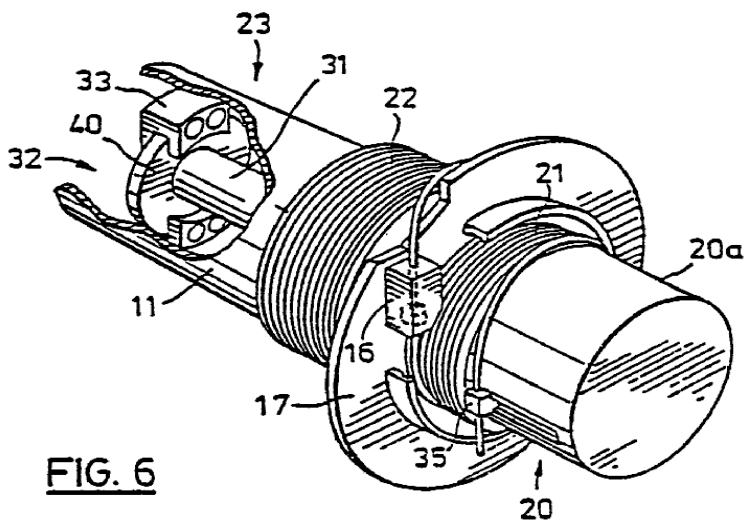
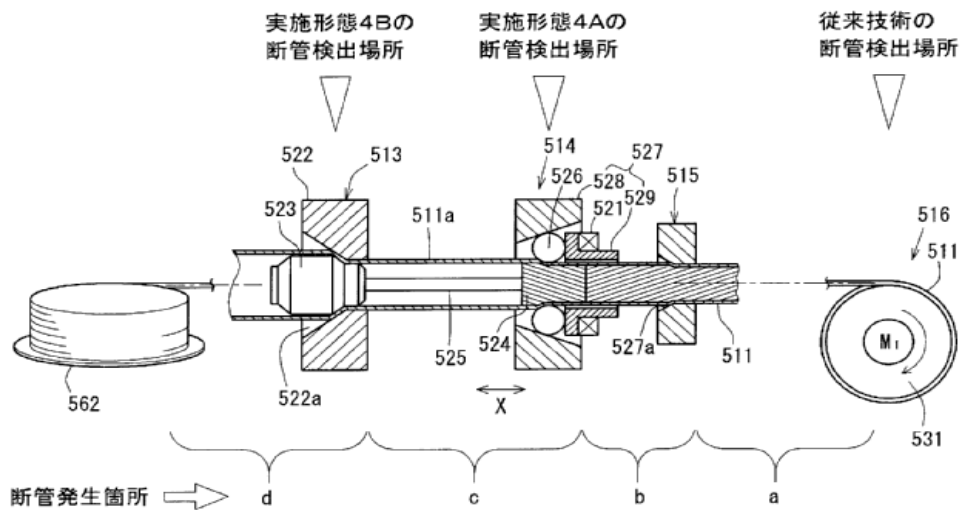
## B21C 1/20

from stock of essentially unlimited length ([B21C 1/22](#) takes precedence)

### Definition statement

*This place covers:*

All aspects relating to drawing devices and methods from stock of unlimited length.



### References

#### Limiting references

*This place does not cover:*

Metal drawing by machines specially adapted for making tubular articles	<a href="#">B21C 1/22</a>
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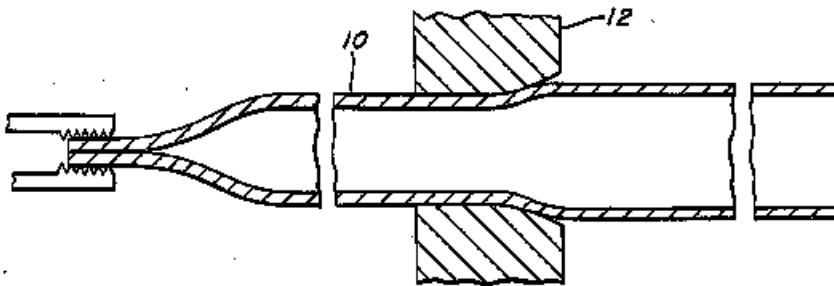
## B21C 1/22

especially adapted for making tubular articles (bending sheet metal into tubular form by drawing [B21D 5/10](#))

### Definition statement

*This place covers:*

All aspects relating to drawing devices and methods specially adapted for making tubular articles, also starting from stock of limited length.



### References

#### Informative references

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

Tube-rolling not restricted to methods provided for in only one of groups <a href="#">B21B 17/00</a> , <a href="#">B21B 19/00</a> , <a href="#">B21B 21/00</a> , e.g. combined processes	<a href="#">B21B 23/00</a>
Bending sheet metal along straight lines, e.g. to form simple curves for making tubes	<a href="#">B21D 5/10</a>
Rigid pipes wound from sheets or strips, with or without reinforcement, made of metal	<a href="#">F16L 9/165</a>

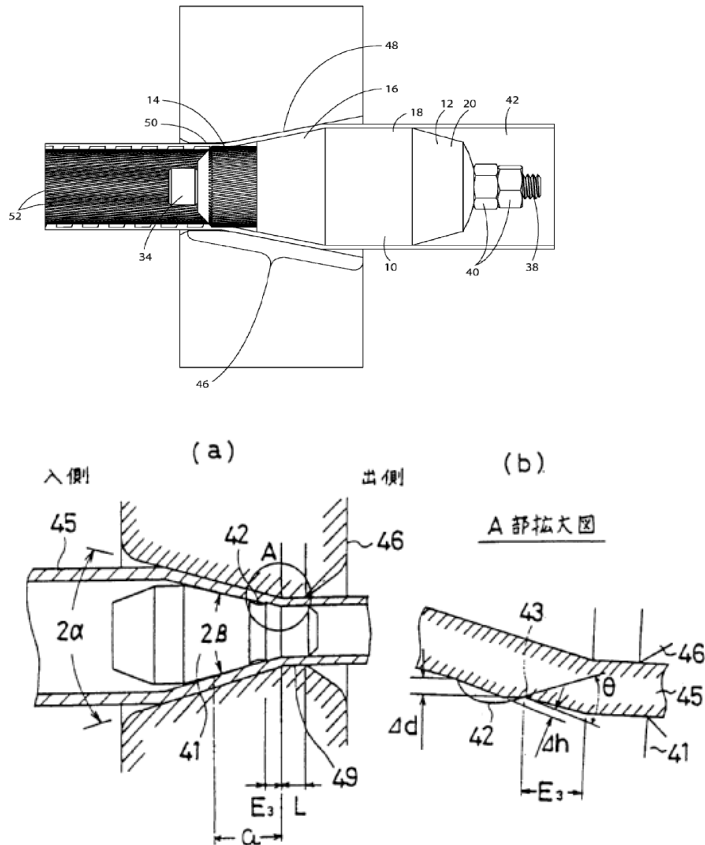
## B21C 1/24

### by means of mandrels

#### Definition statement

*This place covers:*

All aspects relating to drawing devices and methods specially adapted for making tubular articles by means of mandrels.



#### References

##### Informative references

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

Mandrels	<a href="#">B21C 3/16</a>
Making helical or similar guides in or on tubes without removing material, e.g. by drawing same over mandrels, by pushing same through dies; {Making tubes with angled walls, ribbed tubes and tubes with decorated walls}	<a href="#">B21C 37/20</a>

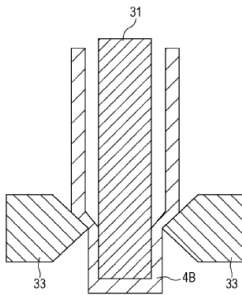
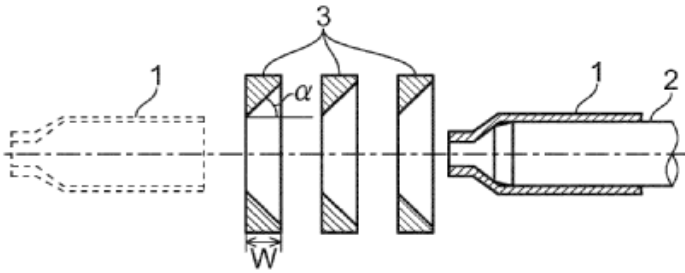
## B21C 1/26

### Push-bench drawing

#### Definition statement

*This place covers:*

All aspects relating to drawing devices and methods specially adapted for making tubular articles by means of mandrels by push-bench drawing.



#### References

##### Informative references

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

Mandrels; Mounting or adjusting same	<a href="#">B21C 3/16</a>
Tube-rolling not restricted to methods provided for in only one of groups <a href="#">B21B 17/00</a> , <a href="#">B21B 19/00</a> , <a href="#">B21B 21/00</a> , e.g. combined processes	<a href="#">B21B 23/00</a>
Shaping without cutting, by deep-drawing	<a href="#">B21D 22/20</a>

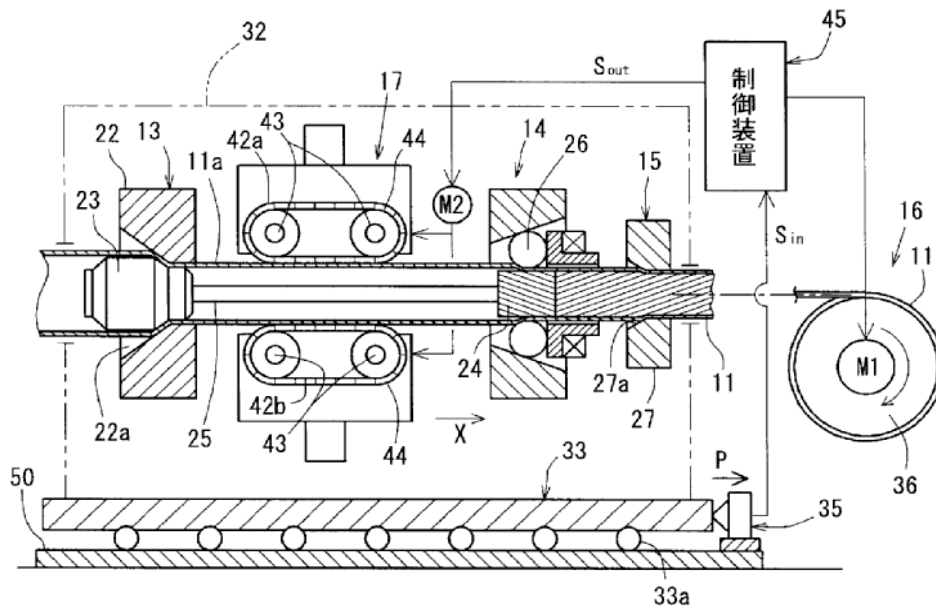
## B21C 1/27

### Carriages; Drives

#### Definition statement

*This place covers:*

All aspects relating to drawing carriages and drives.



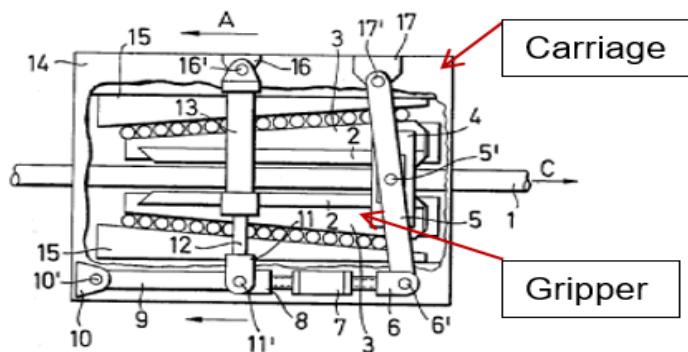
## B21C 1/28

### Carriages; Connections of grippers thereto; Grippers

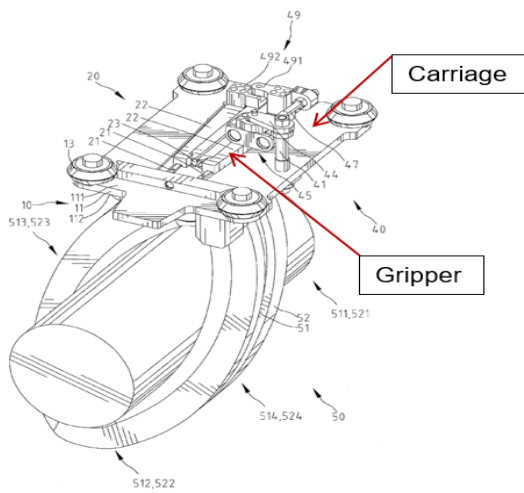
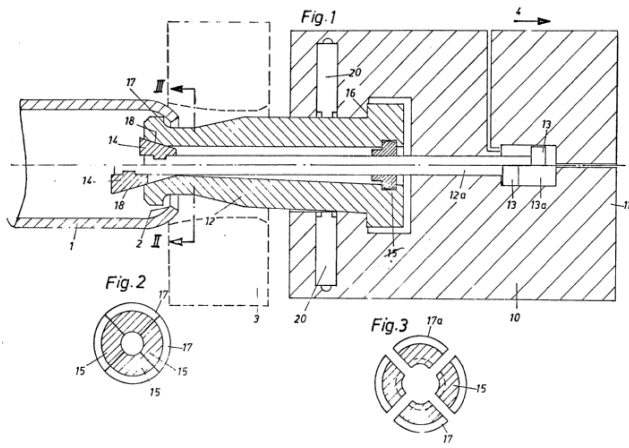
#### Definition statement

*This place covers:*

All aspects relating to drawing carriages, connections of grippers thereto and grippers.







**References**

**Informative references**

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

Grippers for drawing machines of the drum type	<a href="#">B21C 1/14</a>
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## B21C 1/30

Drives, e.g. carriage-traversing mechanisms; Driving elements, e.g. drawing chains; Controlling the drive {(endlessly revolving chain systems for metal coiling: [B21C 47/3458](#))}

### Definition statement

*This place covers:*

All aspects relating to drives for drawing.

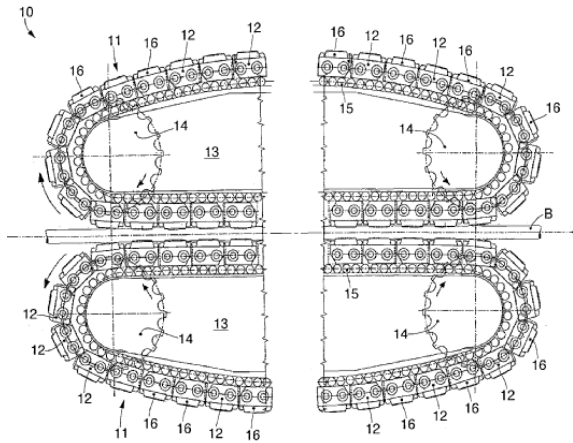
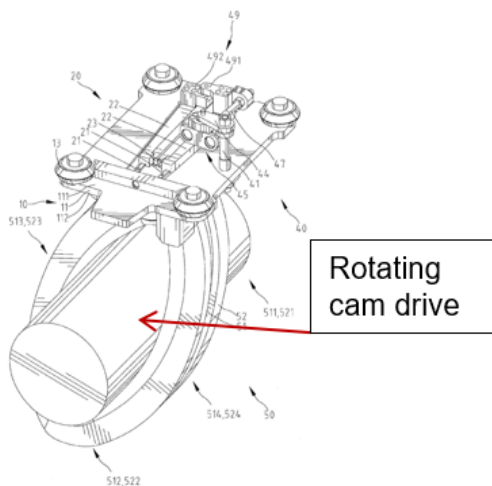


fig. 1



### References

#### Limiting references

*This place does not cover:*

Endlessly revolving chain systems	<a href="#">B21C 47/3458</a>
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#### Informative references

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

Removing or drawing-off work	<a href="#">B21C 35/02</a>
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Forwarding filamentary material; Aprons, endless belts, lattices, or like driven elements	<a href="#">B65H 51/14</a>
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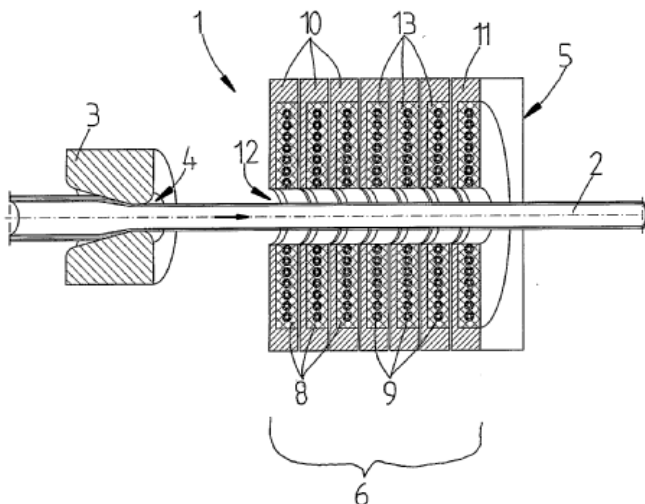
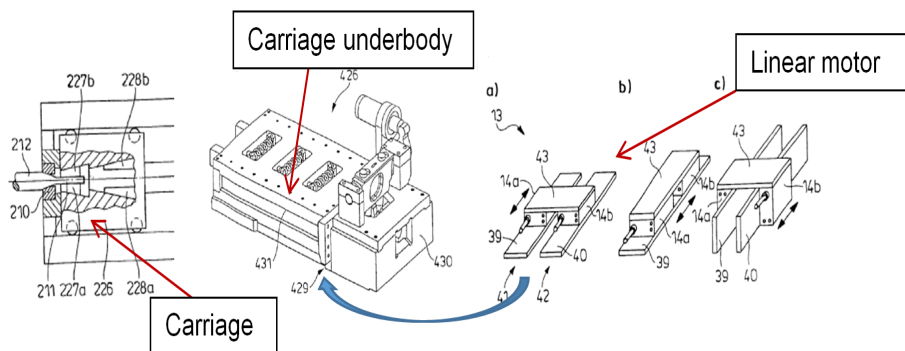
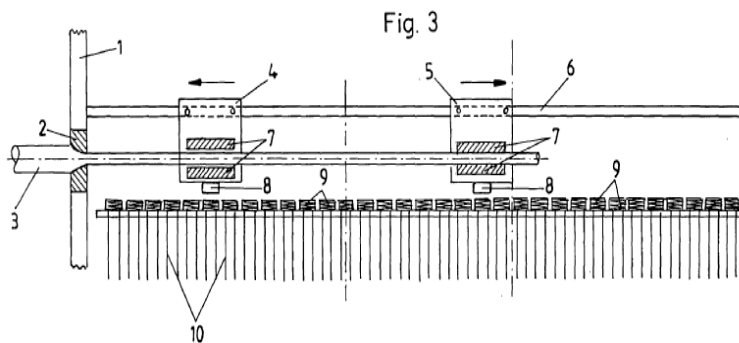
## B21C 1/305

### {Linear motor pulling devices}

#### Definition statement

*This place covers:*

All aspects relating to electric linear motors for drawing.



**References**

**Informative references**

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

<p>Propulsion systems in which a rigid body is moved along a path due to dynamo-electric interaction between the body and a magnetic field travelling along the path; Linear motors; Sectional motors</p>	<p><a href="#">H02K 41/02</a></p>
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**B21C 1/32**

**Feeding or discharging the material or mandrels**

**Definition statement**

This place covers:

All aspects relating to feeding or discharging the material or mandrels.

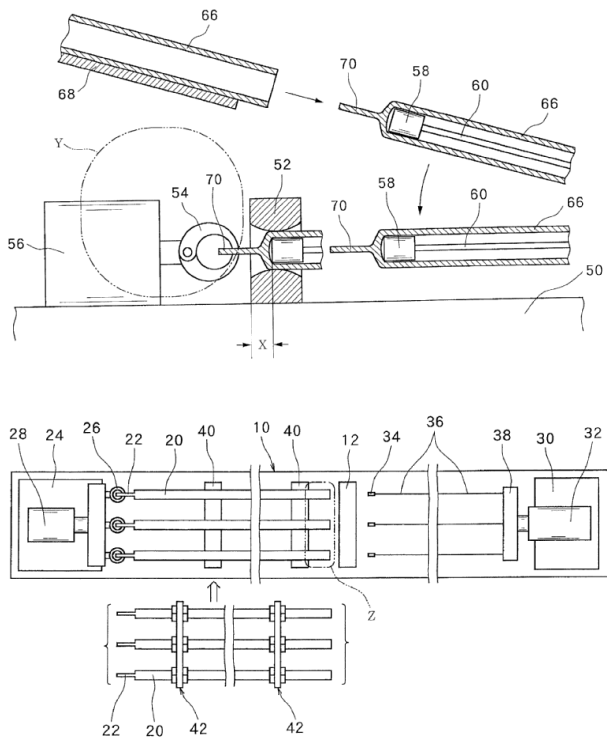


Fig. 1a

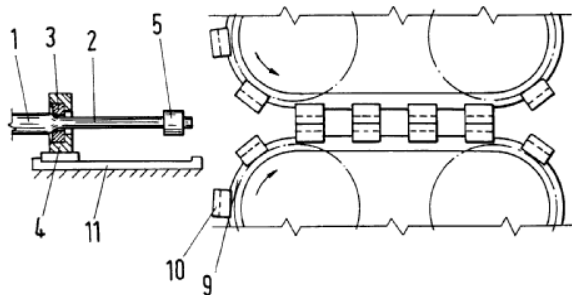
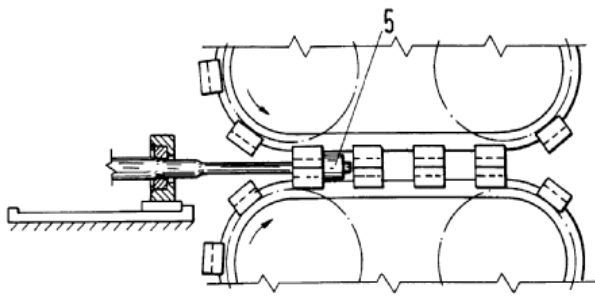


Fig.1b



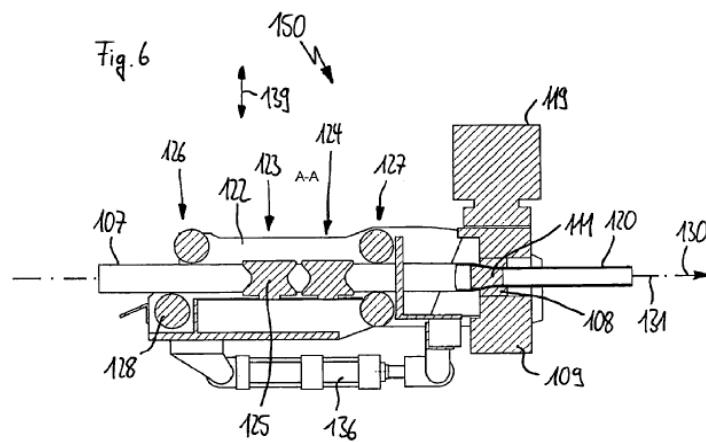
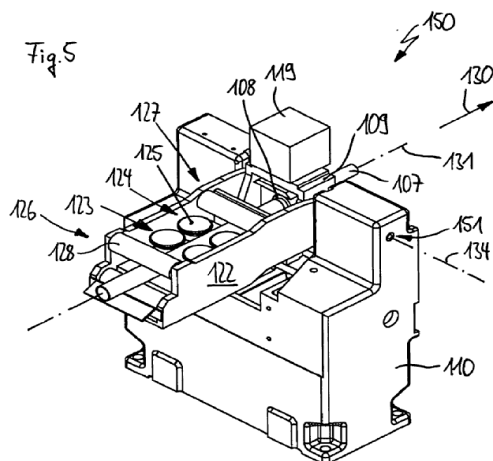
## B21C 1/34

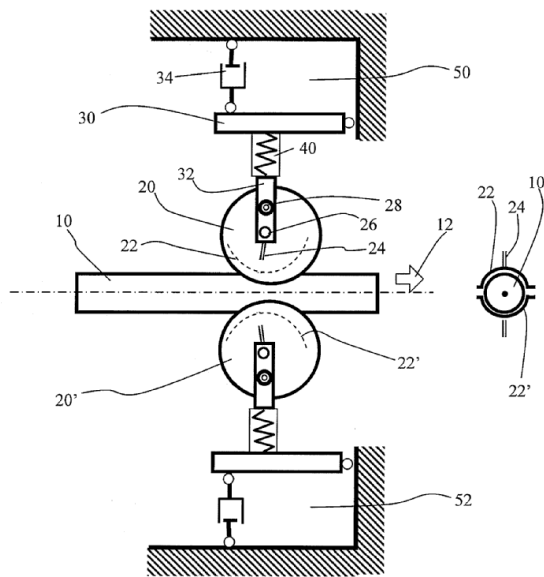
### Guiding or supporting the material or mandrels

#### Definition statement

*This place covers:*

All aspects relating to guiding or supporting the material or mandrels.





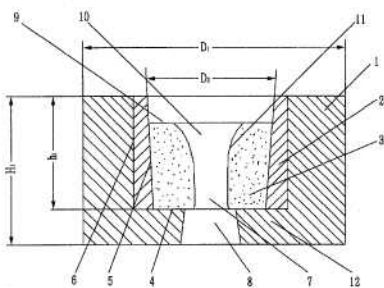
**B21C 3/00**

**Profiling tools for metal drawing; Combinations of dies and mandrels**

**Definition statement**

*This place covers:*

All aspects relating to metal drawing tools (dies, die holders, mandrels).



Source: WO2008010614

**References**

**Informative references**

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

Metal drawing machines, methods or drives	<a href="#">B21C 1/00</a>
Pointing	<a href="#">B21C 5/00</a>
Cooling, heating or lubricating drawing material	<a href="#">B21C 9/00</a>

## B21C 3/16

### Mandrels; Mounting or adjusting same

#### References

##### *Informative references*

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

Separating mandrels from work	<a href="#">B21C 45/00</a>
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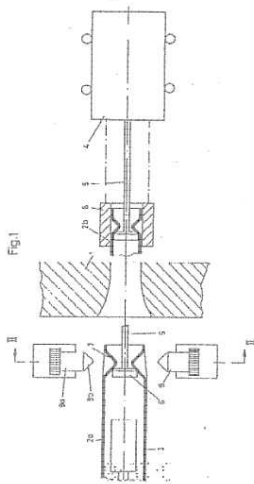
## B21C 5/00

### Pointing; Push-pointing

#### Definition statement

*This place covers:*

Reducing the cross-section of the material's leading end for easing its insertion into the drawing die prior to drawing.



Source: DE3634229

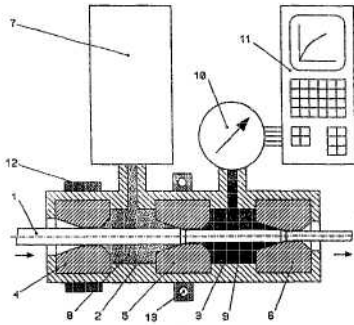
## B21C 9/00

**Cooling, heating or lubricating drawing material ([B21C 3/14](#) takes precedence)**

### Definition statement

*This place covers:*

All aspects of cooling, heating or lubricating the drawing material and/or the drawing devices or dies.



Source: DE19817088

### References

#### Informative references

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

Metal drawing machines, methods or drives	<a href="#">B21C 1/00</a>
Metal drawing tools, dies and mandrels	<a href="#">B21C 3/00</a>
Lubricants in general	<a href="#">C10M</a>

## B21C 19/00

**Devices for straightening wire or like work combined with or specially adapted for use in connection with drawing or winding machines or apparatus**

### Definition statement

*This place covers:*

Devices either:

- for straightening wire, wherein the straightening action is realized by using drawing dies, or
- for straightening wire, which devices are used in combination with wire drawing or winding machines (e.g. straightening prior to drawing).

### References

#### Informative references

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

Winding, coiling	<a href="#">B21C 47/00</a>
Straightening or restoring form of metal rods, metal tubes, metal profiles, or specific articles made there from.	<a href="#">B21D 3/08</a>
Working of wire by straightening	<a href="#">B21F 1/02</a>



## B21C 23/00

### Extruding metal; Impact extrusion

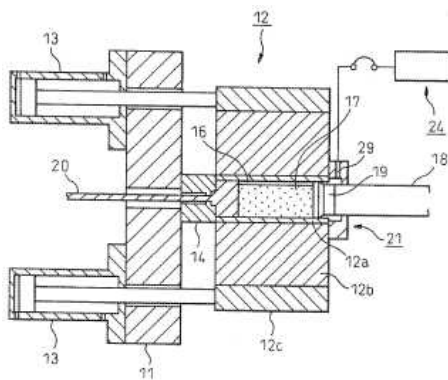
#### Definition statement

*This place covers:*

Methods and devices for metal extrusion; products obtained by metal extrusion as well as lubrication aspects.

The title refers to impact extrusion. This is however only one specific metal extrusion technique covered by this group.

Metal extrusion consists in forcing solid metal through a suitably shaped orifice using compressive forces. Metal extrusion differs from metal drawing by the higher rate of reduction.



Source: US2007227221

#### References

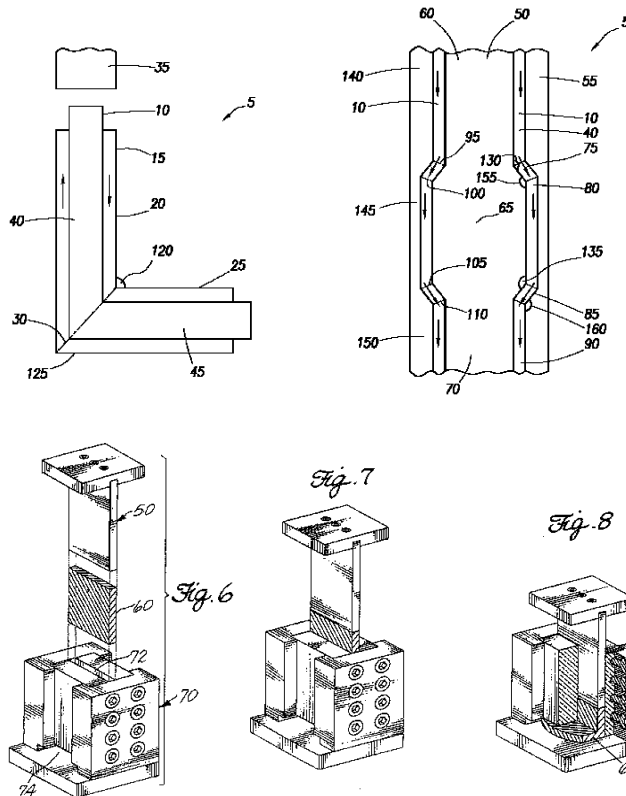
##### Informative references

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

Tools for metal extrusion (i.e. mandrels and dies)	<a href="#">B21C 25/00</a>
Rams, plungers or disks therefore	<a href="#">B21C 26/00</a>
Containers for metal to be extruded	<a href="#">B21C 27/00</a>
Cooling or heating work or parts of the extrusion press	<a href="#">B21C 29/00</a>
Control or measuring devices in relation with extrusion	<a href="#">B21C 31/00</a>
Feeding extrusion presses with metal to be extruded	<a href="#">B21C 33/00</a>
Removing work or waste from extrusion presses; Cleaning	<a href="#">B21C 35/00</a>
Continuous casting	<a href="#">B22D</a>
Extrusion of plastic material	<a href="#">B29C 48/00</a>

**B21C 23/001****{to improve the material properties, e.g. lateral extrusion}****Definition statement***This place covers:*

All aspects relating to extrude metals with the purpose of improving the physical properties of such metals, for example, through severe plastic deformation such as ECAP and ECAE.

**References****Informative references**

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

Starting from material of particular form or shape, e.g. mechanically pre-treated	<a href="#">B21C 23/01</a>
Preliminary treatment of metal stock without particular shaping, e.g. salvaging segregated zones, forging or pressing in the rough	<a href="#">B21J 1/025</a>
Modifying the physical properties of iron or steel by deformation by cold working	<a href="#">C21D 7/02</a>
Changing the physical structure of non-ferrous metals or alloys by heat treatment or by hot or cold working	<a href="#">C22F 1/00</a>

## B21C 23/21

### Presses specially adapted for extruding metal

#### References

##### Informative references

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

Extrusion presses in general	<a href="#">B30B 11/22</a>
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## B21C 25/00

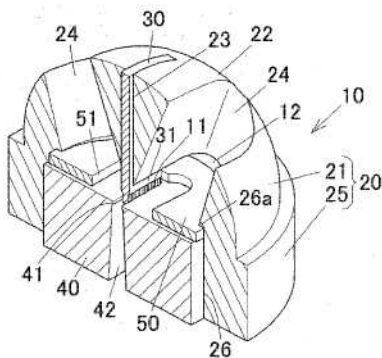
### Profiling tools for metal extruding

#### Definition statement

This place covers:

Dies and mandrels for metal extrusion, including dies and mandrels for coating work by extrusion or having a section variable during extruding.

The extrusion die and/or mandrel define/s the section through which the billet is forced, thereby defining the cross sectional shape of the extruded product.



Source: WO2007029888

#### References

##### Informative references

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

Extrusion devices and methods	<a href="#">B21C 23/00</a>
Rams, plungers or disks therefore	<a href="#">B21C 26/00</a>
Containers for metal to be extruded	<a href="#">B21C 27/00</a>
Cooling or heating work or parts of the extrusion press	<a href="#">B21C 29/00</a>
Control or measuring devices in relation with extrusion	<a href="#">B21C 31/00</a>
Feeding extrusion presses with metal to be extruded	<a href="#">B21C 33/00</a>
Removing work or waste from extrusion presses; Cleaning	<a href="#">B21C 35/00</a>

## B21C 26/00

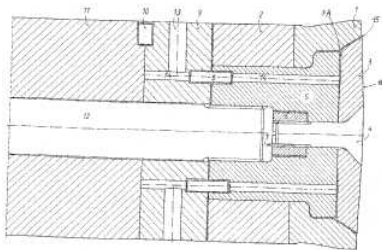
### Rams or plungers; Discs therefor

#### Definition statement

*This place covers:*

Rams or plungers for metal extrusion; the disks therefore as well as the dummy blocks.

The extrusion ram or plunger is normally the element applying the extrusion pressure to the billet to be extruded.



Source: DE10036463

#### References

##### Informative references

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

Extrusion devices and methods	<a href="#">B21C 23/00</a>
Tools for metal extrusion (i.e. mandrels and dies)	<a href="#">B21C 25/00</a>
Containers for metal to be extruded	<a href="#">B21C 27/00</a>
Cooling or heating work or parts of the extrusion press	<a href="#">B21C 29/00</a>
Control or measuring devices in relation with extrusion	<a href="#">B21C 31/00</a>
Feeding extrusion presses with metal to be extruded	<a href="#">B21C 33/00</a>
Removing work or waste from extrusion presses; Cleaning	<a href="#">B21C 35/00</a>

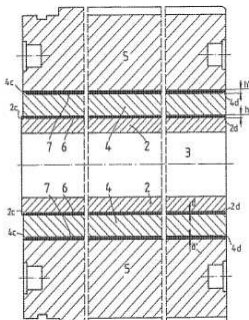
## B21C 27/00

### Containers for metal to be extruded ([B21C 29/02](#) takes precedence)

#### Definition statement

*This place covers:*

The container is the element into which the billet is placed and pressurized for extrusion.



Source: DE3342617

## References

### Limiting references

*This place does not cover:*

Containers comprising cooling or heating elements	<a href="#">B21C 29/02.</a>
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### Informative references

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

Extrusion devices and methods	<a href="#">B21C 23/00</a>
Tools for metal extrusion (i.e. mandrels and dies)	<a href="#">B21C 25/00</a>
Rams, plungers or disks therefore	<a href="#">B21C 26/00</a>
Cooling or heating work or parts of the extrusion press	<a href="#">B21C 29/00</a>
Control or measuring devices in relation with extrusion	<a href="#">B21C 31/00</a>
Feeding extrusion presses with metal to be extruded	<a href="#">B21C 33/00</a>
Removing work or waste from extrusion presses; Cleaning	<a href="#">B21C 35/00</a>

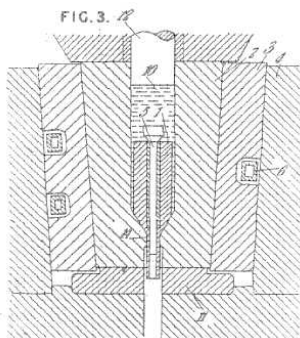
## B21C 29/00

**Cooling or heating work or parts of the extrusion press; {Gas treatment of work}**

### Definition statement

*This place covers:*

All aspects relating to heating or cooling in combination with metal extrusion.



Source: GB1058854

## References

### Informative references

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

Extrusion devices and methods	<a href="#">B21C 23/00</a>
Tools for metal extrusion (i.e. mandrels and dies)	<a href="#">B21C 25/00</a>
Rams, plungers or disks therefore	<a href="#">B21C 26/00</a>
Containers for metal to be extruded	<a href="#">B21C 27/00</a>
Control or measuring devices in relation with extrusion	<a href="#">B21C 31/00</a>
Feeding extrusion presses with metal to be extruded	<a href="#">B21C 33/00</a>

Removing work or waste from extrusion presses; Cleaning	<a href="#">B21C 35/00</a>
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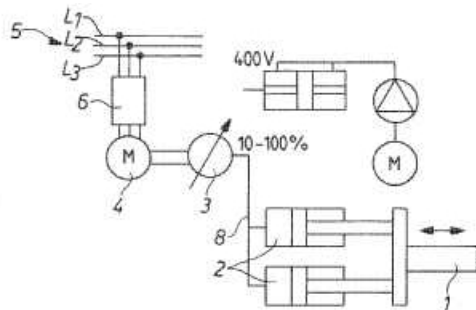
## B21C 31/00

Control devices, e.g. for regulating the pressing speed or temperature of metal ([B21C 25/08](#) takes precedence); Measuring devices, e.g. for temperature of metal, combined with or specially adapted for use in connection with extrusion presses

### Definition statement

*This place covers:*

Control devices, e.g. for regulating the pressing speed or temperature of metal; Measuring devices, e.g. for temperature of metal, combined with or specially adapted for use in connection with extrusion presses.



### References

#### Limiting references

*This place does not cover:*

Controlling variation	<a href="#">B21C 25/08</a>
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#### Informative references

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

Extrusion devices and methods	<a href="#">B21C 23/00</a>
Tools for metal extrusion (i.e. mandrels and dies)	<a href="#">B21C 25/00</a>
Rams, plungers or disks therefore	<a href="#">B21C 26/00</a>
Containers for metal to be extruded	<a href="#">B21C 27/00</a>
Cooling or heating work or parts of the extrusion press	<a href="#">B21C 29/00</a>
Feeding extrusion presses with metal to be extruded	<a href="#">B21C 33/00</a>
Removing work or waste from extrusion presses; Cleaning	<a href="#">B21C 35/00</a>
Measuring devices of more general interest	<a href="#">B21C 51/00</a>

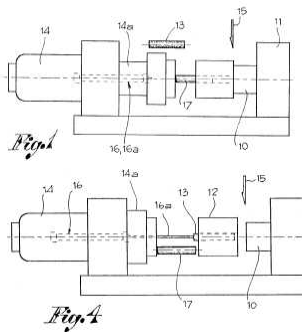
## B21C 33/00

### Feeding extrusion presses with metal to be extruded {; Loading the dummy block}

#### Definition statement

*This place covers:*

All aspects concerning operations or devices upstream of the extrusion press or extrusion process, and specifically linked to it, including e.g. feeding conveyors and grippers used to provide a workpiece to an extrusion press.



Source: EP0486436

#### References

##### Informative references

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

Extrusion devices and methods	<a href="#">B21C 23/00</a>
Tools for metal extrusion (i.e. mandrels and dies)	<a href="#">B21C 25/00</a>
Rams, plungers or disks therefore	<a href="#">B21C 26/00</a>
Containers for metal to be extruded	<a href="#">B21C 27/00</a>
Cooling or heating work or parts of the extrusion press	<a href="#">B21C 29/00</a>
Control or measuring devices in relation with extrusion	<a href="#">B21C 31/00</a>
Removing work or waste from extrusion presses; Cleaning	<a href="#">B21C 35/00</a>

## B21C 35/00

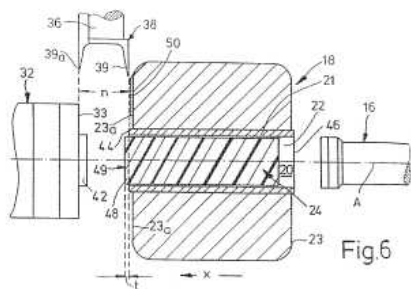
### Removing work or waste from extruding presses; Drawing-off extruded work (in connection with the extruding of bent tubes or rods [B21C 23/12](#)); Cleaning dies, ducts, containers, or mandrels

#### Definition statement

*This place covers:*

All aspects concerning operations or devices downstream of the extrusion press or extrusion process, and specifically linked to it, including e.g.:

- Removing work or waste from extruding presses;
- Drawing off extruded work;
- Cleaning dies, ducts, containers or mandrels.
- Scrapers and scraping knives for cutting-off or removing the waste or for removing sections from the extruded work, e.g. removing a strip to create an open profile.



Source: EP0787543

**References**

**Informative references**

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

Extrusion devices and methods	<a href="#">B21C 23/00</a>
Tools for metal extrusion (i.e. mandrels and dies)	<a href="#">B21C 25/00</a>
Rams, plungers or disks therefore	<a href="#">B21C 26/00</a>
Containers for metal to be extruded	<a href="#">B21C 27/00</a>
Cooling or heating work or parts of the extrusion press	<a href="#">B21C 29/00</a>
Control or measuring devices in relation with extrusion	<a href="#">B21C 31/00</a>
Feeding extrusion presses with metal to be extruded	<a href="#">B21C 33/00</a>

**B21C 35/03**

**Straightening the work**

**References**

**Informative references**

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

Metal straightening in general	<a href="#">B21D</a>
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**B21C 37/00**

**Manufacture of metal sheets, bars, wire, tubes or like semi-manufactured products, not otherwise provided for; Manufacture of tubes of special shape**

**Definition statement**

*This place covers:*

Processes and devices for the manufacture of:

Metal sheets (covered by [B21C 37/02](#)).

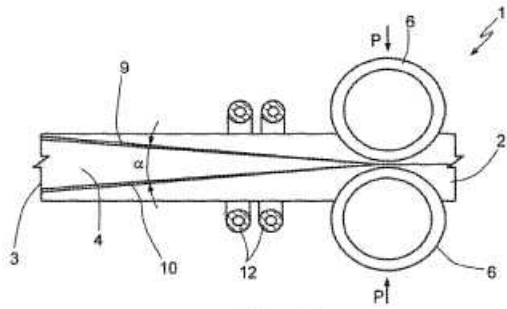
Metal wires (covered by [B21C 37/04](#)).

Metal tubes (covered by [B21C 37/08-B21C 37/14](#)).

Metal tubes of special shape (covered by [B21C 37/15-B21C 37/298](#)).



Finishing tubes, e.g. sizing, burnishing (covered by [B21C 37/30](#)).



**References**

**References out of a residual place**

Examples of places in relation to which this place is residual:

Metal extrusion devices and methods	<a href="#">B21C 23/00</a>
Manufacture by rolling	<a href="#">B21B</a>
Manufacture by working or processing semi-finished sheet metal, profiles, tubes or wire	<a href="#">B21D</a>
Bending of metal sheet along straight lines	<a href="#">B21D 5/00</a>
Manufacture by working or processing semi-finished sheet metal, profiles, tubes or wire	<a href="#">B21F</a>
Manufacture by casting	<a href="#">B22</a>
Manufacture by material-removing machine tools	<a href="#">B23</a>
Manufacture by welding, e.g. cladding or plating	<a href="#">B23K</a>
Manufacture of metallic fibers	<a href="#">B23P 17/06</a>
Manufacture by grinding or polishing	<a href="#">B24</a>
Manufacture by electroforming	<a href="#">C25D 1/00</a>

**B21C 37/06**

**of tubes or metal hoses; Combined procedures for making tubes, e.g. for making multi-wall tubes**

**References**

**References out of a residual place**

Examples of places in relation to which this place is residual:

Bending sheets for making tubes	<a href="#">B21D 5/00</a>
Seaming by folding	<a href="#">B21D 39/02</a>

**B21C 37/08**

**Making tubes with welded or soldered seams {(with helically arranged seams [B21C 37/122](#))}**

**References****Limiting references**

*This place does not cover:*

With helically arranged seams	<a href="#">B21C 37/122</a>
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**References out of a residual place**

*Examples of places in relation to which this place is residual:*

Involving only a soldering or welding operation	<a href="#">B23K</a>
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**B21C 37/0815**

**{without continuous longitudinal movement of the sheet during the bending operation}**

**References****Informative references**

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

Sheet bending in general	<a href="#">B21D</a>
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**B21C 37/108**

**{without continuous longitudinal movement of the sheet during the bending operation}**

**References****Informative references**

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

Sheet bending in general	<a href="#">B21D</a>
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**B21C 37/122**

**{with welded or soldered seams}**

**References****Informative references**

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

Welding and soldering helically arranged seams per se	<a href="#">B23K</a>
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## B21C 37/22

**Making finned or ribbed tubes by fixing strip or like material to tubes**

### References

#### *References out of a residual place*

*Examples of places in relation to which this place is residual:*

Making heat exchangers	<a href="#">B21D 53/02</a>
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## B21C 43/00

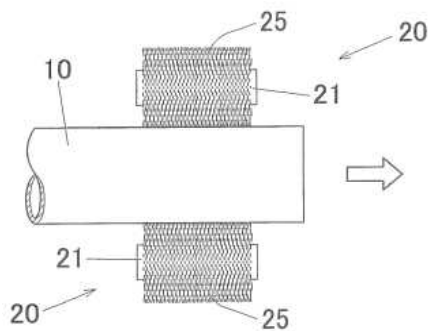
**Devices for cleaning metal products combined with or specially adapted for use with machines or apparatus provided for in this subclass**

### Definition statement

*This place covers:*

All aspects relating to cleaning metal products, wherein the cleaning action is realized by using machines of [B21C](#) or wherein the cleaning action is used in combination with machines of [B21C](#).

This group includes in particular, cleaning metal products, especially descaling, by metal drawing, or with methods associated to metal drawing or winding processes.



Source: WO2006200502

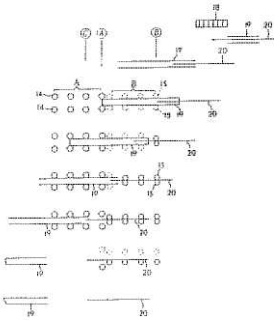
## B21C 45/00

### Separating mandrels from work or vice versa

#### Definition statement

*This place covers:*

Separation of mandrels from work or vice-versa.



Source: JP61092708

## B21C 47/00

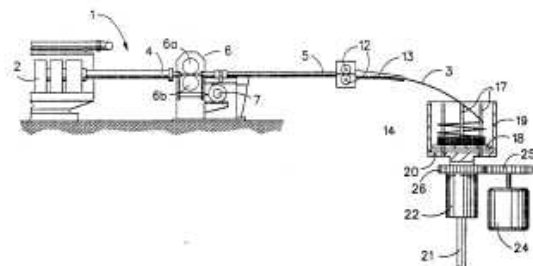
### Winding-up, coiling or winding-off metal wire, metal band or other flexible metal material characterised by features relevant to metal processing only (coiling wire into particular forms [B21F 3/00](#))

#### Definition statement

*This place covers:*

Methods and devices for coiling (winding) and uncoiling (unwinding) of metal wire, band or similar metal product.

Associated operations, like feeding or guiding the material, transferring coils, joining wire or band ends, treating the material, holding on drums or coil holders.



#### References

##### Limiting references

*This place does not cover:*

Coiling wire into particular form	<a href="#">B21F 3/00</a>
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**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:

Hot coilers in connection with heat-treatment apparatus	<a href="#">C21D 9/68</a>
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**Informative references**

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

Joining metal sheets	<a href="#">B21B 15/0085</a>
Unwinding welding material	<a href="#">B23K 9/1333</a>
Winding electrical elements	<a href="#">H01F 41/00</a> , <a href="#">H02K 15/00</a>

**B21C 47/04**

**on or in reels or drums, without using a moving guide**

**References****Informative references**

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

Reels or drums	<a href="#">B21C 47/28</a>
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**B21C 47/28**

**Drums or other coil-holders**

**References****Informative references**

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

Gripping means	<a href="#">B21C 47/32</a>
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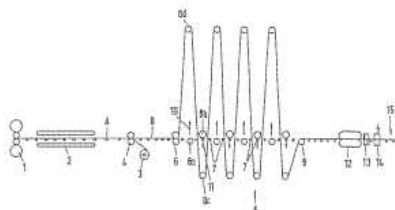
**B21C 49/00**

**Devices for temporarily accumulating material**

**Definition statement**

*This place covers:*

Devices for temporarily accumulating metallic material (e.g. metal bands or wires).



Source: DE4243409

## References

### Informative references

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

Accumulating rolled material	<a href="#">B21B 41/00</a>
Accumulating material in general	<a href="#">B65H 20/00</a>

## B21C 51/00

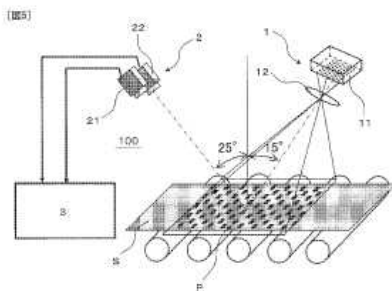
**Measuring, gauging, indicating, counting, or marking devices specially adapted for use in the production or manipulation of material in accordance with subclasses [B21B](#) - [B21F](#)**

### Definition statement

*This place covers:*

Mainly detecting flaws of metal sheets and positioning or marking said flaws.

However, this group has been conceived very generally, which is reflected in its content.



Source: WO2011145168

## References

### Informative references

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

Embossing, marking	<a href="#">B44B</a>
Measuring	<a href="#">G01N</a>

## B21C 99/00

**Subject matter not provided for in other groups of this subclass**

### Definition statement

*This place covers:*

Subject-matter not provided for in other groups of this subclass concerning the manufacture of metal sheets, wire, rods, tubes or profiles otherwise than by rolling

Subject-matter not provided for in other groups of this subclass concerning auxiliary operations used in connection with metal-working without essentially removing material.