

F01L

CYCLICALLY OPERATING VALVES FOR MACHINES OR ENGINES

Definition statement

This place covers:

- Valve-gear or valve arrangements, e.g. lift-valve gear;
- Lift-valve, i.e. cut-off apparatus with closure members having at least a component of their opening and closing motion perpendicular to the closing faces;
- Slide valve-gear or valve-arrangements;
- Valve-gear or valve arrangements actuated non-mechanically;
- Valve arrangements in working piston or piston-rod;
- Modifications of valve-gear to facilitate reversing, braking, starting, changing compression ratio, or other specific operations;
- Valve-gear or valve arrangements, e.g. with reciprocating slide valves, other than provided for in groups;
- Slide valve-gear or valve arrangements with cylindrical, sleeve, or part annularly-shaped valves surrounding working cylinder or piston;
- Slide valve-gear or valve arrangements with reciprocating and other movement of same valve, e.g. longitudinally of working cylinder and in cross direction
- Use of working pistons or pistons-rods as fluid-distributing valves or a valve-supporting elements, e.g. in free-piston machines
- Valves controlled by impact by piston, e.g. in free-piston machines; Drive, or adjustment during the operation, or distribution or expansion valves by non-mechanical means;
- Distribution or expansion valve-gear peculiar to free-piston machines or engines;
- Reversing gear Valve drive, valve adjustment during operation;
- Rotary or oscillatory slide valve-gear or valve arrangements, specially adapted for machines or engines with variable fluid distribution;
- Lift valve-gear or valve arrangements specially adapted for machines or engines with variable fluid distribution

References

Informative references

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

In machines or engines in general, control of working-fluid admission or discharge peculiar thereto	F01B 3/10 , F01B 15/06
In rotary-piston machines or engines, control of working-fluid admission or discharge	F01C 2021/12
In internal-combustion aspects of rotary-piston engines, valve control therefor	F02B 53/06
In positive-displacement engines driven by liquids, distributing valve-gear peculiar thereto	F03C 1/08
In positive displacement machines or pumps, self-acting distribution members	F04B 1/18
In positive displacement machines or pumps positively-driven distribution members	F04B 7/00
In positive displacement machines or pumps, actuation of distribution members	F04B 39/08

In positive displacement machines or pumps, adaptation or arrangements of distribution members	F04B 39/10
In rotary-piston pumps for liquid, control of working-fluid admission or discharge	F04C 15/06
In rotary-piston pumps for elastic fluids, control of working-fluid admission or discharge	F04C 29/12
Valves in general	F16K

Special rules of classification

The use of the Indexing Codes [F01L 2201/00](#) – [F01L 2820/00](#) is mandatory.

Glossary of terms

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

Engine	A device for continuously converting fluid energy into mechanical power; thus this term includes, for example, steam piston engines or steam turbine or internal combustion engines.
Machine	A device that could equally be an engine and a pump, and not a device that is restricted to an engine or one that is restricted to a pump.

F01L 1/00

Valve-gear or valve arrangements, e.g. lift-valve gear (lift-valve and valve-seat assemblies per se [F01L 3/00](#); slide-valve gear [F01L 5/00](#); actuated non-mechanically [F01L 9/00](#); valve arrangements in working piston or piston rod [F01L 11/00](#); modifications of valve-gear to facilitate reversing, braking, starting, changing compression ratio, or other specific operations [F01L 13/00](#))

Definition statement

This place covers:

Valve drive units, e.g. transmission between crankshaft and camshaft, camshaft arrangements, cam followers, camshaft phasers.

References

Limiting references

This place does not cover:

Lift-valve and valve-seat assemblies per se	F01L 3/00
Slide-valve gear	F01L 5/00
Actuated non-mechanically	F01L 9/00
Valve arrangements in working piston or piston rod	F01L 11/00
Modifications of valve-gear to facilitate reversing, braking, starting, changing compression ratio, or other specific operations	F01L 13/00

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:

Valve-gear specially for steam engines or specially for other machines or engines with variable fluid distribution	F01L 15/00 - F01L 35/00
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Informative references

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

Valve arrangements in general	F16K
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F01L 1/02

Valve drive (transmitting-gear between valve drive and valve [F01L 1/12](#))

References**Limiting references**

This place does not cover:

Transmitting-gear between valve drive and valve	F01L 1/12
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Informative references

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

Camshaft drives indexed according to their transmission means -chain, belt, gear wheel:	F01L 1/00 , F01L 1/02 , F01L 1/04 , F01L 1/06
Auxiliary apparatus of engines driven by means of chains, belts or like endless members:	F02B 67/04 , F02B 67/06
Safety means relating to endless members:	F02B 77/081
Driving belts, driving chains:	F16G 1/00 , F16G 13/00
Gearings for conveying rotary motion by endless flexible members:	F16H 7/00
Means for tensioning:	F16H 7/02 , F16H 7/08

F01L 1/022

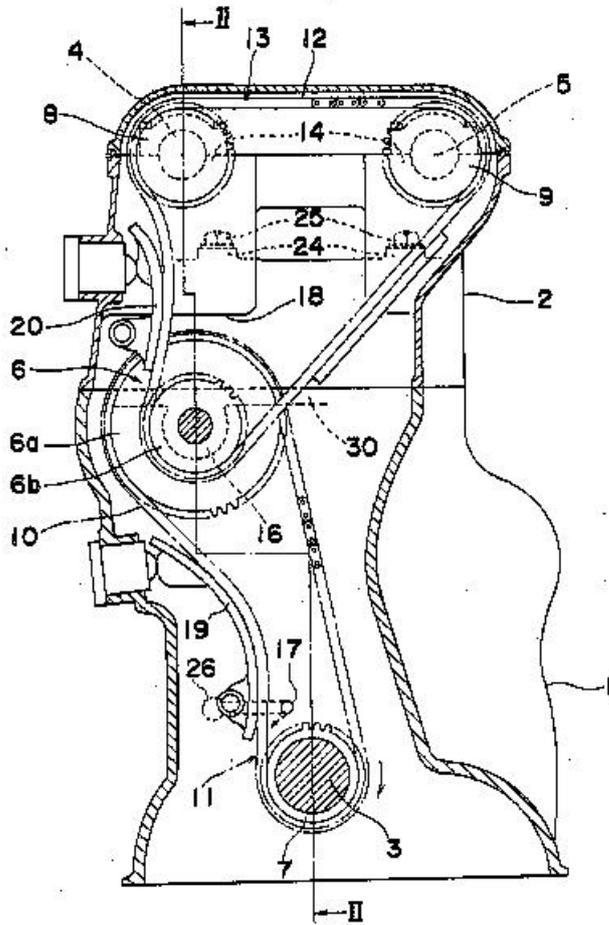
{Chain drive}

Definition statement

This place covers:

Illustrative example

US4750455



References

Informative references

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

Gearings for conveying rotary motion with chains	F16H 7/06
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F01L 1/024

{Belt drive}

Definition statement

This place covers:

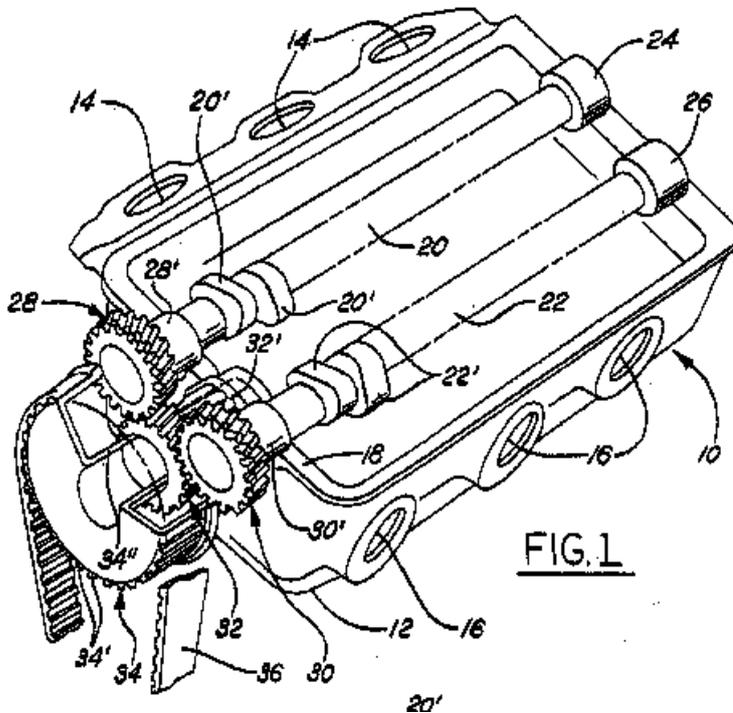
Illustrative example

US5598630

U.S. Patent

Feb. 4, 1997

5,598,630



F01L 1/047

Camshafts

References

Informative references

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

Manufacturing by shaping with fluid pressure	B21D 26/02
Manufacturing camshafts	B21D 53/845.
Machining camshafts	B23B 41/00
Connecting cams to shaft	B23P 11/00
By expanding and then shrinking	B23P 11/02
Using pressure fluids	B23P 11/022
Using heat or cold	B23P 11/025
Grinding	B24B 19/12
Lubrication of camshaft bearings	F01M 9/102
Rigidly coupling two coaxial shafts involving plastic deformation	F16D 1/072
Camshafts with single track cams	F16H 53/02
Characterised by their construction	F16H 53/025

F01L 1/053**overhead type****References*****Informative references***

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

Single overhead camshafts (SOHC)	F01L 2001/0535
Double overhead camshafts (DOHC)	F01L 2001/0537
Camshaft in cylinder block	F01L 2001/054

F01L 1/08**Shape of cams****References*****Informative references***

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

Cams as part of gearings in general	F16H 53/00
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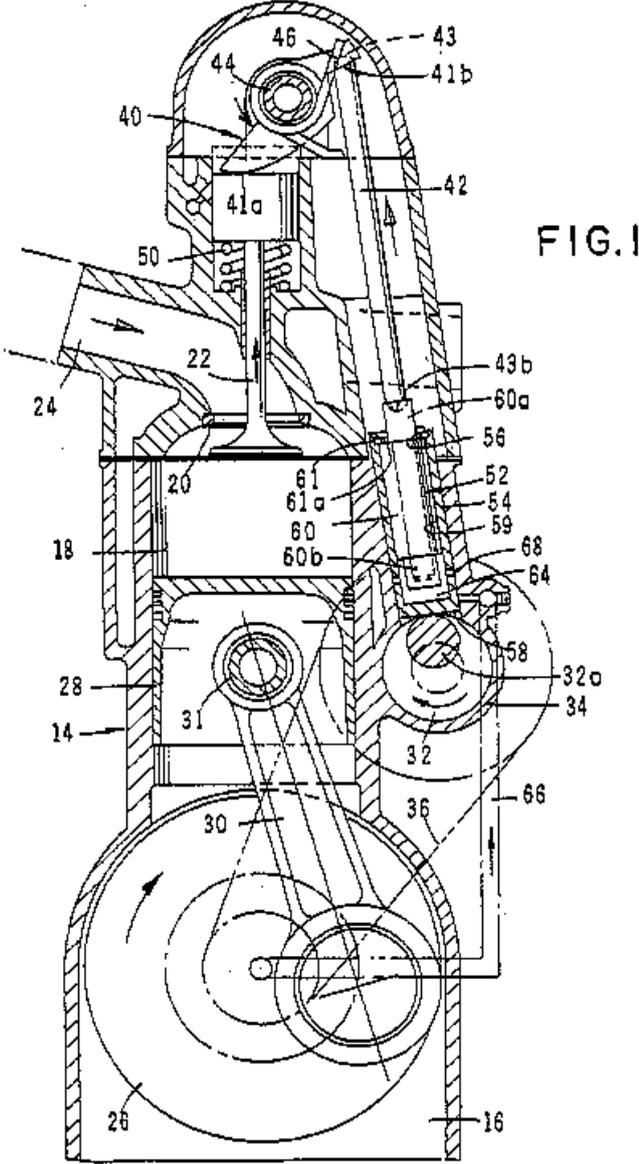
F01L 1/10

by means of crank-or eccentric-driven rods

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:

Reciprocating cams	F01L 1/044
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F01L 1/12

Transmitting gear between valve drive and valve (simultaneously operating two or more valves [F01L 1/26](#))

References

Limiting references

This place does not cover:

Simultaneously operating two or more valves	F01L 1/26
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Informative references

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

Valve arrangement comprising rollers	F01L 2305/00 , F01L 2305/02
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F01L 1/14

Tappets {(hydraulic tappets for automatically adjusting or compensating clearance [F01L 1/24](#))}; Push rods

References

Limiting references

This place does not cover:

Simultaneously operating two or more valves	F01L 1/24
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Informative references

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

Preventing the rotation of tappet	F01L 2307/00
Lubrication of tappets	F01M 9/104
Tappets for fuel pump	F02M 59/102

F01L 1/18

Rocking arms or levers

References

Informative references

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

Split rocking arms	F01L 2001/186
Clips for retaining rocker arm on pivot	F01L 2001/187
Fulcrums at upper surface	F01L 2001/188
Manufacturing	B21K 1/205 , B21D 53/84

F01L 1/181

{Centre pivot rocking arms}

Definition statement

This place covers:

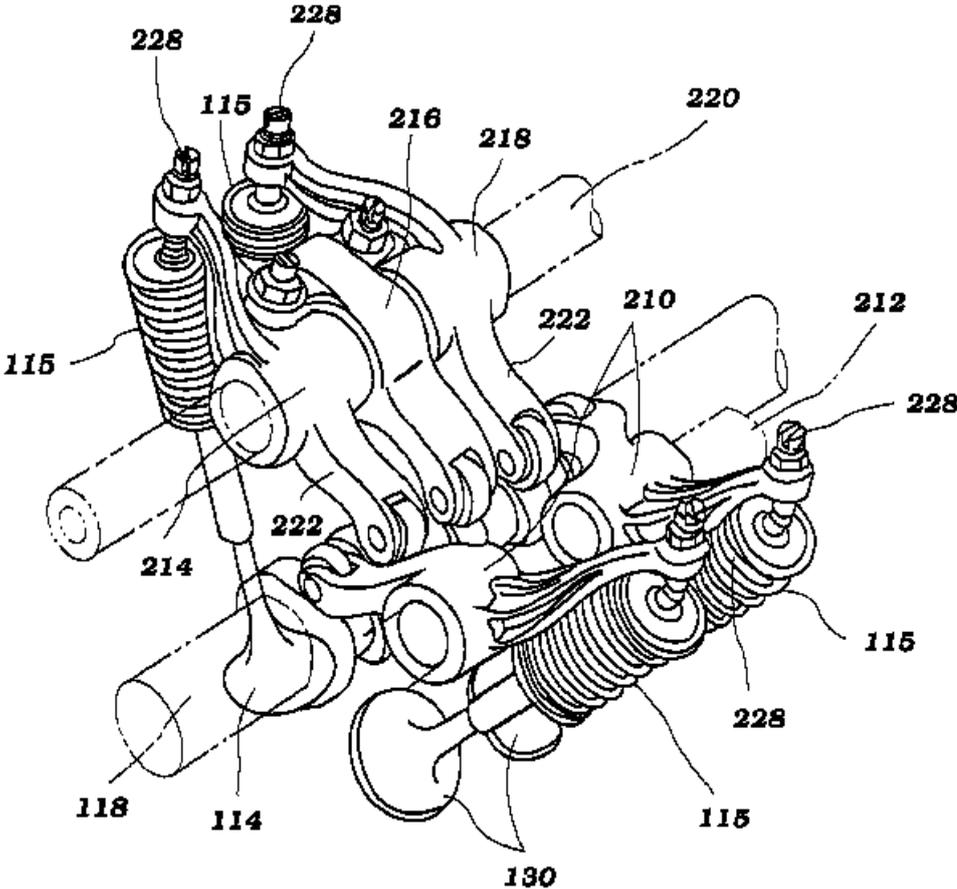
Illustrative example

U.S. Patent

Mar. 16, 2004

Sheet 4 of 8

US 6,705,264 B2



F01L 1/182

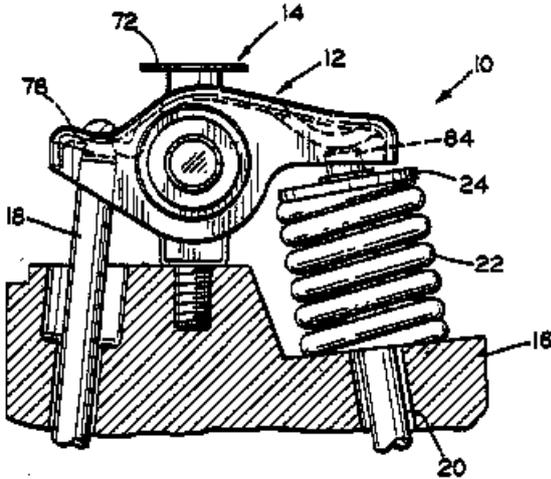
{the rocking arm being pivoted about an individual fulcrum, i.e. not about a common shaft}

Definition statement

This place covers:

Illustrative example

U.S. Patent **Nov. 12, 1991** **Sheet 1 of 2** **5,063,889**



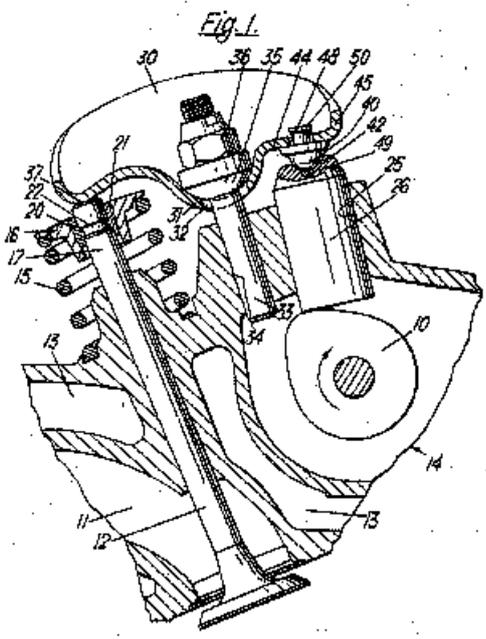
F01L 1/183

{of the boat type}

Definition statement

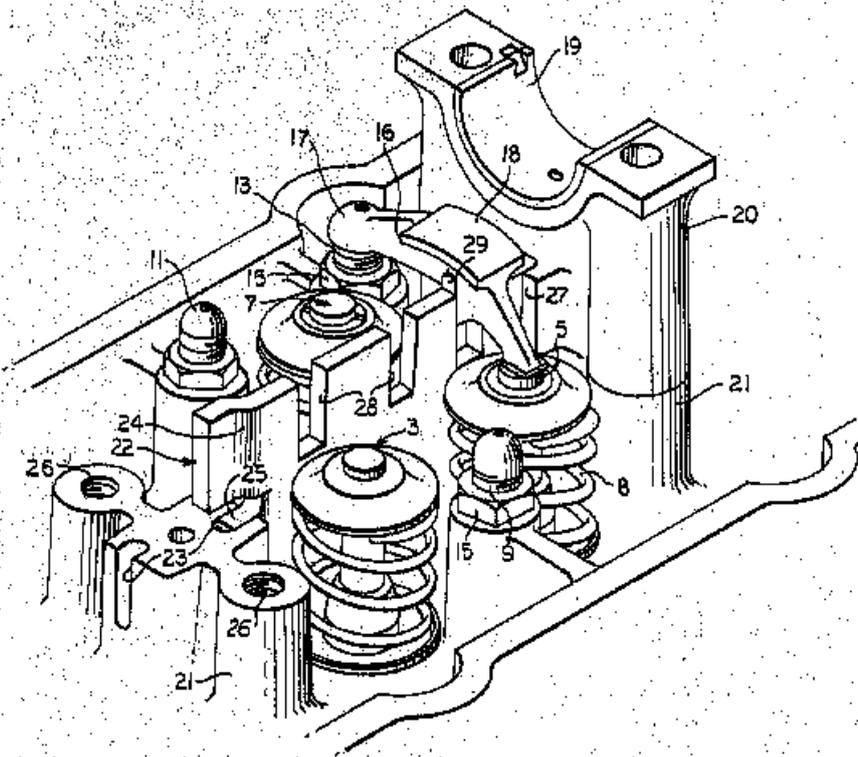
This place covers:
Illustrative example

Feb. 7, 1967 C. B. LEACH 3,302,628
INTERNAL COMBUSTION ENGINE VALVE GEAR
Filed Dec. 21, 1965



F01L 1/185**{Overhead end-pivot rocking arms}****Definition statement***This place covers:*

Illustrative example

Patented Feb. 16, 1971**3,563,215****F01L 1/24****by fluid means, e.g. hydraulically****References****Informative references***Attention is drawn to the following places, which may be of interest for search:*

Self-contained lash adjusters

[F01L 2309/00](#)

F01L 1/32

characterised by the provision of means for rotating lift valves, e.g. to diminish wear

References**Informative references**

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

Arrangements for valve movement other than for opening or closing e.g. grinding-in, preventing sticking	F16K 29/00
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F01L 1/34

characterised by the provision of means for changing the timing of the valves without changing the duration of opening {and without affecting the magnitude of the valve lift}

References**Informative references**

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

Modifying distribution valve timing	F02B 29/08
Coupling of coaxial shafts for variable angular relationship	F16D 3/10
Gearing for varying phase	F16H 35/008

F01L 1/344

changing the angular relationship between crankshaft and camshaft, e.g. using helicoidal gear

References**Informative references**

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

Yielding couplings with means for varying the angular relationship of two coaxial shafts during motion	F16D 3/10
Gearings for variation of rotational phase between input and output shaft	F16H 35/008

F01L 1/34403

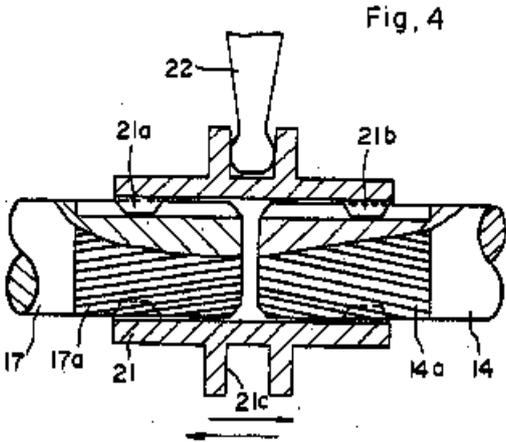
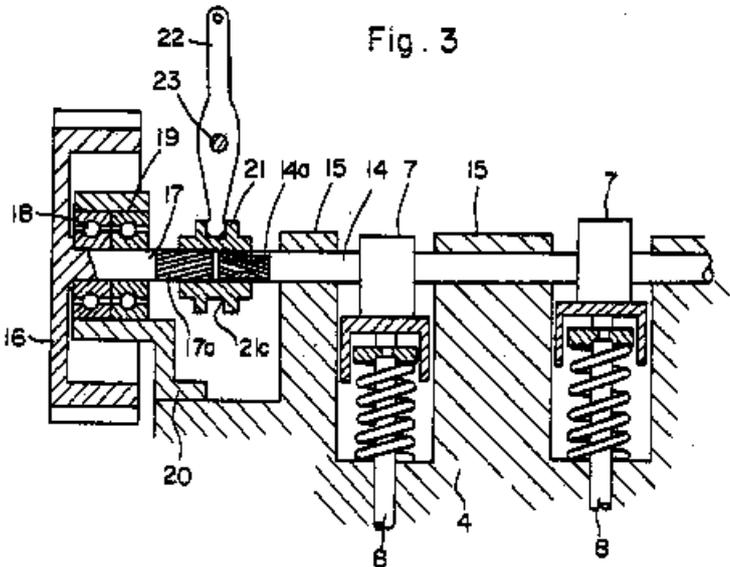
{using helically teathed sleeve or gear moving axially between crankshaft and camshaft}

Definition statement

This place covers:

Illustrative example

U.S. Patent June 23, 1992 Sheet 3 of 4 **5,123,388**



F01L 1/34406

{the helically teathed sleeve being located in the camshaft driving pulley}

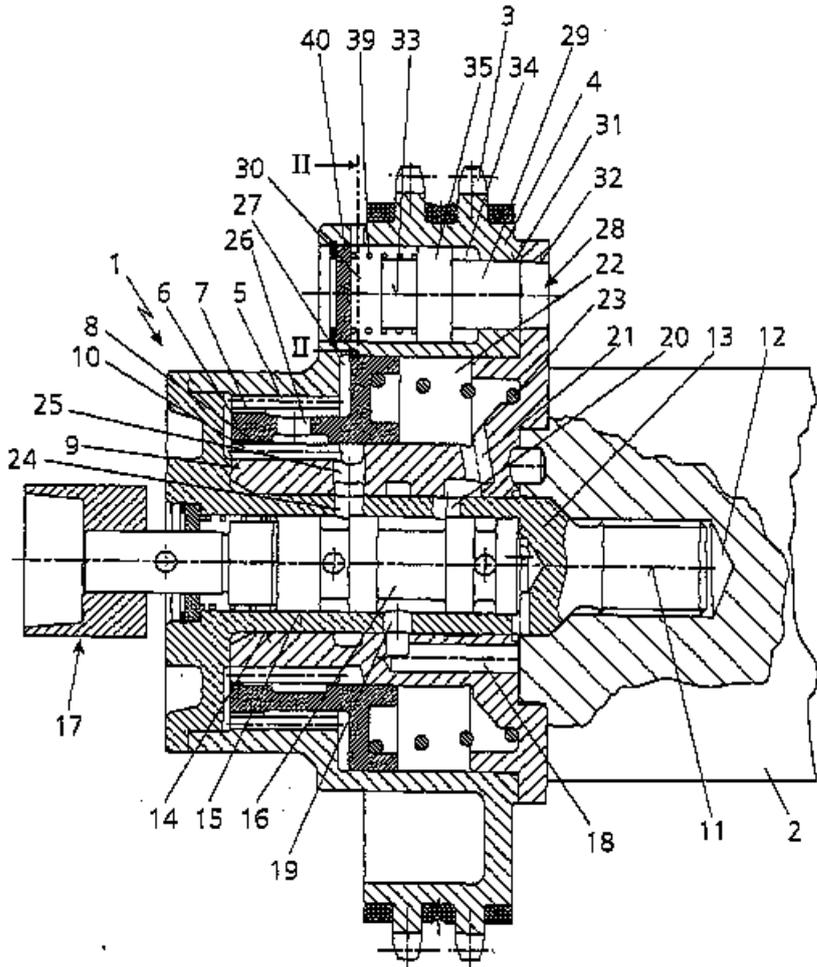
Definition statement

This place covers:

Illustrative example

ZEICHNUNGEN SEITE 1

Nummer: DE 100 06 349 A1
Int. Cl.?: F01L 1/344
Offenlegungstag: 30. August 2001



F01L 1/34413

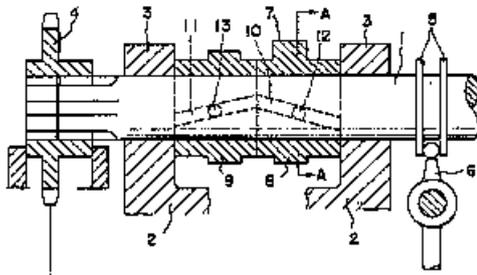
{using composite camshafts, e.g. with cams being able to move relative to the camshaft}

Definition statement

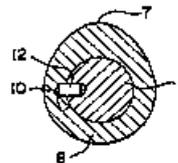
This place covers:

Illustrative example

JP59183009 A



第 2 圖



References

Informative references

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

composite camshafts	F01L 2001/0473
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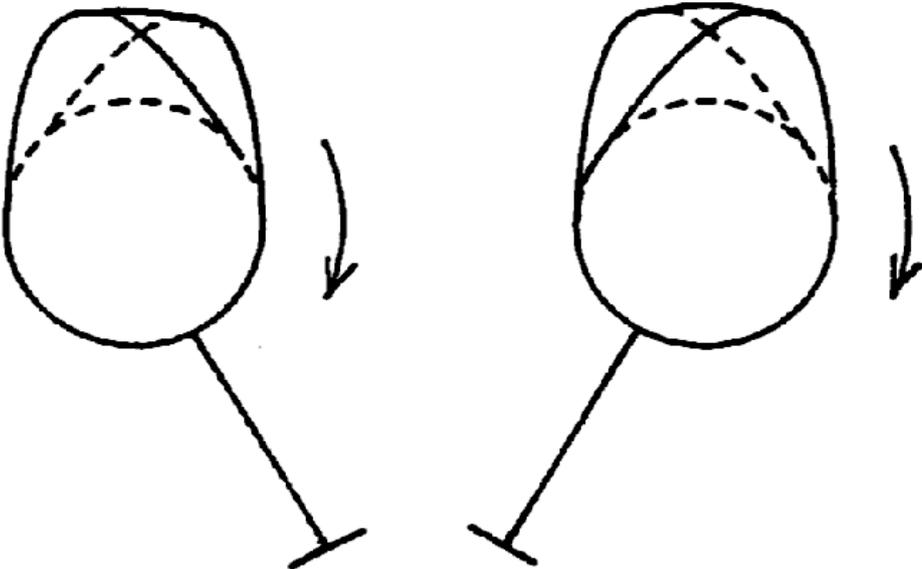
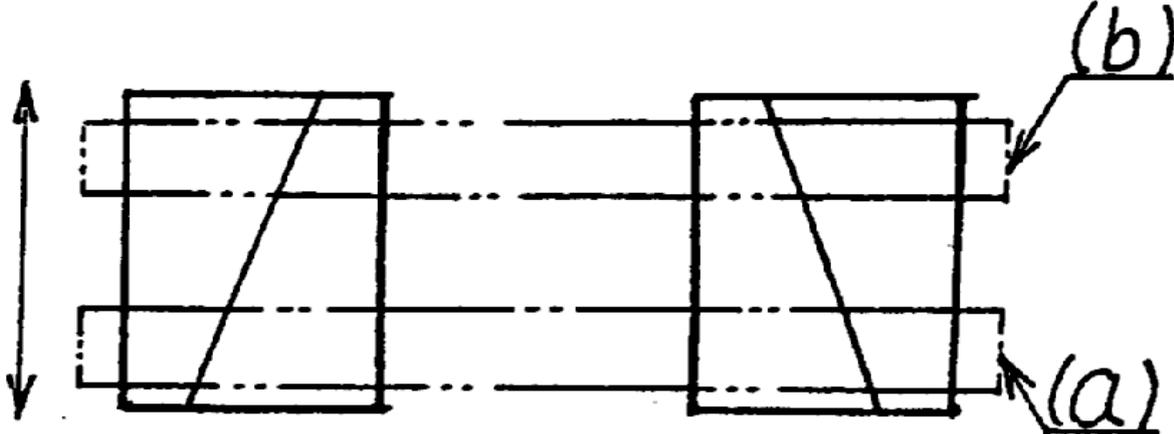
F01L 1/34416

{using twisted cams}

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:

If axial displacement of a three-dimensional cam modifies beyond the opening/closing timing also the valve lift	F01L 2013/0078
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F01L 1/3442

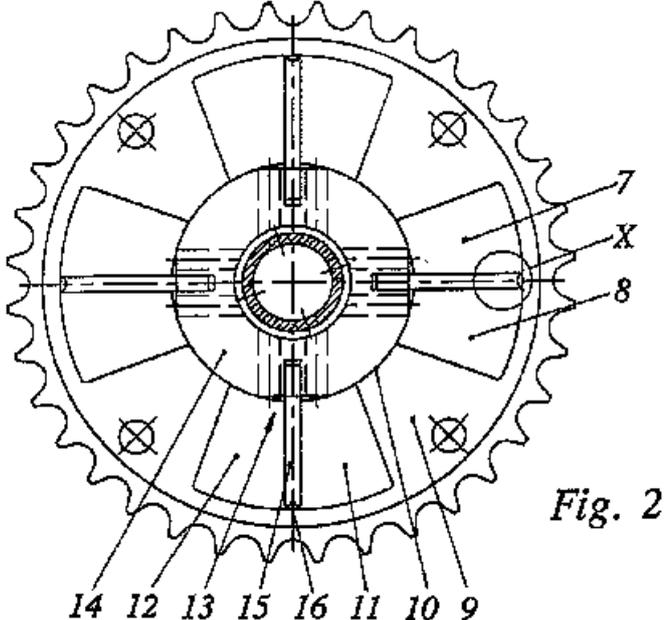
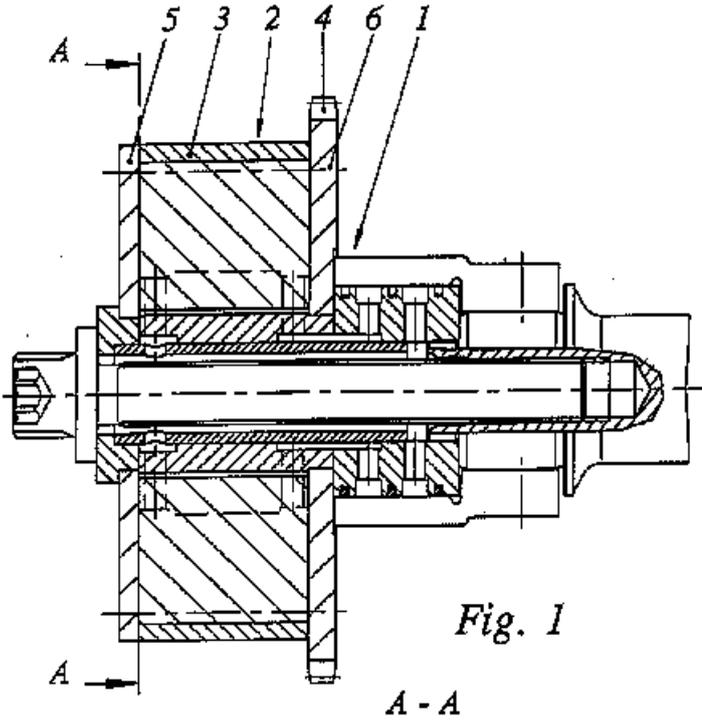
{using hydraulic chambers with variable volume to transmit the rotating force}

Definition statement

This place covers:

Illustrative example

DE19745908 A



References

Informative references

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

Details of servo motor systems for spool valves	F15B 13/0402
oil control valves such as spool valves in general	F16K 11/00
solenoid actuated control valves	F16K 31/06 , F15B 13/0442
solenoid aspects of the spool valve actuator	H01F 7/16

F01L 1/348

by means acting on timing belts or chains

Definition statement

This place covers:

Illustrative example

EP 0 551 592 A1

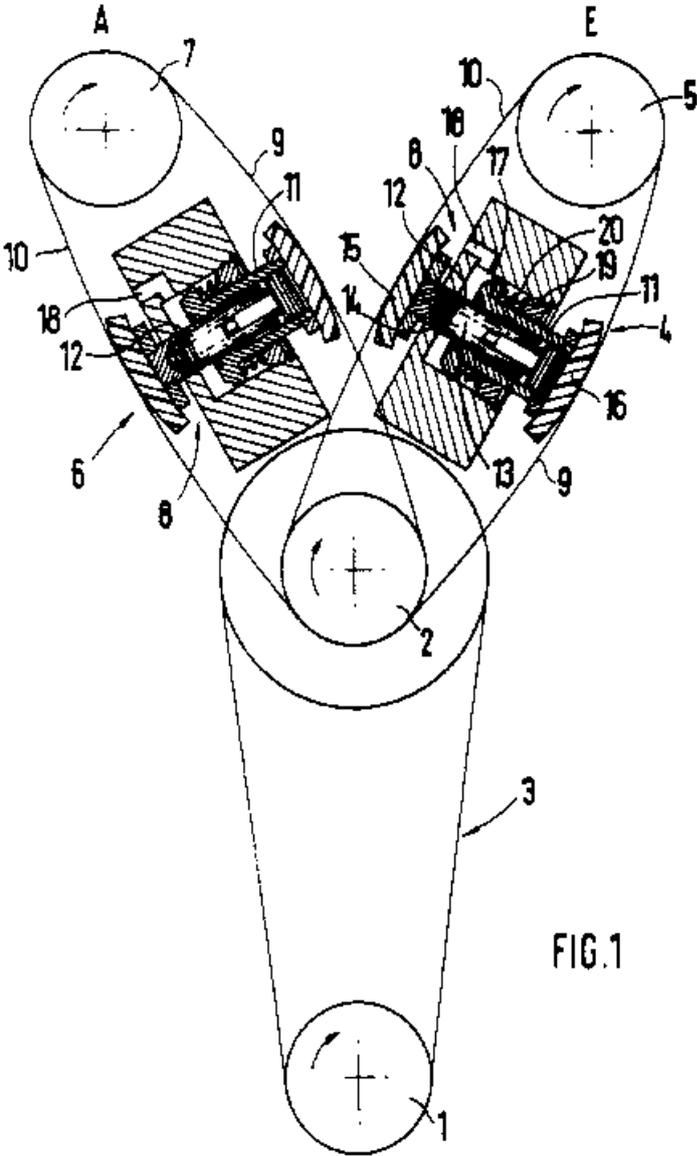


FIG.1

References

Informative references

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

Means for varying tension of belts, ropes or chains	F16H 7/08
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F01L 1/352

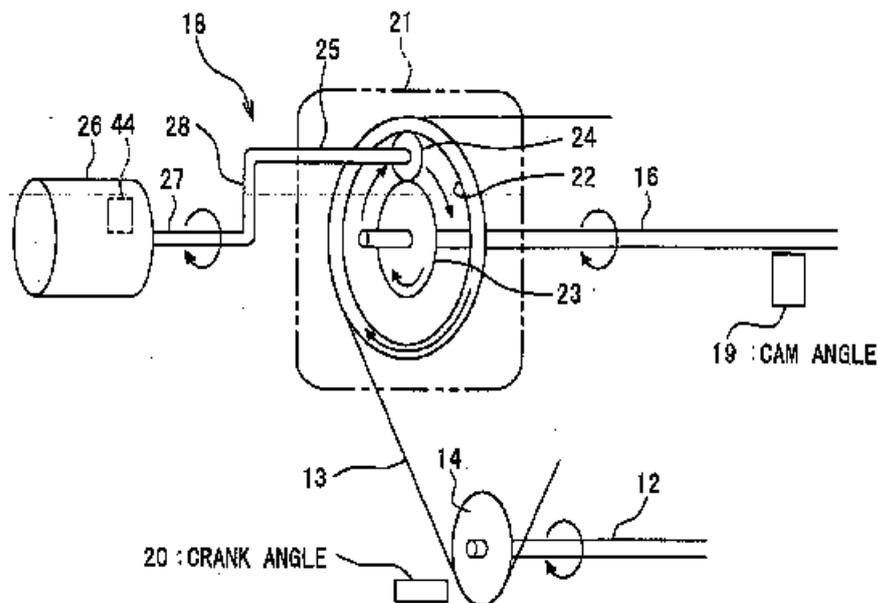
using bevel or epicyclic gear

Definition statement*This place covers:*

Illustrative example

Patent Application Publication Mar. 2, 2006 Sheet 2 of 4

US 2006/0042578 A1

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

Differential gears between crankshaft and camshaft(s) for varying timing	F01L 2311/00
Gears with orbital motion	F16H 1/321
Wave gearings, harmonic drive transmission	F16H 49/001

F01L 1/40

for engines with scavenging charge near top dead centre position, e.g. by overlapping inlet and exhaust time

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

Scavenging aspects	F02B
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F01L 3/00

Lift-valve, i.e. cut-off apparatus with closure members having at least a component of their opening and closing motion perpendicular to the closing faces; Parts or accessories thereof

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:

Valve-gear specially for steam engines or specially for other machines or engines with variable fluid distribution	F01L 15/00 - F01L 35/00
Valves for specific use as Exhaust Gas Recirculation valves (EGR valves)	F02M 26/52

Informative references

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

Finishing, reconditioning valves	B23C 3/05
Making poppet valves	B23P 15/002 , B21K 1/22

F01L 3/16

by means of a fluid flowing through or along valve, e.g. air

References**Informative references**

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

Sealing of valve stem by means of a fluid flowing through or along valve	F01L 3/08
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F01L 5/00

Slide valve-gear or valve-arrangements (with pure rotary or oscillatory movement [F01L 7/00](#))

References**Limiting references**

This place does not cover:

Valve-arrangements with pure rotary or oscillatory movement	F01L 7/00
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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:

Valve-gear specially for steam engines or specially for other machines or engines with variable fluid distribution	F01L 15/00 - F01L 35/00
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F01L 7/00

Rotary or oscillatory slide valve-gear or valve arrangements (slide valves with combined rotary and non-rotary movements, combinations of rotary and non-rotary slide valves [F01L 5/00](#))

Definition statement

This place covers:

- Slide valve-gear or valve arrangements with a pure rotary movement
- Slide valve-gear or valve arrangements with a pure oscillatory movement

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:

Valve-gear specially for steam engines or specially for other machines or engines with variable fluid distribution	F01L 15/00 - F01L 35/00
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Informative references

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

Slide valves with combined rotary and non-rotary movements, combinations of rotary and non-rotary slide valves	F01L 5/00
Rotary valve drives:	F01L 2313/00

Special rules of classification

Reference [F01L 5/00](#) is non-limiting in the main group [F01L 7/00](#). CPC will be updated/corrected once this inconsistency is resolved.

Looping references between [F01L 5/00](#) and [F01L 7/00](#) have been identified. Until this inconsistency is resolved, the current classification practice in CPC is as follows: [F01L 7/00](#) covers only slide valve-gear or valve arrangements with a pure rotary movement or a pure oscillatory movement, while slide valves with combined rotary and non-rotary movements or combinations of rotary and non-rotary slide valves belong to [F01L 5/00](#).

F01L 9/00

Valve-gear or valve arrangements actuated non-mechanically

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:

Valve-gear specially for steam engines or specially for other machines or engines with variable fluid distribution	F01L 15/00 - F01L 35/00
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F01L 9/10**by fluid means, e.g. hydraulic****References*****Informative references****Attention is drawn to the following places, which may be of interest for search:*

Means for increasing the initial opening force on the valve, boost means	F01L 9/18
Fluid pressure actuators	F15B 13/00

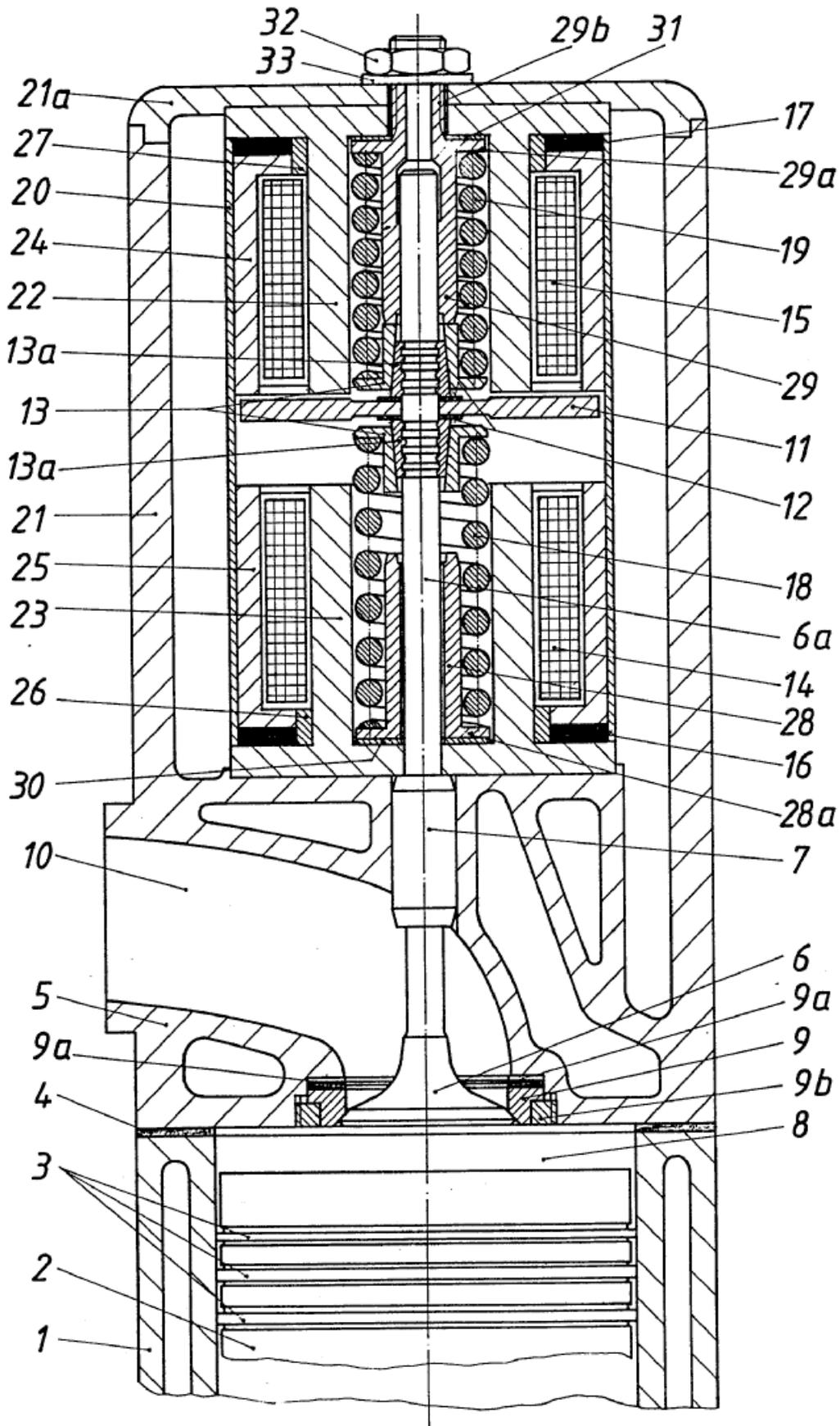
F01L 9/20

by electric 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:

Electric actuating device, using motor	F16K 31/02 , F16K 31/04 , F16K 31/06 , F16K 31/08
Pivoting, rectilinear armature, using motor	H01F 7/14 , H01F 7/16 , H01F 7/17
Linear motor	H02K 41/00

F01L 11/00

Valve arrangements in working piston or piston-rod

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:

Valve-gear specially for steam engines or specially for other machines or engines with variable fluid distribution	F01L 15/00 - F01L 35/00
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F01L 13/00

Modifications of valve-gear to facilitate reversing, braking, starting, changing compression ratio, or other specific operations

Relationships with other classification places

This group covers the structure of valve drive, while the methods or processes of controlling the valve belong to [F02D](#).

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:

Valve-gear specially for steam engines or specially for other machines or engines with variable fluid distribution	F01L 15/00 - F01L 35/00
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Informative references

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

Controlling engine output power by varying valve lift and timing of inlet resp. exhaust valve(s)	F02D 13/00 ;
Methods of controlling engine output power by varying valve lift and timing of inlet resp. exhaust valve(s), for which the emphasis is not on the structure of the valve gear used	F02D 13/02 , F02D 13/04 , F02D 13/06 , F02D 13/08 , F02D 15/00
Internal EGR	F02M 26/01

F01L 13/0005

{Deactivating valves}

Definition statement

This place covers:

Structure of valve drive switchable to a valve deactivating mode for lost motion of the cam follower, e.g. two-part cam followers with switchable locking means there between.

Relationships with other classification places

This group covers the structure of valve drive, while the methods or processes of controlling the valve belong to [F02D](#).

References

Informative references

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

Methods of controlling engines by rendering engine inoperative or idling or by cutting out individual cylinders, for which the emphasis is not on the structure of the valve gear used	F02D 17/00
Cutting-out	F02D 17/02
Inoperative or idling	F02D 17/04

F01L 13/06

for braking

Definition statement

This place covers:

Structure of valve drive switchable to an engine braking mode, e.g. actuator opening exhaust valve for compression release event or cam follower switchable to a configuration to transmit to the valve the lift of a cam braking lobe.

References

Informative references

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

Control of valve gear for switching to compressor action for braking:	F01L 2760/003
Braking being exclusively produced by compression in the cylinders:	F01L 2760/004 ;
In cooperation with vehicle transmission or brakes:	F01L 2760/005
Engine brake with retarder:	B60W 10/18
Control of engine for using engine as brake:	F02D 13/04

F01L 23/00**Valves controlled by impact by piston, e.g. in free-piston machines****Definition statement***This place covers:*

valves actuated by interference with the stroke of the piston, valves ballistically driven

F01L 25/00**Drive, or adjustment during the operation, or distribution or expansion valves by non-mechanical means****Definition statement***This place covers:*Types of non-mechanical valve drives like for [F01L 9/00](#), but for steam engines**F01L 27/00****Distribution or expansion valve-gear peculiar to free-piston machines or engines and not provided for in [F01L 21/00](#) - [F01L 25/00](#)****Definition statement***This place covers:*Distribution or expansion valve-gear peculiar to free-piston machines or engines and not provided for in [F01L 21/00](#) - [F01L 25/00](#)**F01L 33/00****Rotary or oscillatory slide valve-gear or valve arrangements, specially adapted for machines or engines with variable fluid distribution (drive, adjustment during operation, tripping-gear, reversing-gear, use of working pistons or piston-rods as valves or as valve-supporting elements, valve-gear or valve arrangements peculiar to free-piston machines or engines [F01L 15/00](#) - [F01L 31/00](#))****Definition statement***This place covers:*Types of rotary or oscillatory slide valve arrangements like for [F01L 7/00](#), but for steam engines**References****Informative references***Attention is drawn to the following places, which may be of interest for search:*

Rotary or oscillatory slide valve-gear or valve arrangements for combustion engines	F01L 7/00
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F01L 35/00

Lift valve-gear or valve arrangements specially adapted for machines or engines with variable fluid distribution (drive, adjustment during operation, tripping-gear, reversing-gear, use of working pistons or piston-rods as valves or as valve-supporting elements, valve-gear or valve arrangements peculiar to free-piston machines or engines [F01L 15/00](#) - [F01L 31/00](#))

Definition statement

This place covers:

Types of lift valve arrangements like for [F01L 3/00](#), but for steam engines

References

Informative references

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

Lift valve arrangements for combustion engines	F01L 3/00
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