F01B

MACHINES OR ENGINES, IN GENERAL OR OF POSITIVE-DISPLACEMENT TYPE, e.g. STEAM ENGINES (of rotary-piston or oscillating-piston type F01C; of non-positive-displacement type F01D; internal-combustion aspects of reciprocating-piston engines F02B57/00, F02B59/00; crankshafts, crossheads, connecting-rods F16C; flywheels F16F; gearings for interconverting rotary motion and reciprocating motion in general F16H; pistons, piston rods, cylinders, for engines in general F16J)

Definition statement

This subclass/group covers:

Machines or engines, in general or of positive-displacement type

References relevant to classification in this subclass

This subclass/group does not cover:

Rotary-piston or oscillating-piston type	F01C
Non-positive-displacement type	F01D

Informative references

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

Internal combustion engines	F02B
Internal combustion aspects of reciprocating piston engines	F02B 57/00; F02B 59/00
Crankshafts, crossheads, connecting-rods	F16C
Flywheels	F16F
Gearings for interconverting rotary motion and reciprocating motion in general	F16H
Pistons, piston rods, cylinders for engines in general	F16J

Cyclically operating valves for machines or engines	F01L
Lubrication of machines or engines in general	F01M
Steam engine plants	F01K

Glossary of terms

In this subclass/group, the following terms (or expressions) are used with the meaning indicated:

In patent documents the following abbreviations are often used:

Engine	a device for continuously converting fluid energy into mechanical power, Thus, this term includes, for example, steam piston engines or steam turbines, per se, or internal-combustion piston engines, but it excludes single-stroke devices.
Machine	a device which could equally be an engine and a pump, and not a device which is restricted to an engine or one which is restricted to a pump.
Pump	a device for continuously raising, forcing, compressing, or exhausting fluid by mechanical or other means. Thus, this term includes fans or blowers;
Positive displacement	Means the way the energy of a working fluid is transformed into mechanical energy, in which variations of volume created by the working fluid in a working chamber produce equivalent displacements of the mechanical member transmitting the energy, the dynamic effect of the fluid being of minor importance, and vice versa ;
Non-positive displacement	means the way the energy of a working fluid is transformed into

	mechanical energy, by transformation of the energy of the working fluid into kinetic energy, and vice versa ;
Oscillating-piston machine	means a positive-displacement machine in which a fluid-engaging work-transmitting member oscillates. This definition applies also to engines and pumps
Rotary-piston machine	means a positive-displacement machine in which a HYPERLINK "http://www.wipo.int/ipcpub/glossary?lang=en&symbol=(\t "_blank" fluid-engaging work-transmitting member rotates about a fixed axis or about an axis moving along a circular or similar orbit. This definition applies also to HYPERLINK "http://www.wipo.int/ipcpub/glossary?lang=en&symbol=(\t "_blank" engines and pumps
Rotary piston	means the work-transmitting member of a rotary-piston machine and may be of any suitable form, e.g., like a toothed gear;
Free piston	means a piston of which the length of stroke is not defined by any member driven thereby;
Cylinders	"cylinders" means positive-displacement working chambers in general. Thus, this term is not restricted to cylinders of circular cross-section;
Main shaft	means the shaft which converts reciprocating piston motion into rotary motion or vice versa ;
Plant	means an engine together with such additional apparatus as is necessary to run the engine. For example, a steam engine plant includes a steam engine and means for generating the steam
Working fluid	means the driven fluid in a pump or

	the driving fluid in an engine. The working fluid can be in a compressible, gaseous state, called elastic fluid, e.g. steam; in a liquid state; or in a state where there is coexistence of an elastic fluid and liquid phase.

F01B 1/00

Reciprocating-piston machines or engines characterised by number or relative disposition of cylinders or by being built-up from separate cylinder-crankcase elements (F01B3/00, F01B5/00 take precedence)

References relevant to classification in this group

This subclass/group does not cover:

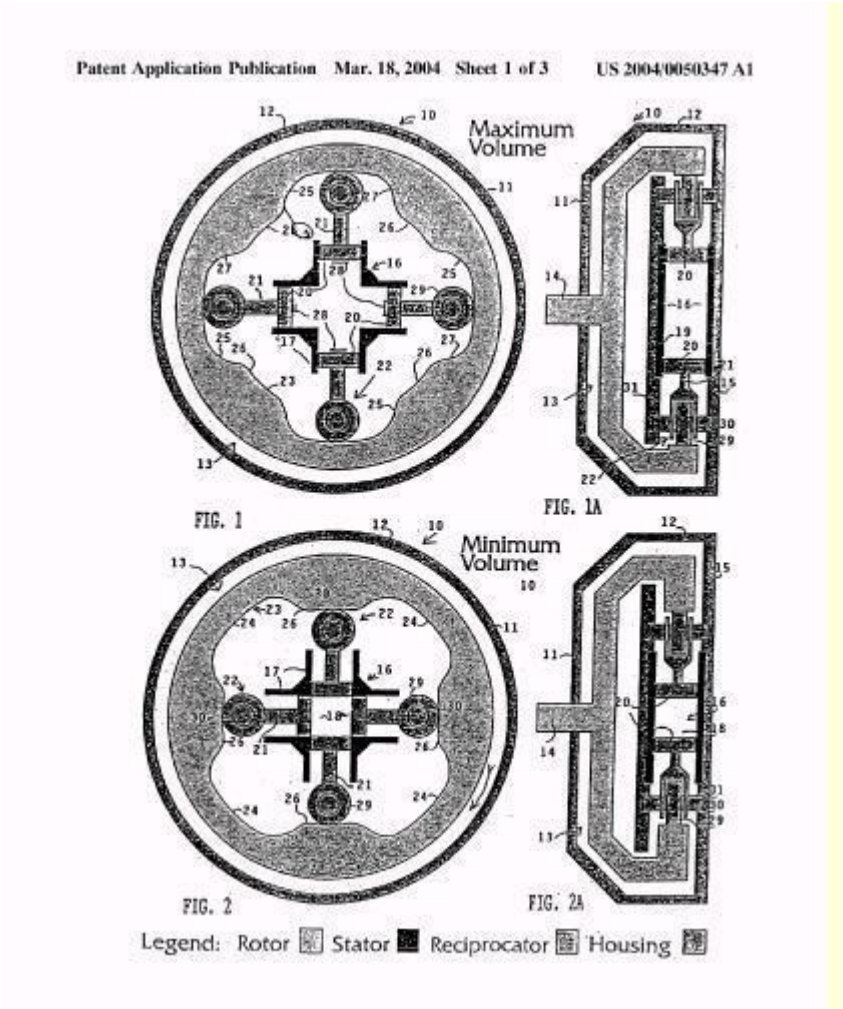
Reciprocating-piston machines or engines with cylinder axes coaxial with, or parallel or inclined to, main shaft	F01B 3/00
Reciprocating-piston machines or engines with cylinder axes arranged substantially tangentially to a circle centred on main shaft axis	F01B 5/00

F01B 1/0603

[N: the connection of the pistons with an element being at the outer ends of the cylinders]

Special rules of classification within this group

Illustrative example of subject matter classified in F01B 1/0603

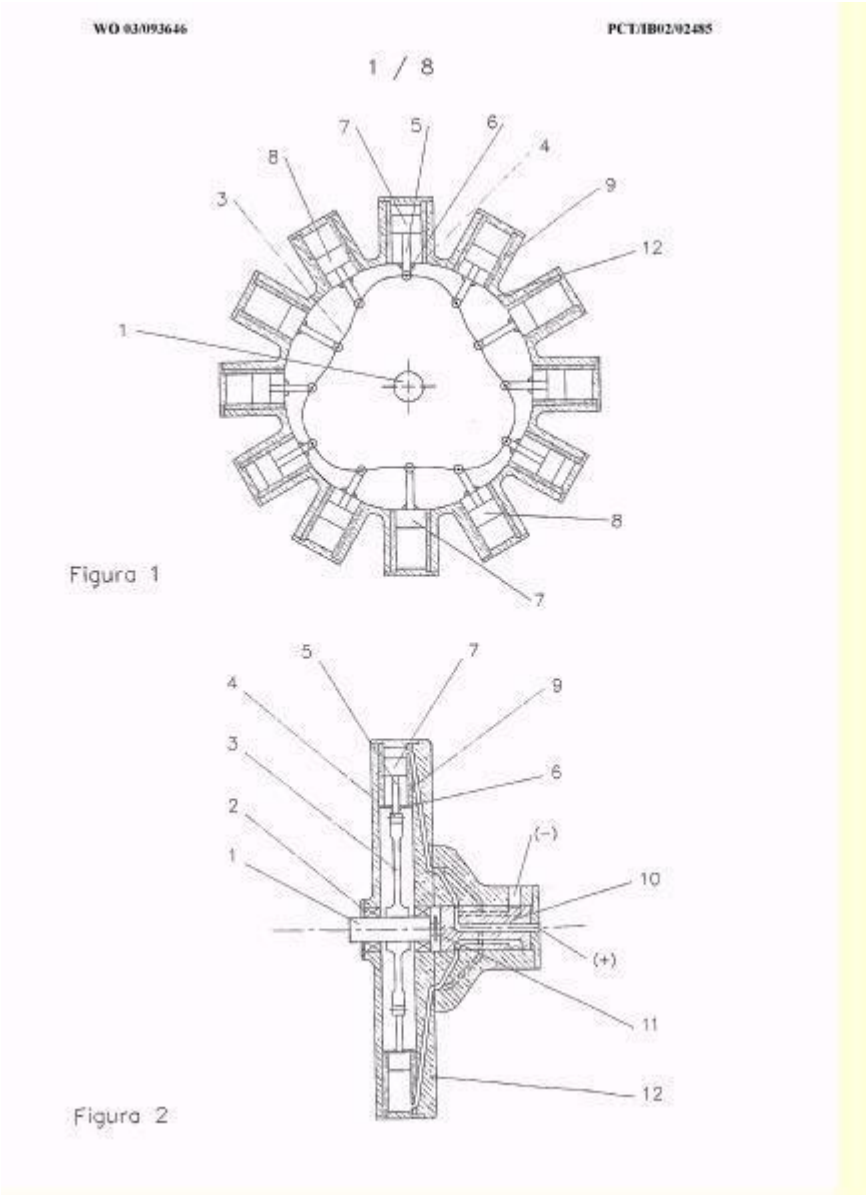


F01B 1/062

[N: the connection of the pistons with an actuating or actuated element being at the inner ends of the cylinders]

Special rules of classification within this group

Illustrative example of subject matter classified in F01B 1/062

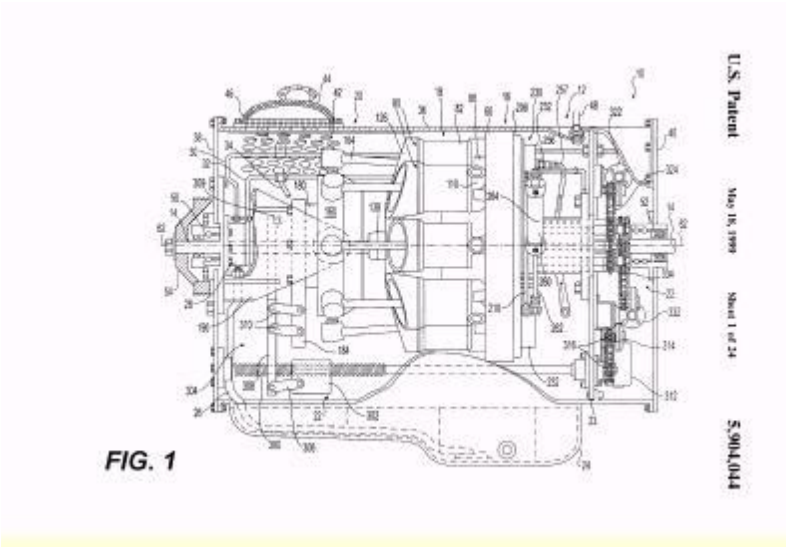


F01B 3/00

Reciprocating-piston machines or engines with cylinder axes coaxial with, or parallel or inclined to, main shaft axis

Special rules of classification within this group

Illustrative example of subject matter classified in F01B 3/00

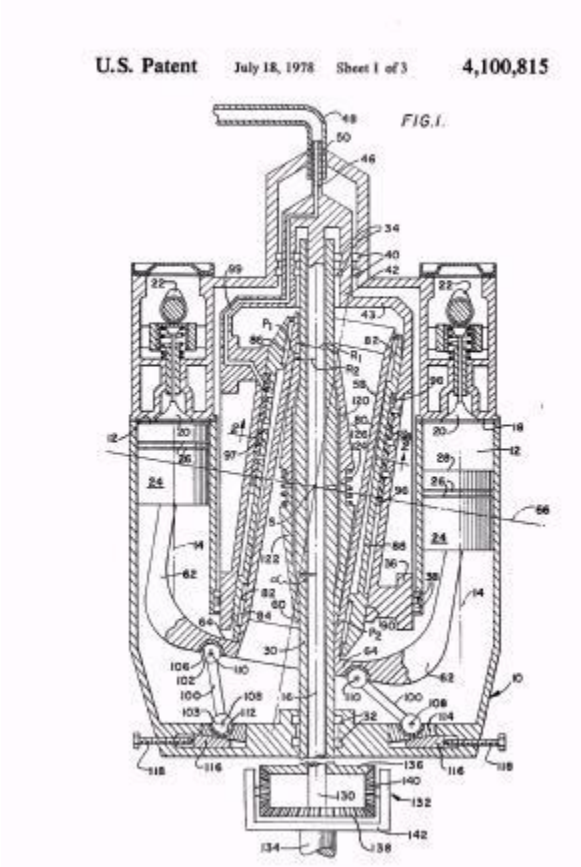


F01B 3/0002

[N: having stationary cylinders]

Special rules of classification within this group

Illustrative example of subject matter classified in F01B 3/0002

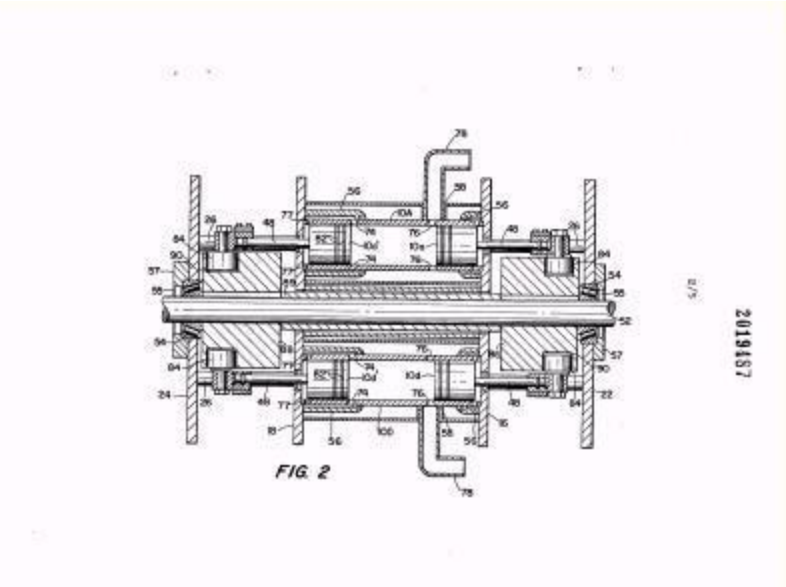


F01B 3/0005

[N: having two or more sets of cylinders or pistons]

Special rules of classification within this group

Illustrative example of subject matter classified in F01B 3/0005

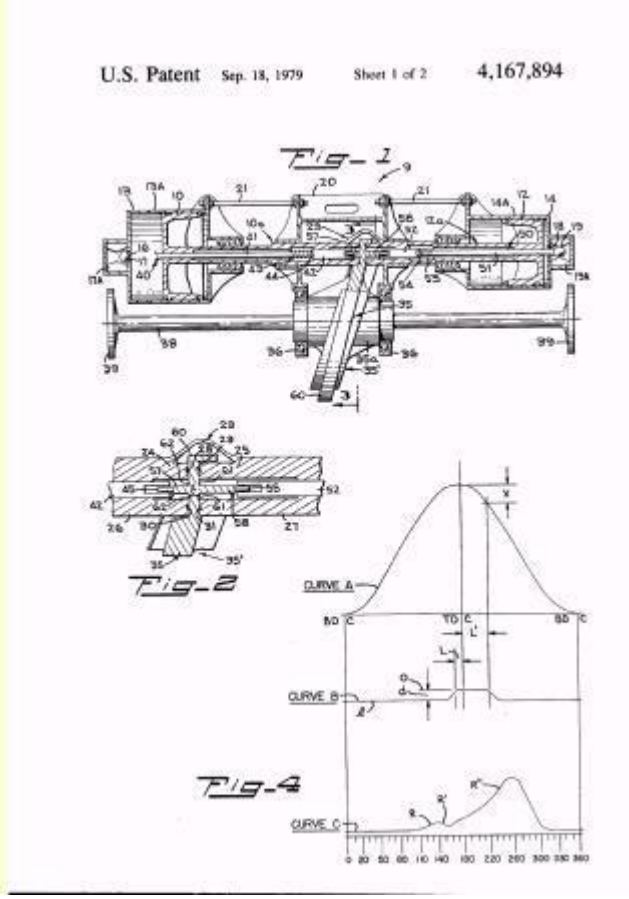


F01B 3/0008

[N: having self-acting distribution members, e.g. actuated by working fluid]

Special rules of classification within this group

Illustrative example of subject matter classified in F01B 3/0008

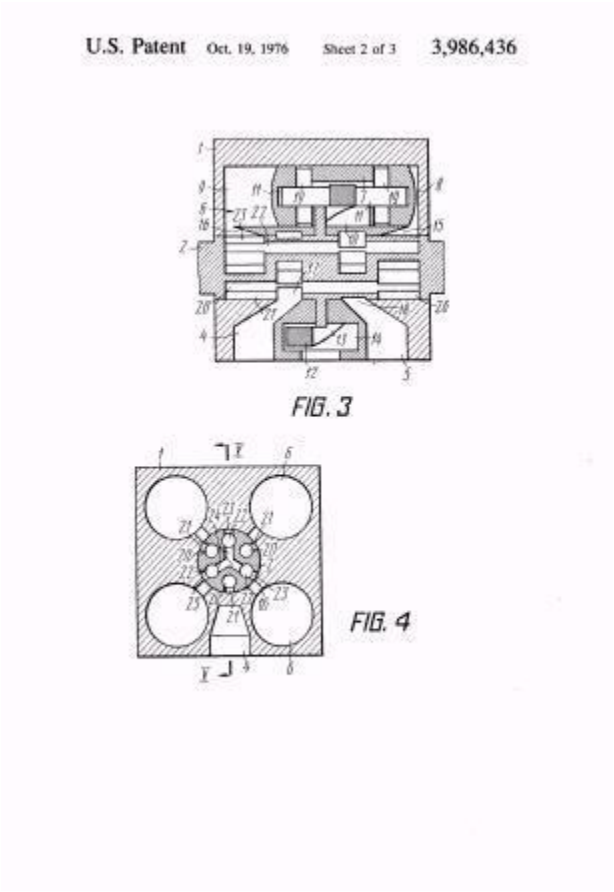


F01B 3/0011

[N: Cylindrical distribution members]

Special rules of classification within this group

Illustrative example of subject matter classified in F01B 3/0011

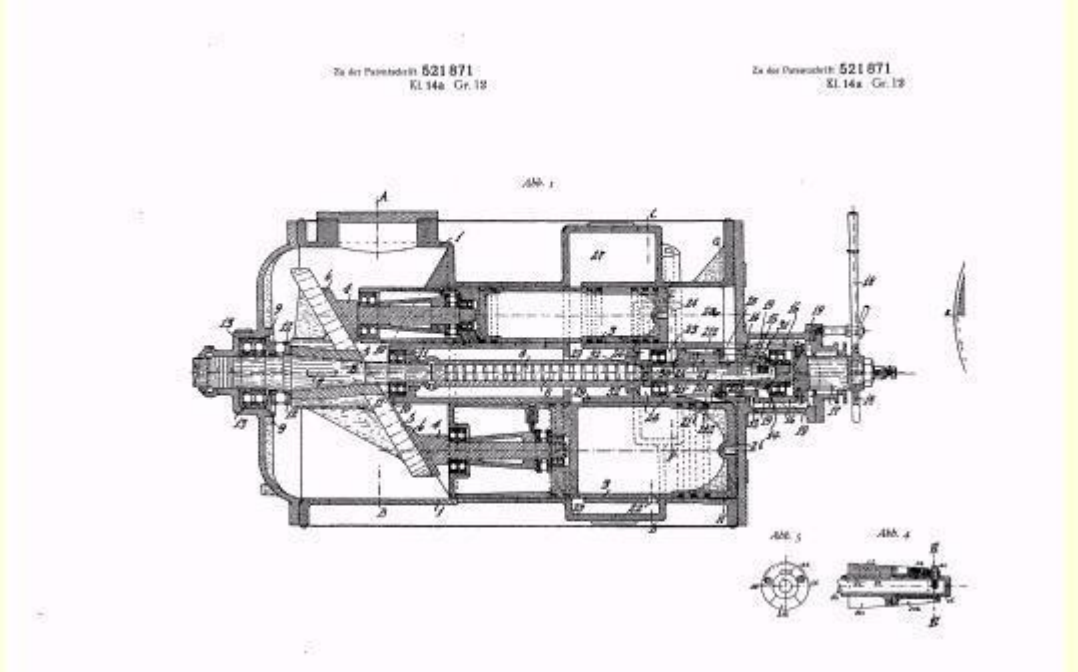


F01B 3/0014

[N: Conical distribution members]

Special rules of classification within this group

Illustrative example of subject matter classified in F01B 3/0014

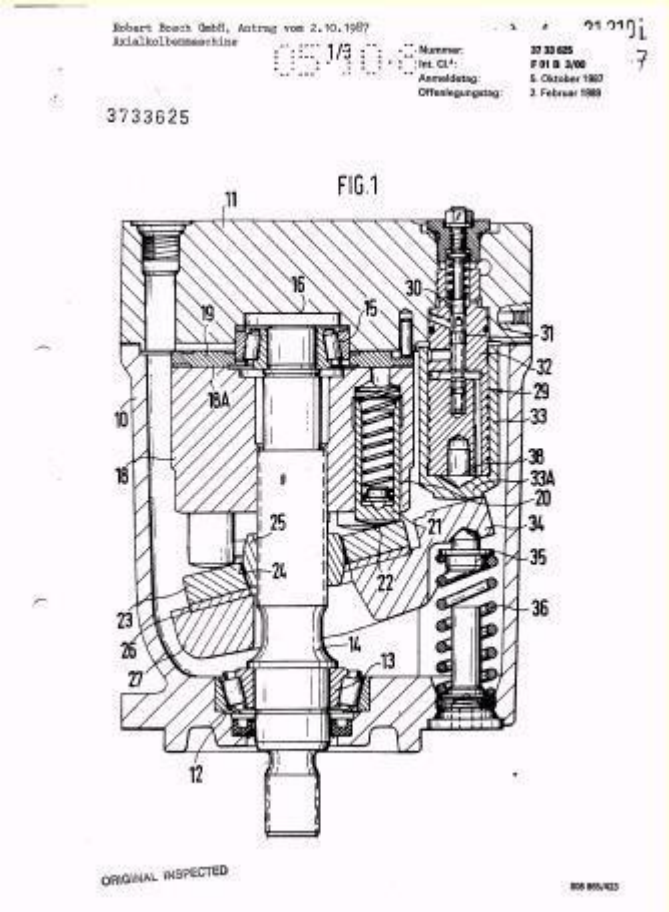


F01B 3/0032

[N: having rotary cylinder block]

Special rules of classification within this group

Illustrative example of subject matter classified in F01B 3/0032

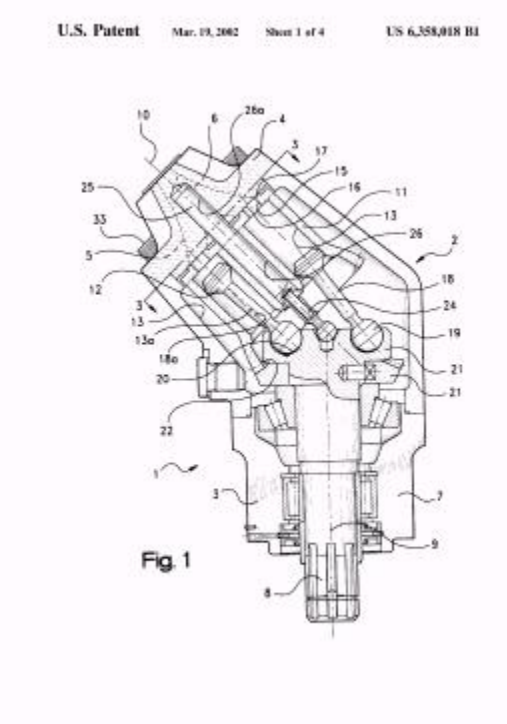


F01B 3/0038

[N: inclined to main shaft axis]

Special rules of classification within this group

Illustrative example of subject matter classified in F01B 3/0038

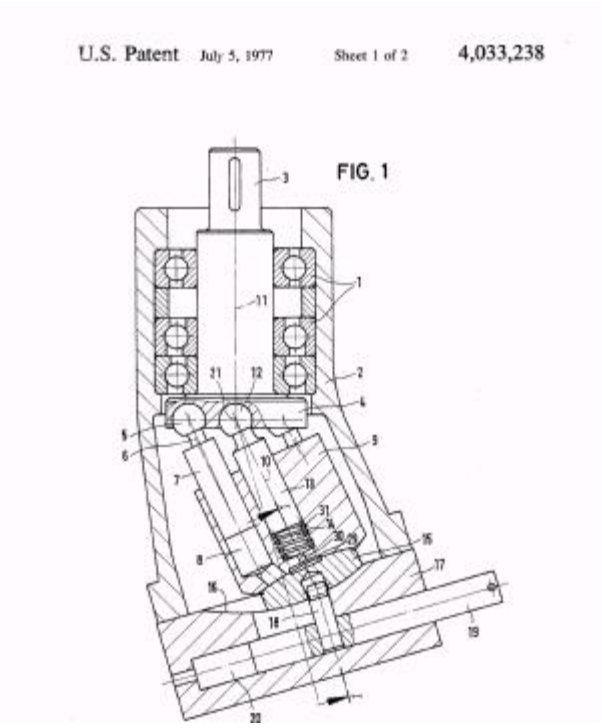


F01B 3/0041

[N: Arrangements for pressing the cylinder barrel against the valve plate, e.g. fluid pressure]

Special rules of classification within this group

Illustrative example of subject matter classified in F01B 3/0041

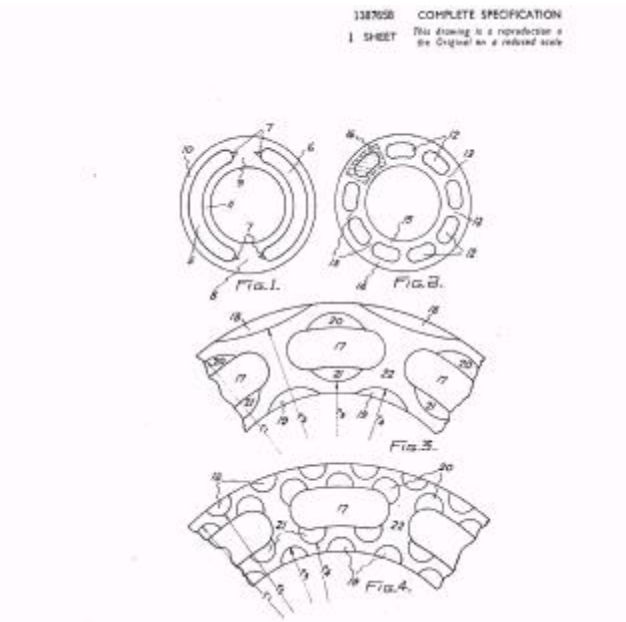


F01B 3/0047

[N: Particularities in the contacting area between cylinder barrel and valve plate]

Special rules of classification within this group

Illustrative example of subject matter classified in F01B 3/0047

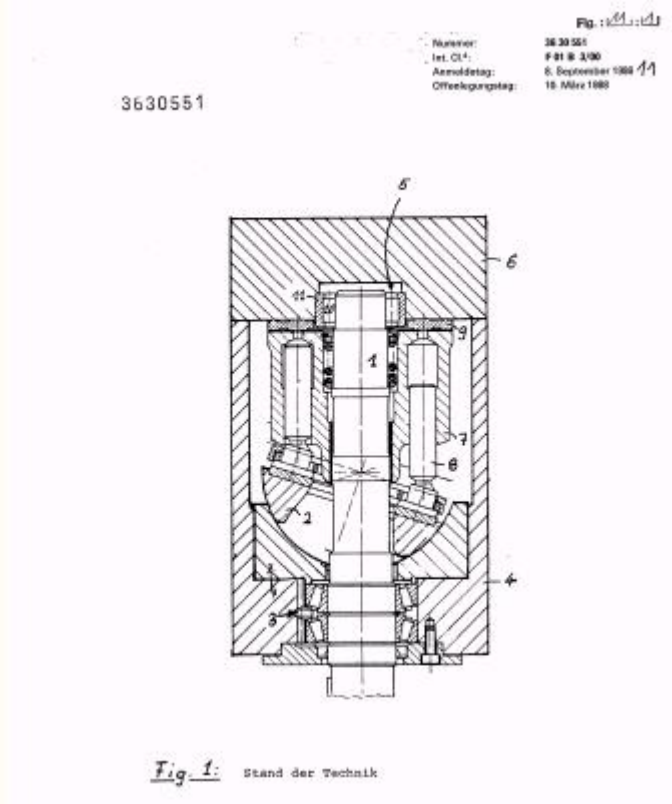


F01B 3/005

[N: Bearing arrangements]

Special rules of classification within this group

Illustrative example of subject matter classified in F01B 3/005

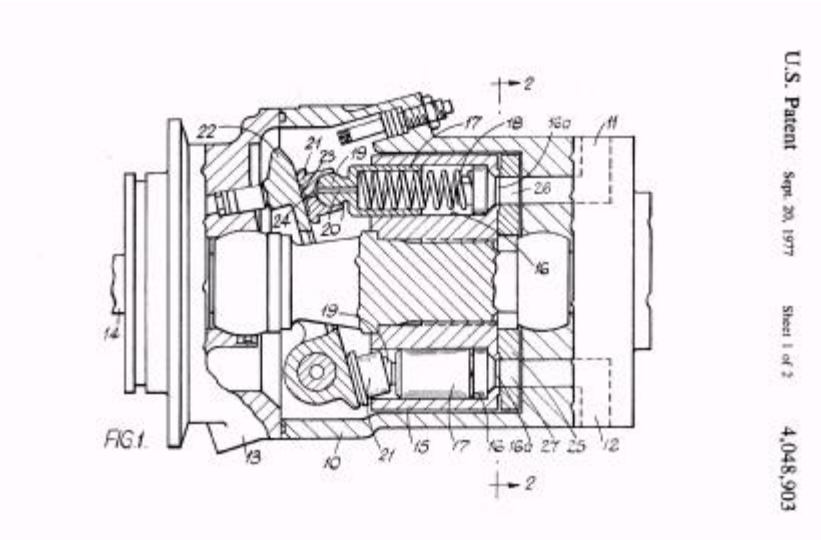


F01B 3/0052

[N: Cylinder barrel]

Special rules of classification within this group

Illustrative example of subject matter classified in F01B 3/0052

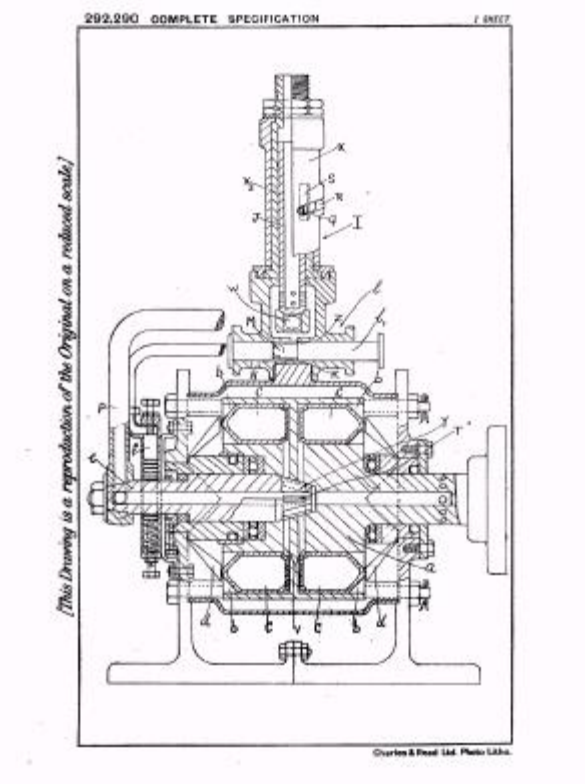


F01B 3/0061

[N: Conical valve means]

Special rules of classification within this group

Illustrative example of subject matter classified in F01B 3/0061



F01B 3/007

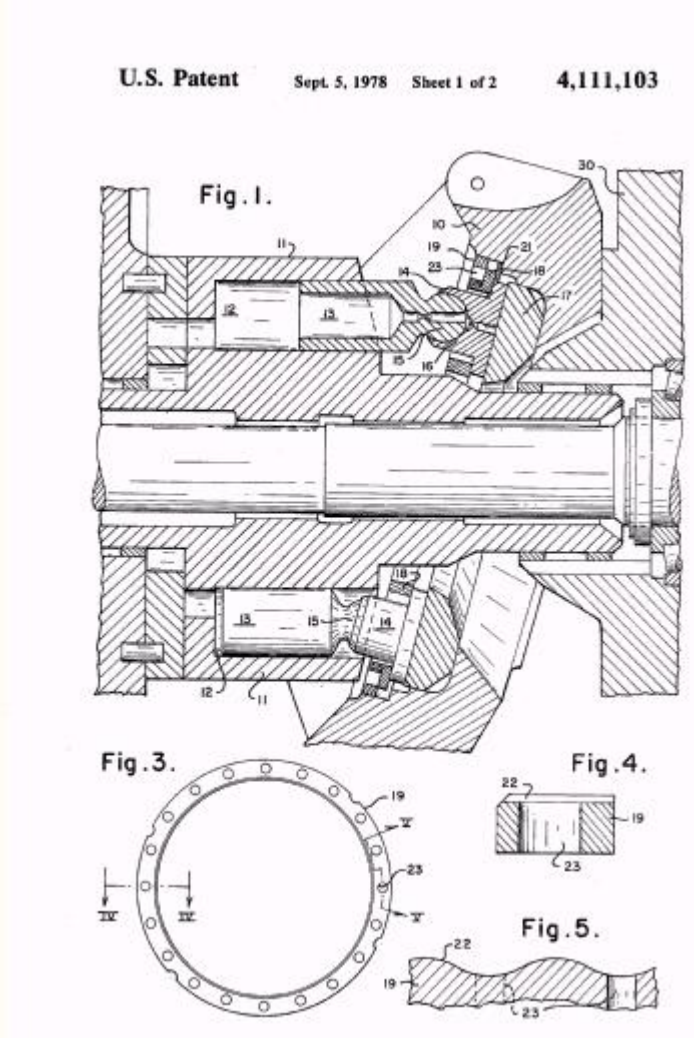
[N: Swash plate]

Definition statement

This subclass/group covers:

Special rules of classification within this group

Illustrative example of subject matter classified in F01B 3/007

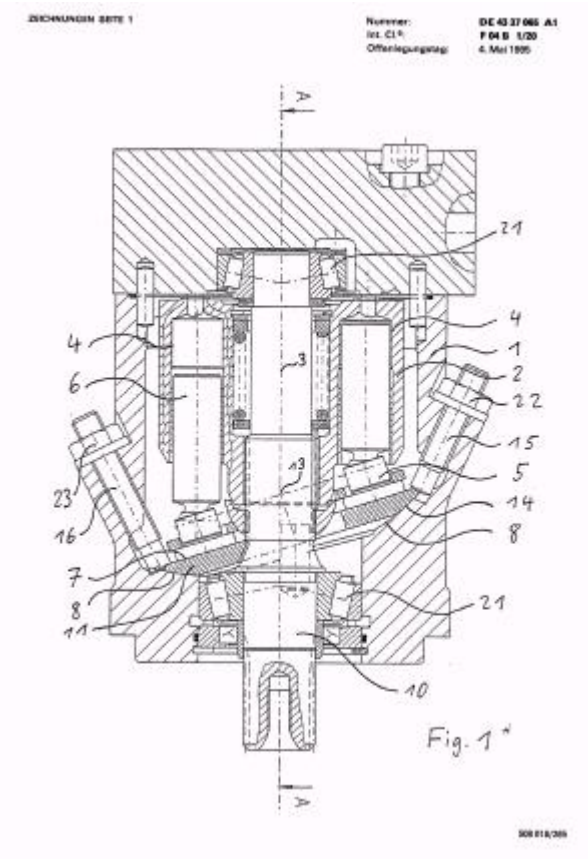


F01B 3/0076

[N: Connection between cylinder barrel and inclined swash plate]

Special rules of classification within this group

Illustrative example of subject matter classified in F01B 3/0076



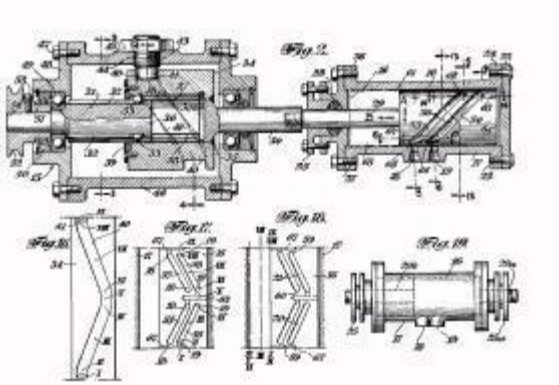
F01B 3/0079

[N: having pistons with rotary and reciprocating motion, i.e. spinning pistons]

Definition statement

This subclass/group covers:

having pistons with rotary and reciprocating motion, i.e. spinning pistons. The piston reciprocates and e.g. by means of a curved groove on the outer circumference will also rotate, (spin) along its longitudinal axis.



Informative references

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

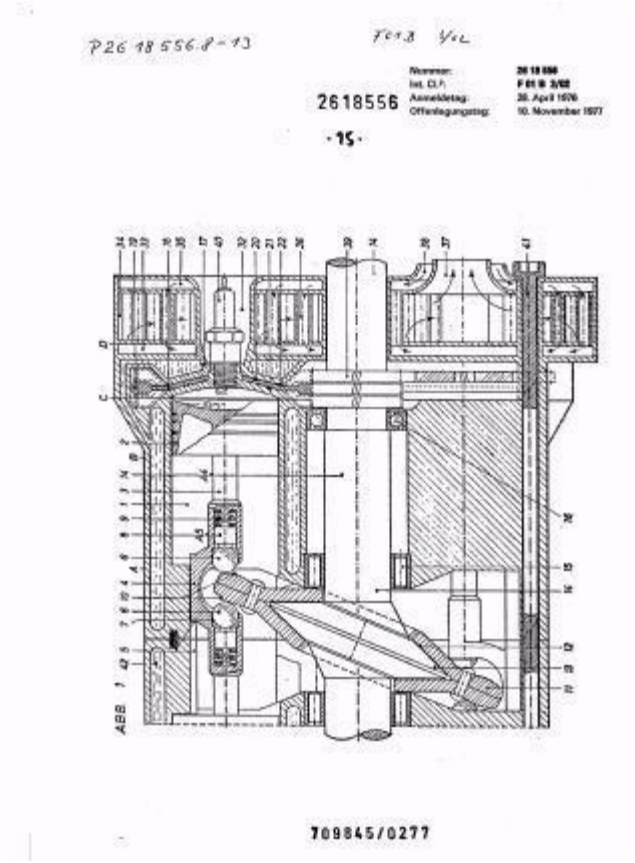
Piston motion being transmitted by curved surfaces, e.g. by cams or grooves	F01B 3/04.
Piston machines or pumps in which the valving is performed by pistons and cylinders coacting to open and close intake or outlet ports, the pistons and cylinders being relatively reciprocated and rotated	F04B 7/06

F01B 3/02

with wobble-plate

Special rules of classification within this group

Illustrative example of subject matter classified in F01B 3/02

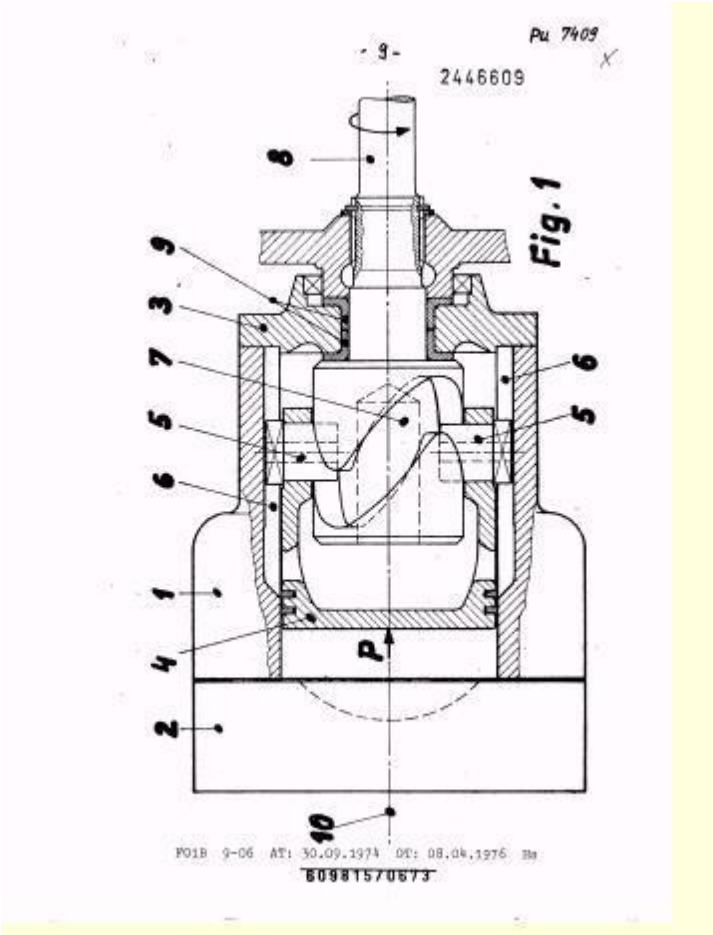


F01B 3/04

the piston motion being transmitted by curved surfaces

Special rules of classification within this group

Illustrative example of subject matter classified in F01B 3/04

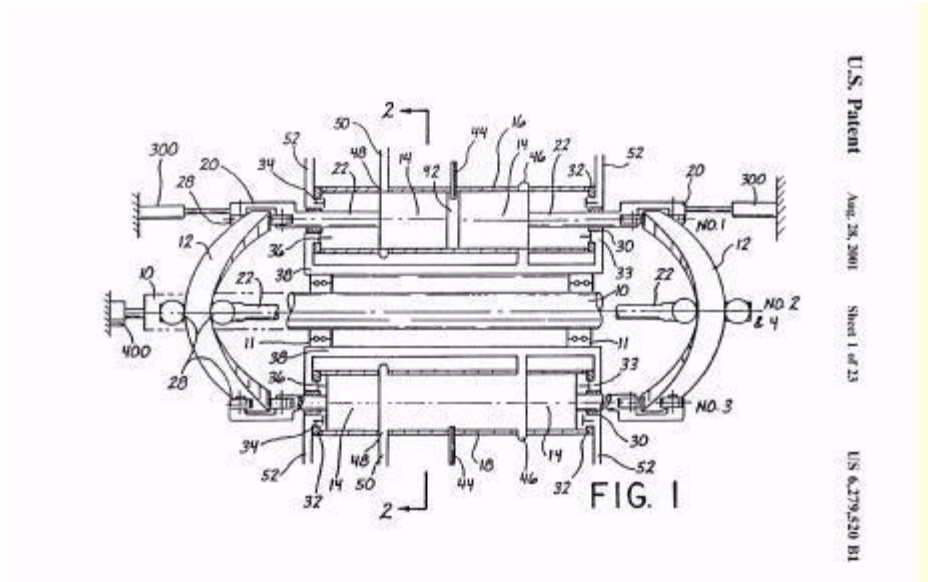


F01B 3/045

[N: by two or more curved surfaces, e.g. for two or more pistons in one cylinder]

Special rules of classification within this group

Illustrative example of subject matter classified in F01B 3/045

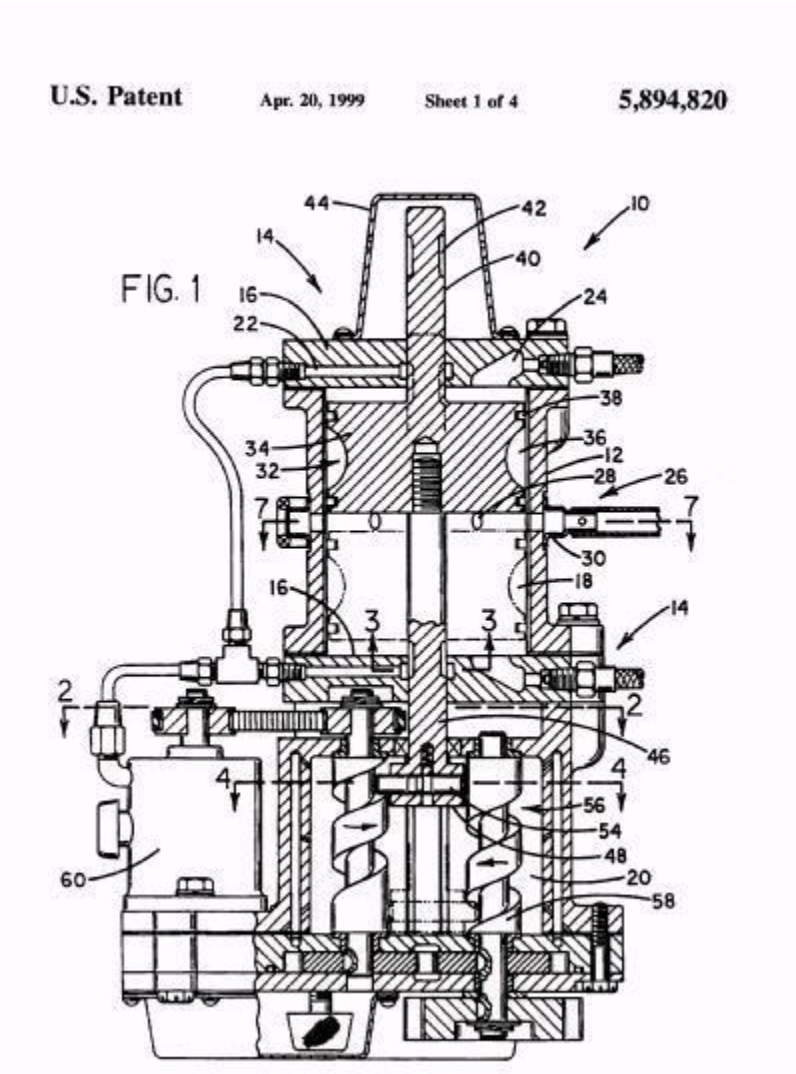


F01B 3/06

by multi-turn helical surfaces and automatic reversal

Special rules of classification within this group

Illustrative example of subject matter classified in F01B 3/06

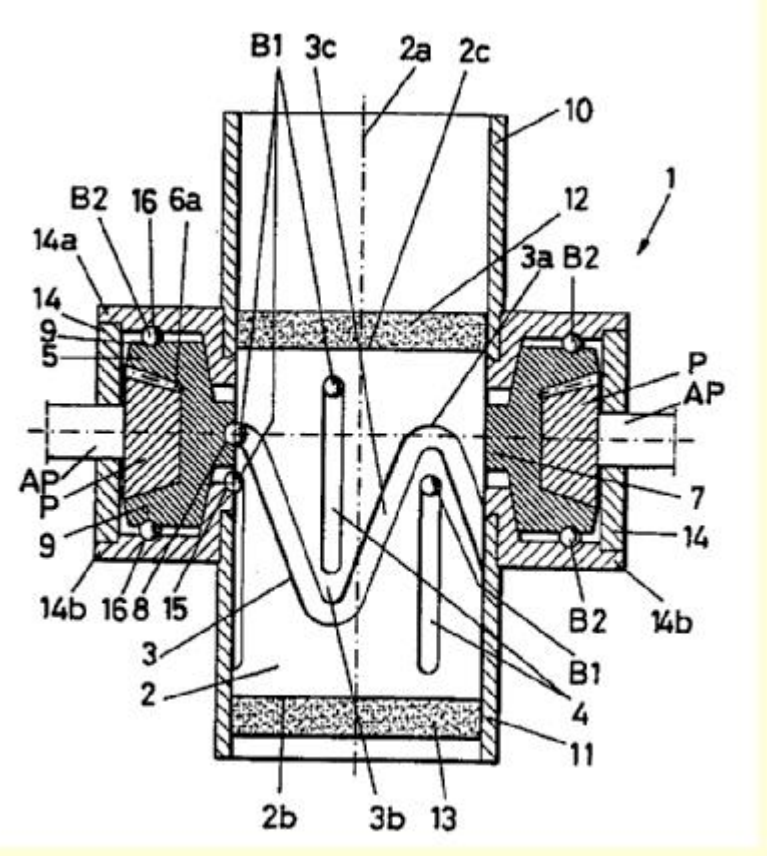


F01B 3/08

the helices being arranged on the pistons

Special rules of classification within this group

Illustrative example of subject matter classified in F01B 3/08



F01B 3/10

Control of working-fluid admission or discharge peculiar thereto (suitable for more general application F01L)

Informative references

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

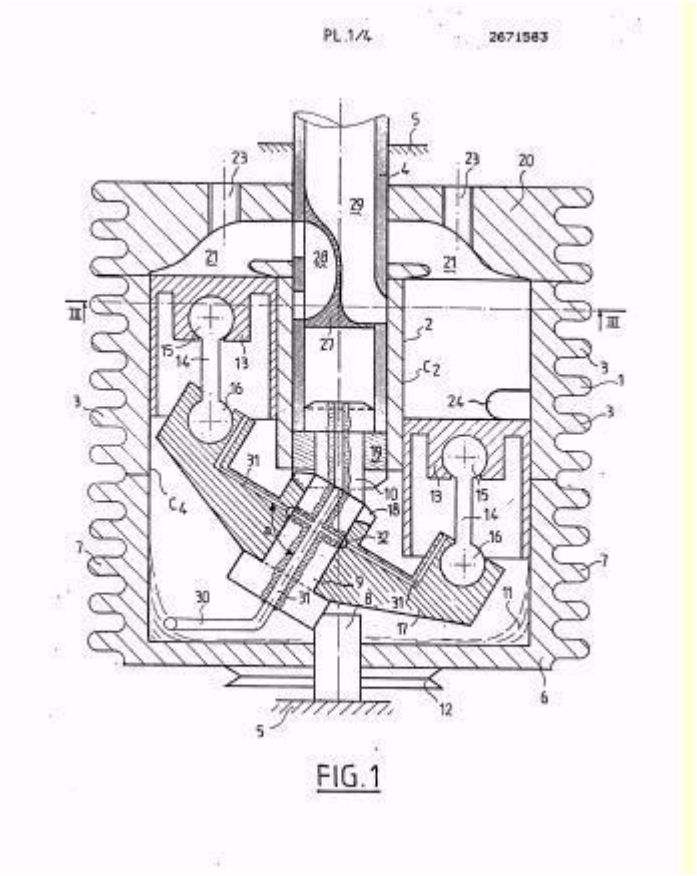
Cyclically operating valves for machines or engines	F01L

F01B 3/103

[N: for machines with rotary cylinder block]

Special rules of classification within this group

Illustrative example of subject matter classified in F01B 3/103

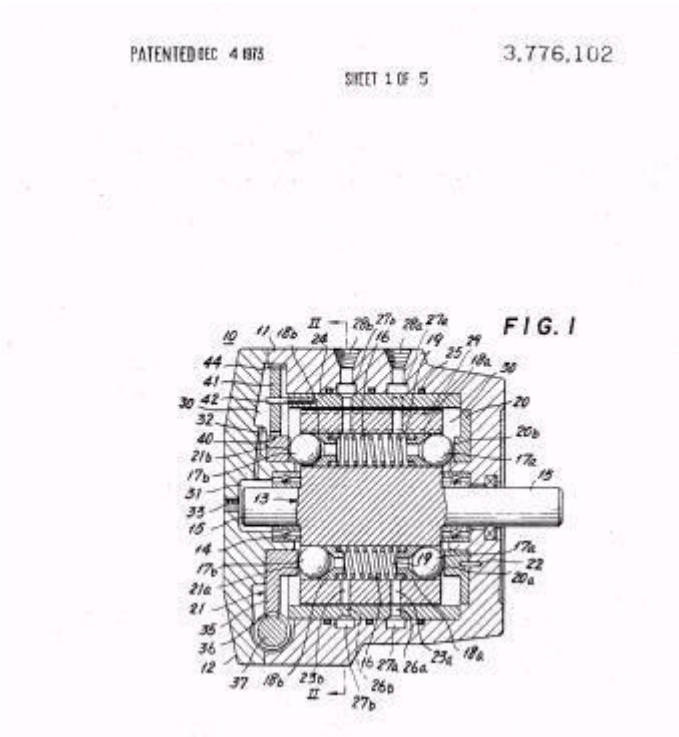


F01B 3/104

[N: by turning the valve plate]

Special rules of classification within this group

Illustrative example of subject matter classified in F01B 3/104

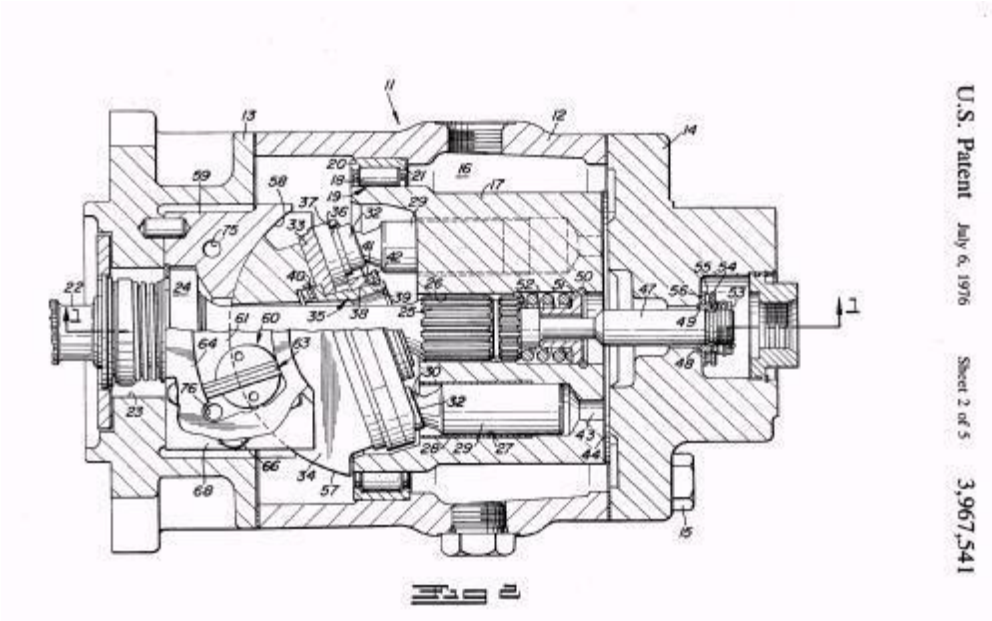


F01B 3/106

[N: by changing the inclination of the swash plate]

Special rules of classification within this group

Illustrative example of subject matter classified in F01B 3/106

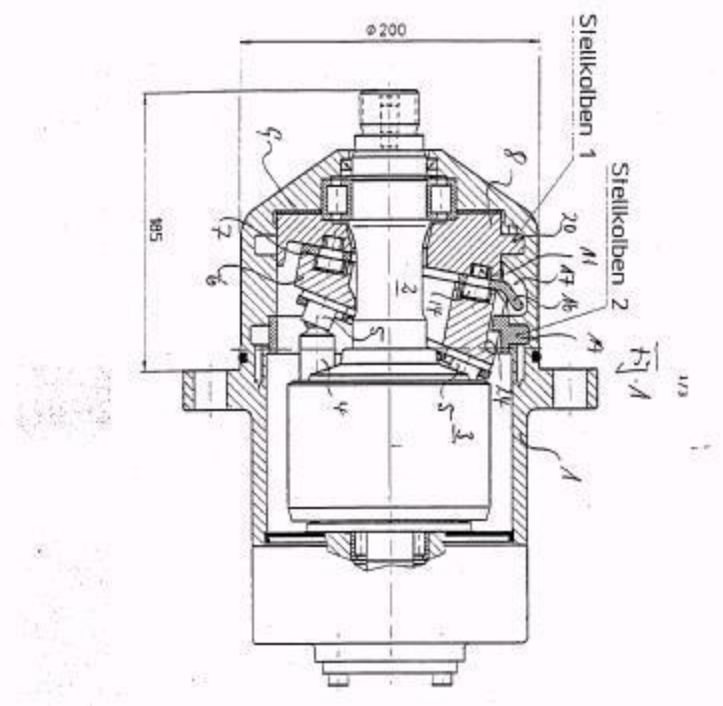


F01B 3/108

[N: by turning the swash plate (with fixed inclination)]

Special rules of classification within this group

Illustrative example of subject matter classified in F01B 3/108



F01B 3/109

[N: by changing the inclination of the axis of the cylinder barrel relative to the swash plate (F01B3/106 takes precedence)]

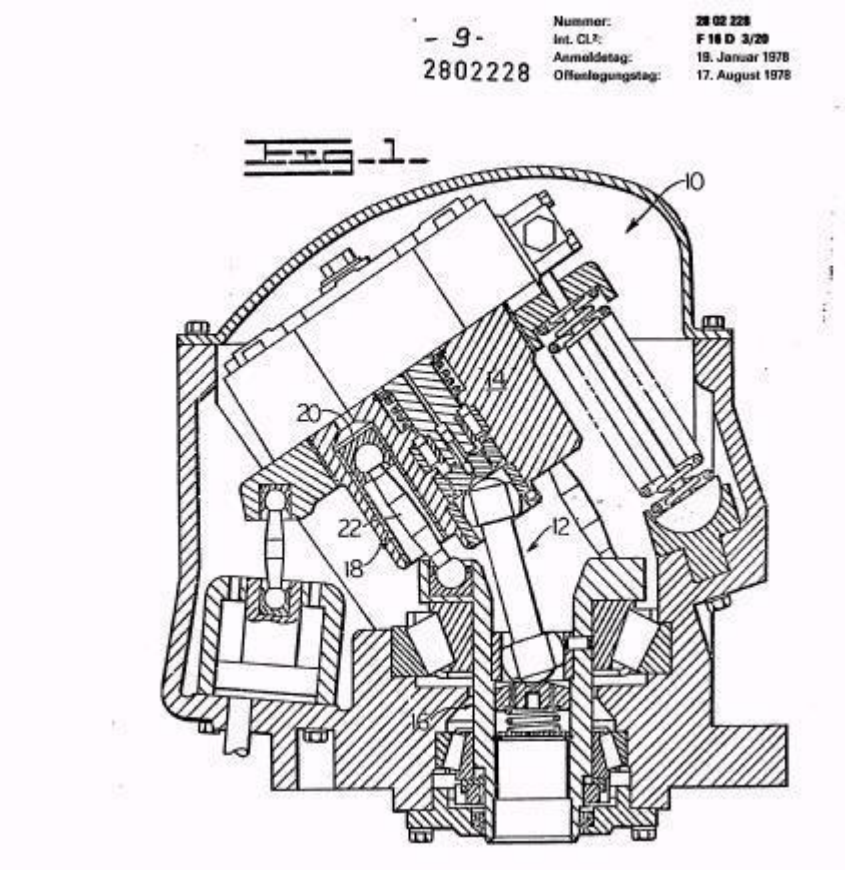
References relevant to classification in this group

This subclass/group does not cover:

By changing the inclination of the swash plate	F01B 3/106

Special rules of classification within this group

Illustrative example of subject matter classified in F01B 3/109

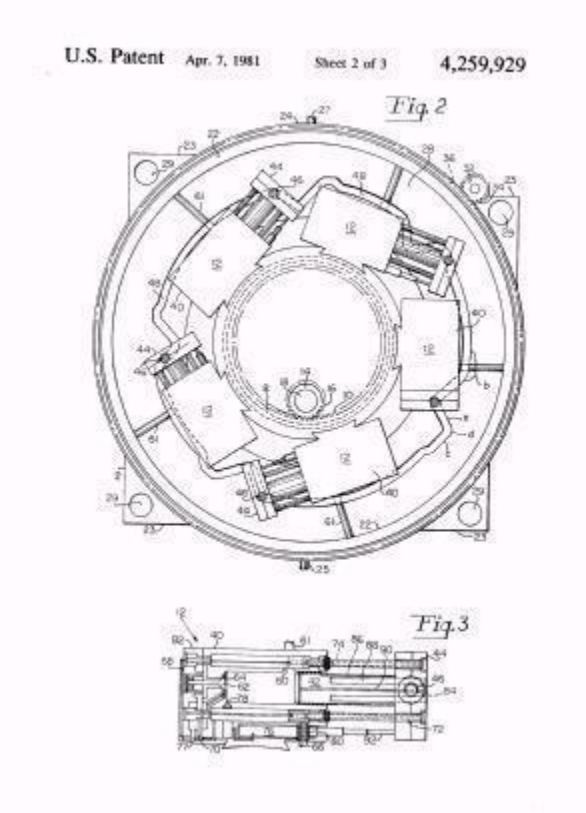


F01B 5/00

Reciprocating-piston machines or engines with cylinder axes arranged substantially tangentially to a circle centred on main shaft axis

Special rules of classification within this group

Illustrative example of subject matter classified in F01B 5/00

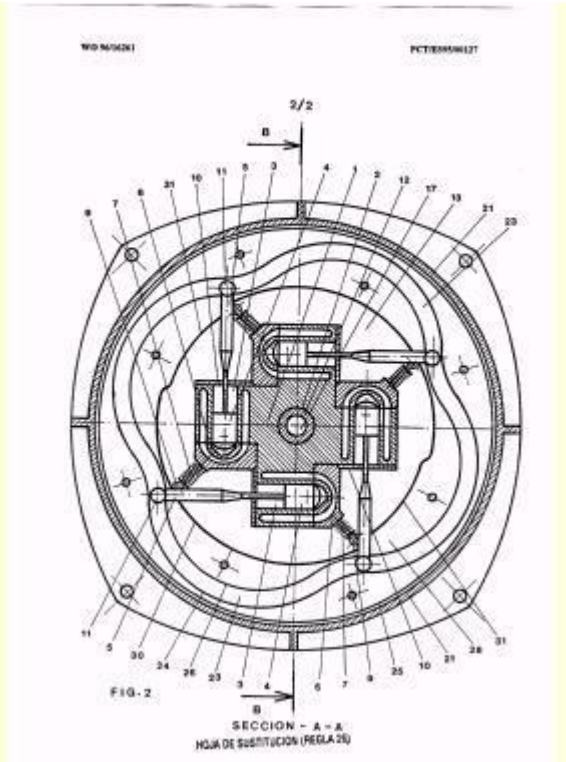


F01B 5/003

[N: the connection of the pistons with an actuated or actuating element being at the outer ends of the cylinders]

Special rules of classification within this group

Illustrative example of subject matter classified in F01B 5/003

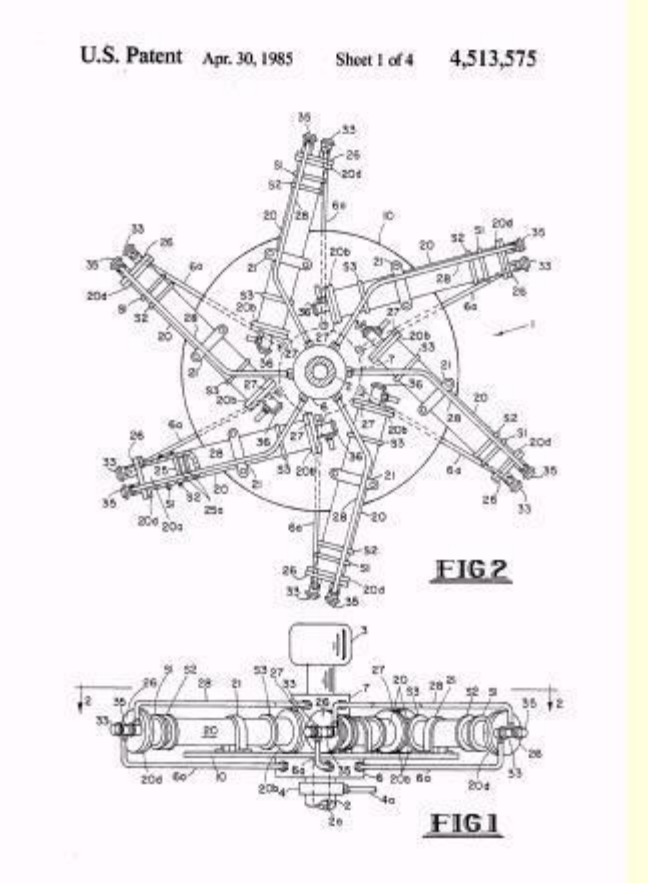


F01B 5/006

[N: the connection of the pistons with an actuated or actuating element being at the inner ends of the cylinders]

Special rules of classification within this group

Illustrative example of subject matter classified in F01B 5/006



F01B 7/00

Machines or engines with two or more pistons reciprocating within same cylinder or within essentially coaxial cylinders (in opposite arrangement relative to main shaft F01B1/08)

References relevant to classification in this group

This subclass/group does not cover:

Coaxial cylinders in opposite arrangement relative to main shaft	F01B 1/08

Special rules of classification within this group

Illustrative example of subject matter classified in F01B 7/00

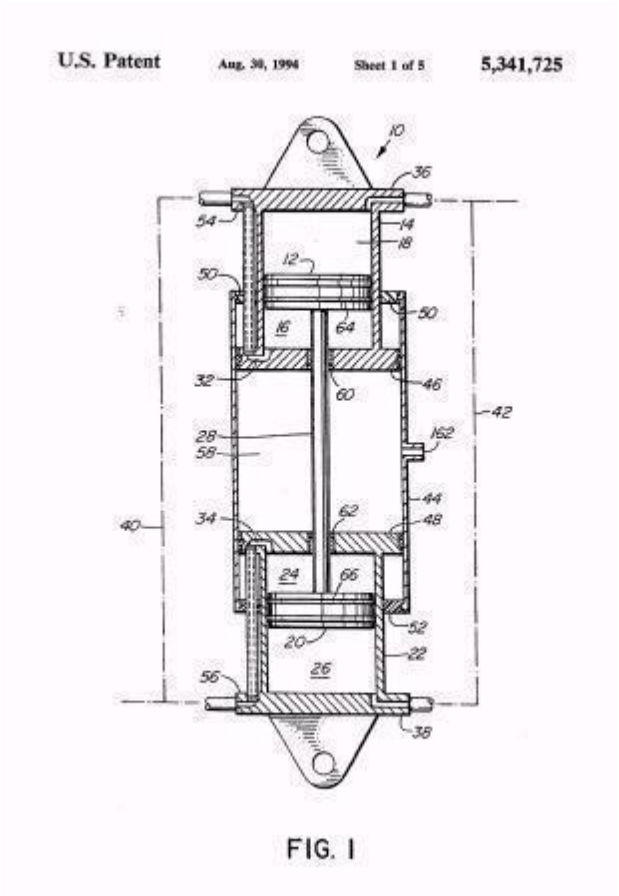


FIG. 1

F01B 7/02

with oppositely reciprocating pistons

Special rules of classification within this group

Illustrative example of subject matter classified in F01B 7/02

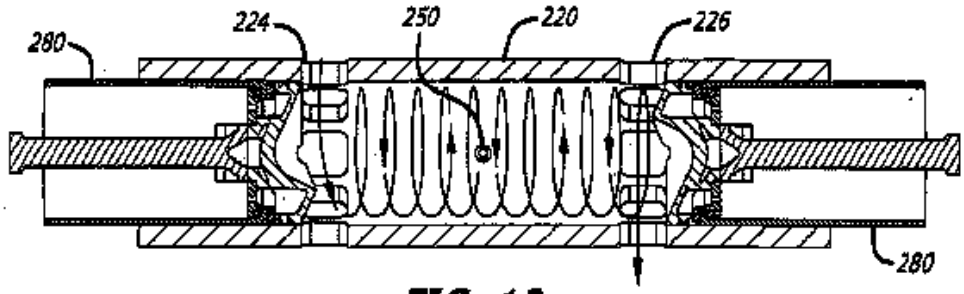


FIG. 12

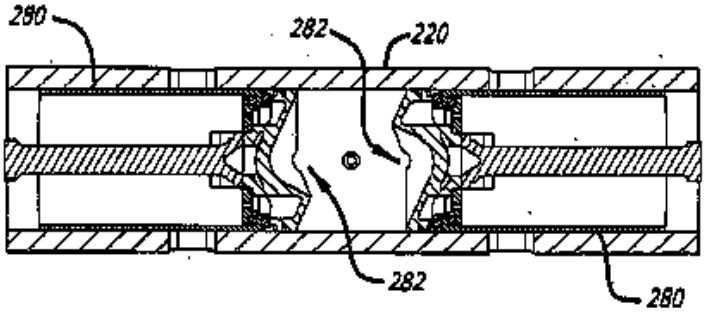


FIG. 13

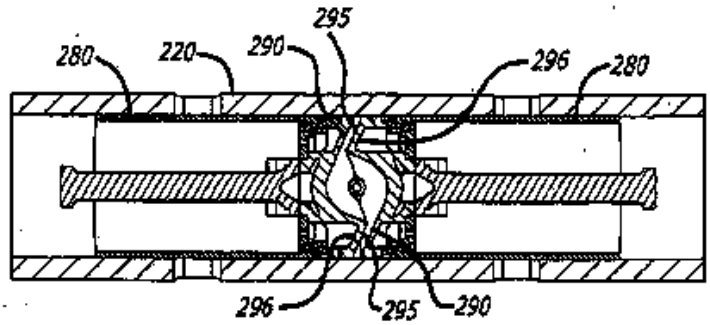


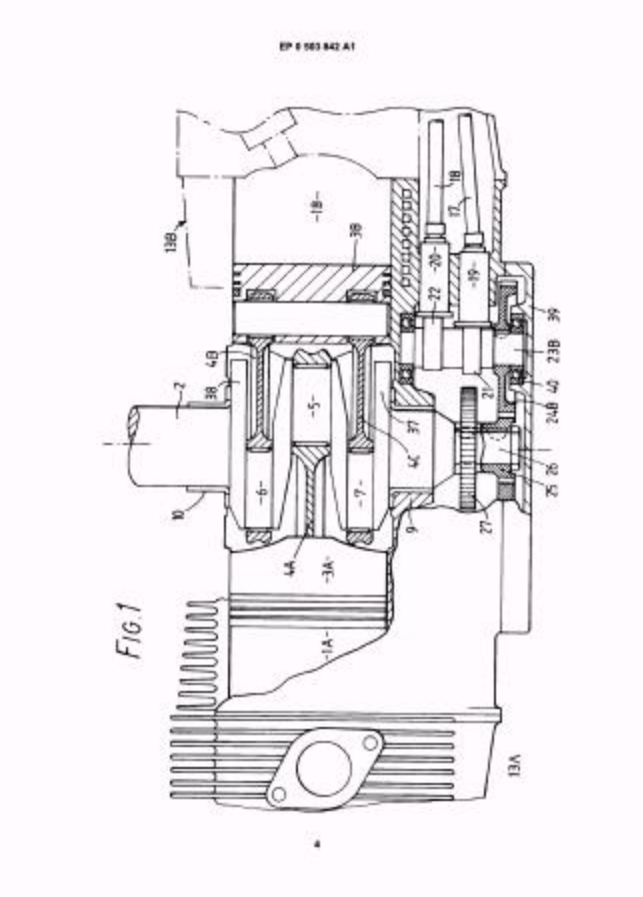
FIG. 14

F01B 7/06

using only connecting-rods for conversion of reciprocatory into rotary motion or vice-versa

Special rules of classification within this group

Illustrative example of subject matter classified in F01B 7/06

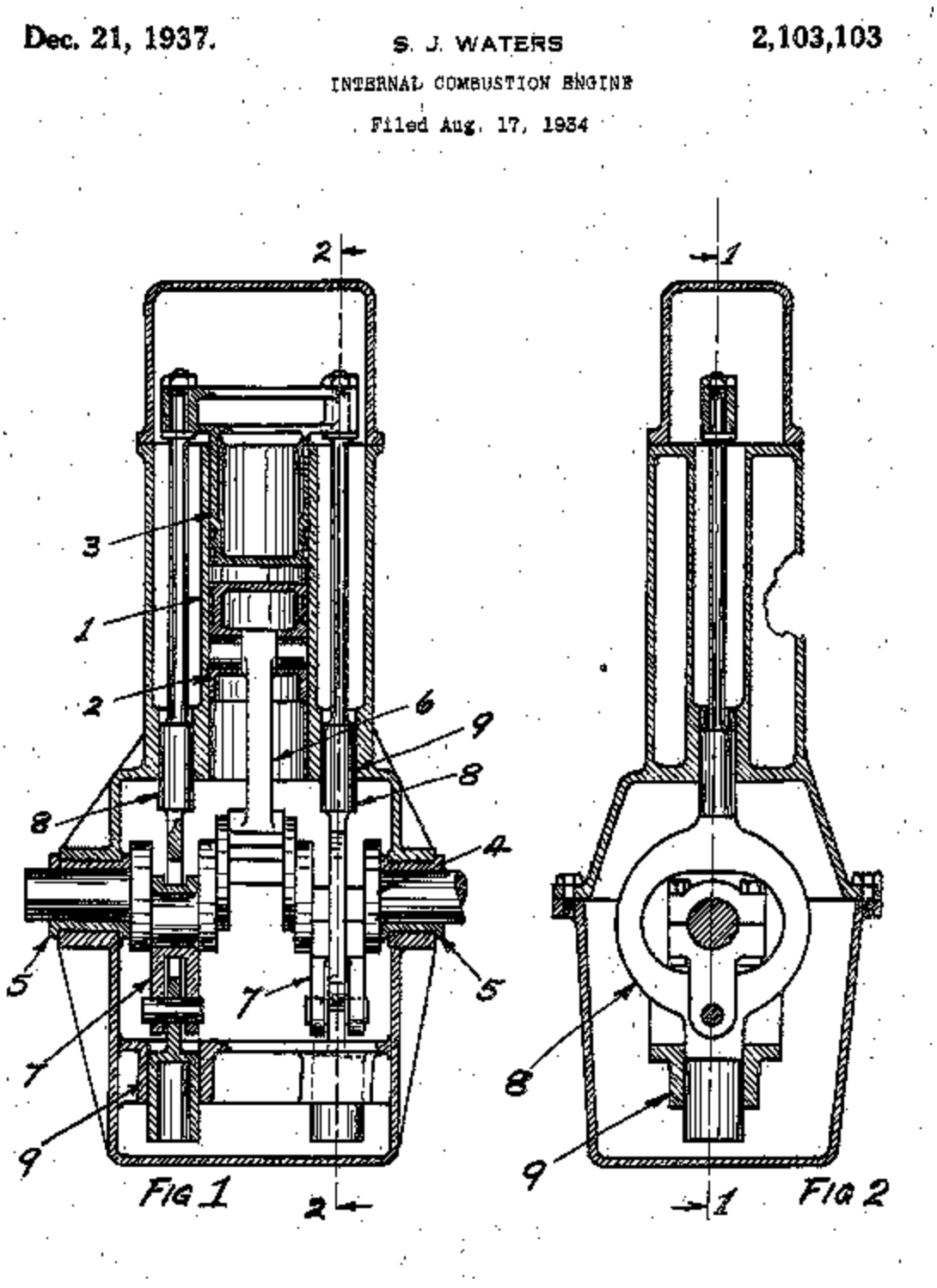


F01B 7/08

with side rods

Special rules of classification within this group

Illustrative example of subject matter classified in F01B 7/08



F01B 7/10

having piston-rod of one piston passed through other piston

Special rules of classification within this group

Illustrative example of subject matter classified in F01B 7/10

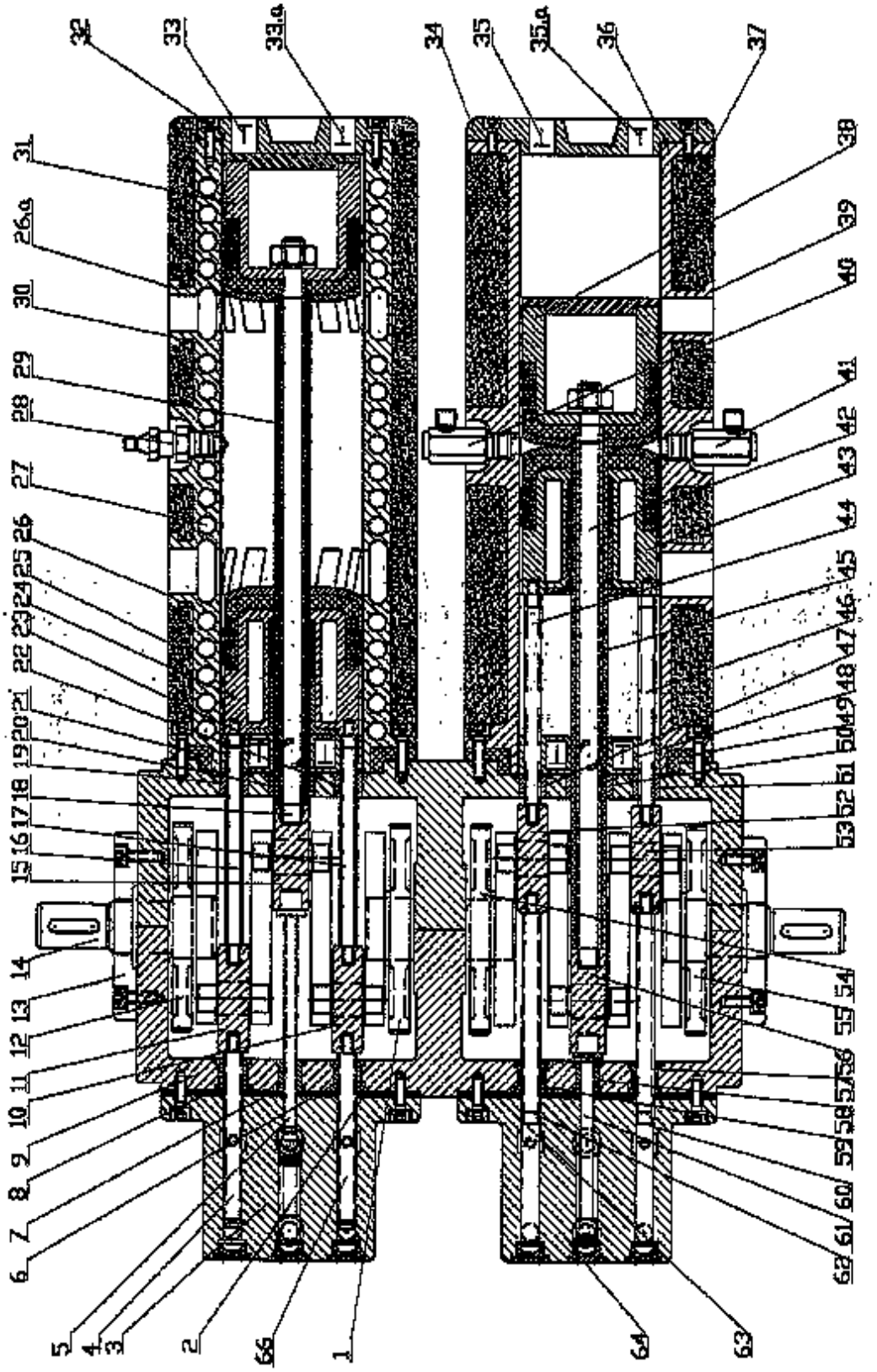

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Fig. 1

F01B 7/12

using rockers and connecting-rods

Special rules of classification within this group

Illustrative example of subject matter classified in F01B 7/12

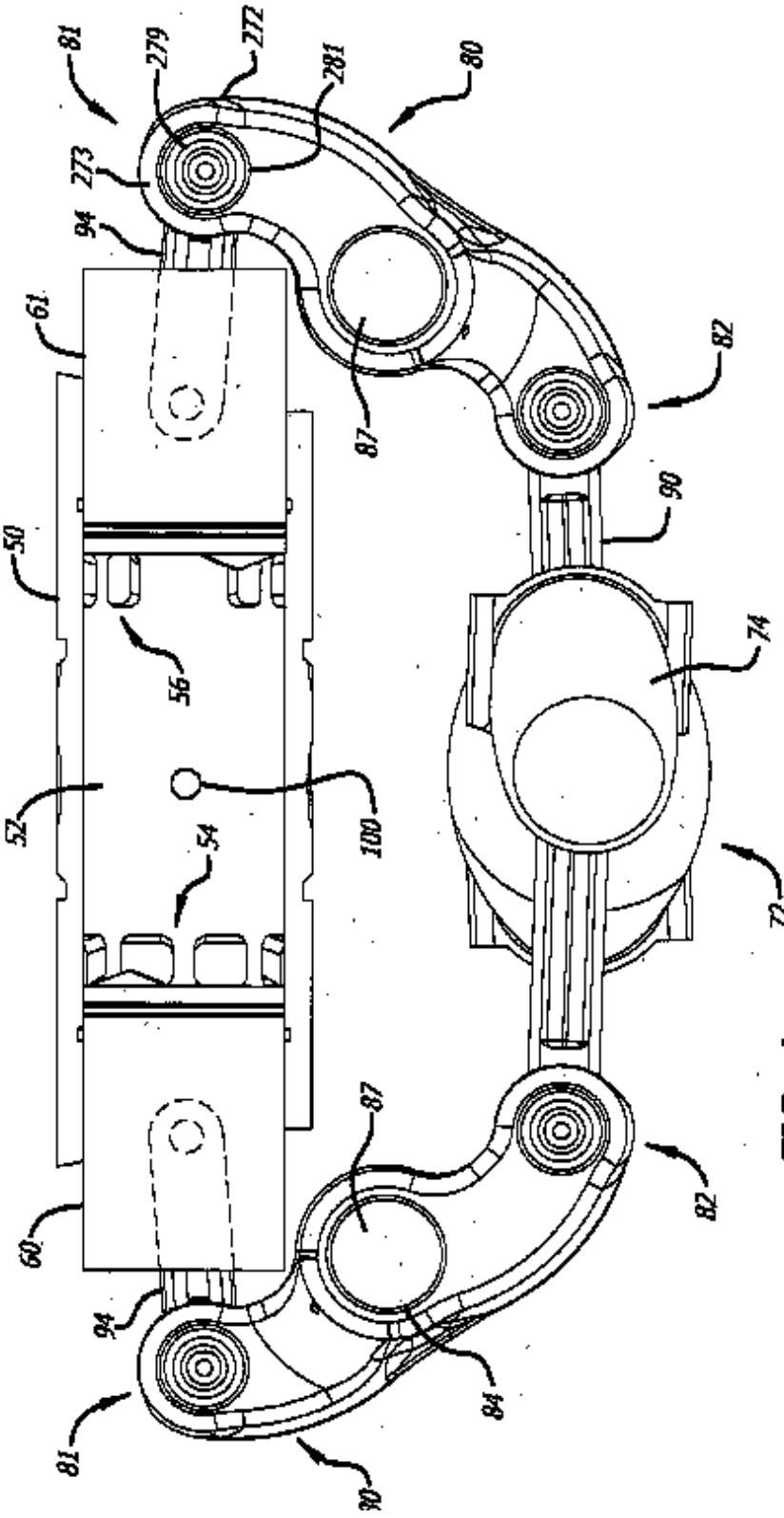
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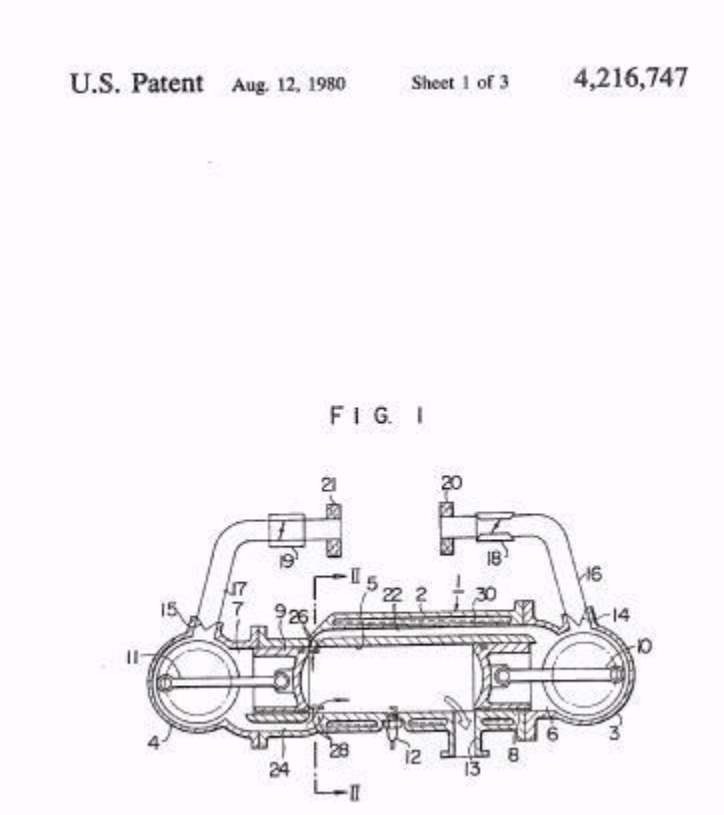
FIG. 4

F01B 7/14

acting on different main shafts

Special rules of classification within this group

Illustrative example of subject matter classified in F01B 7/14

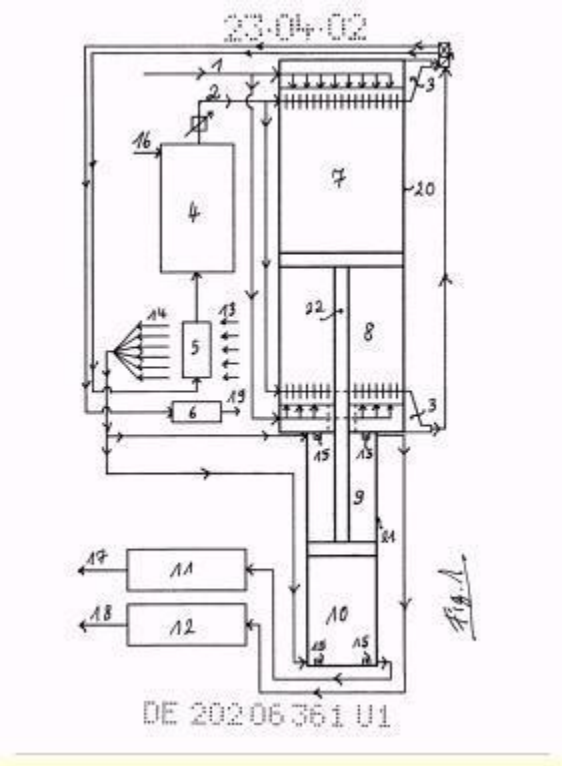


F01B 7/16

with pistons synchronously moving in tandem arrangement

Special rules of classification within this group

Illustrative example of subject matter classified in F01B 7/16



F01B 7/18

with differential piston (F01B7/20 takes precedence)

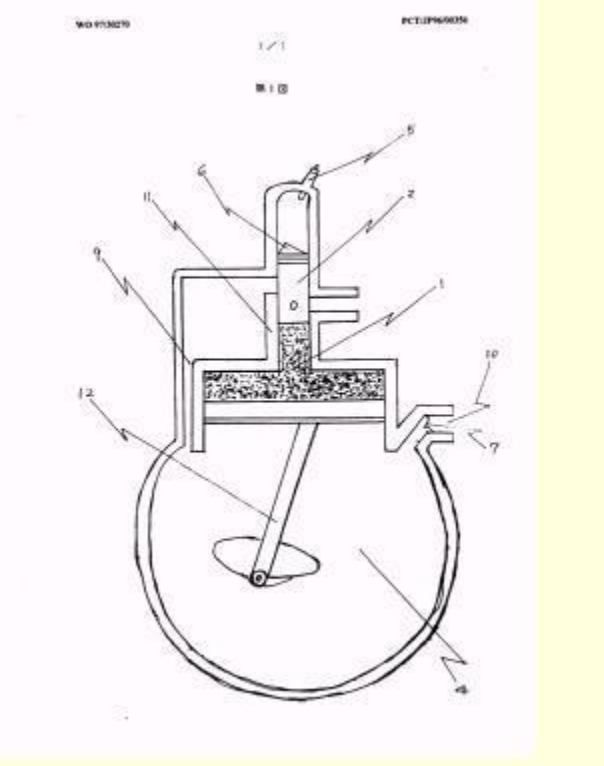
References relevant to classification in this group

This subclass/group does not cover:

With two or more pistons reciprocating one within another	F01B 7/20

Special rules of classification within this group

Illustrative example of subject matter classified in F01B 7/18

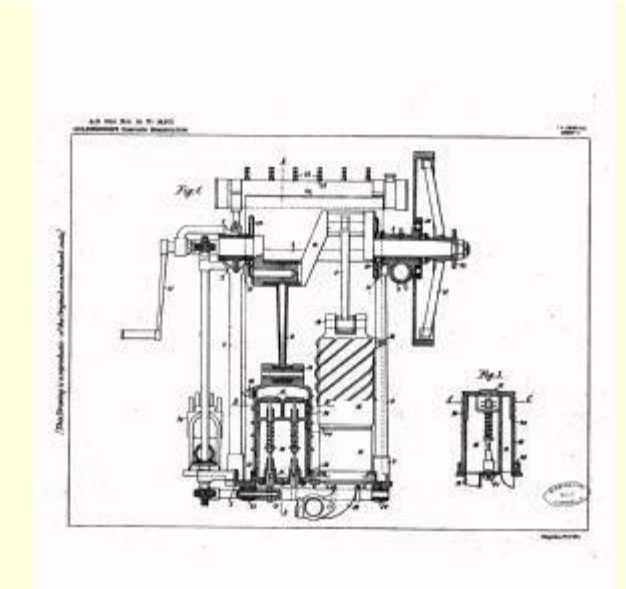


F01B 7/20

with two or more pistons reciprocating one within another, e.g. one piston forming cylinder of the other

Special rules of classification within this group

Illustrative example of subject matter classified in F01B 7/20



F01B 9/00

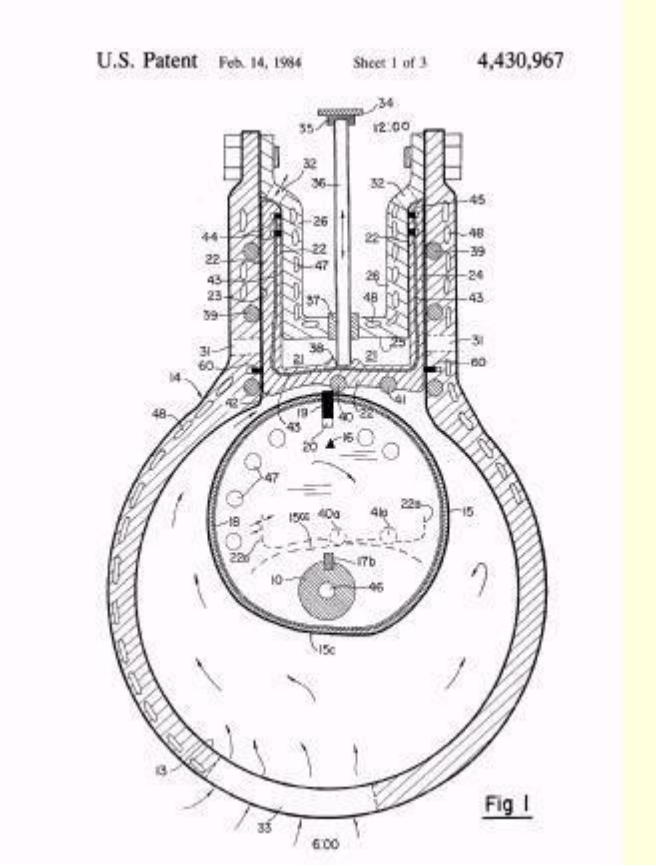
Reciprocating-piston machines or engines characterised by connections between pistons and main shafts and not specific to preceding groups (connections disengageable during idling F01B31/24)

Definition statement

This subclass/group covers:

Reciprocating-piston machines or engines characterised by connections between pistons and main shafts and not specific to preceding groups.

E.g. when no recognisable crank shaft is present or the main shaft is a cam shaft:



References relevant to classification in this group

This subclass/group does not cover:

Idling devices characterised by disengagement of connections between pistons and main shafts during idling	F01B 31/24

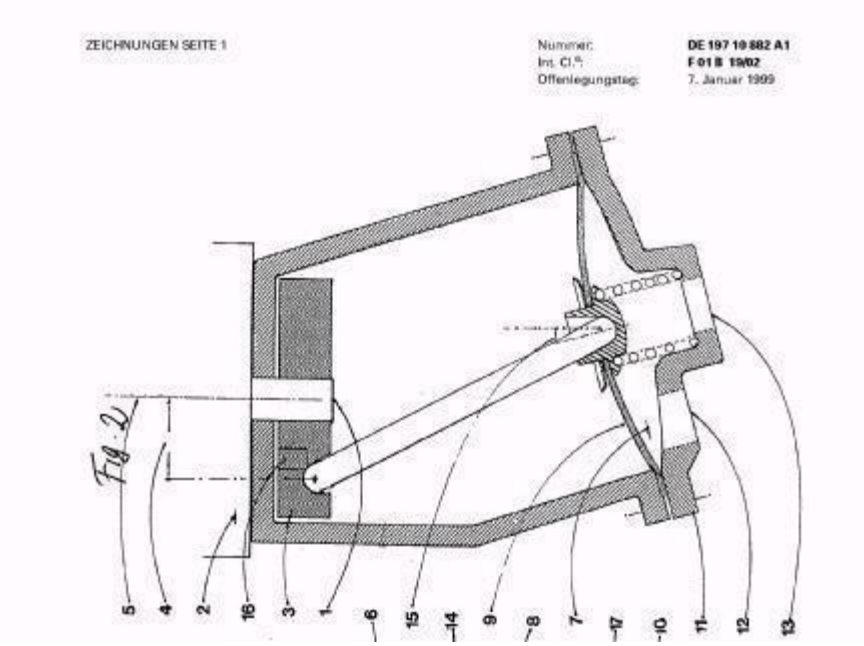
F01B 9/02

with crankshaft

Special rules of classification within this group

Illustrative example of subject matter classified in F01B 9/02

e.g. non-conventional crankshafts:

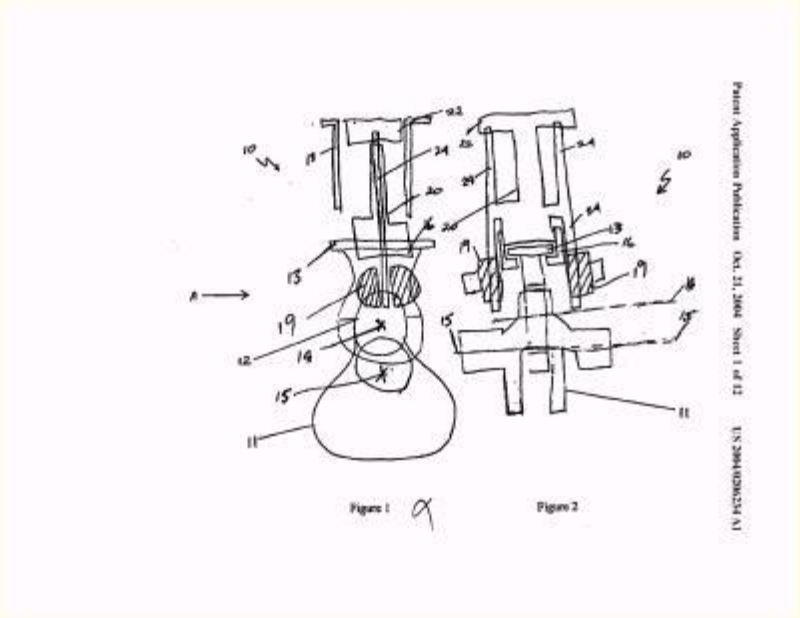


F01B 9/023

[N: of Bourke-type or Scotch yoke]

Special rules of classification within this group

Illustrative example of subject matter classified in F01B 9/023

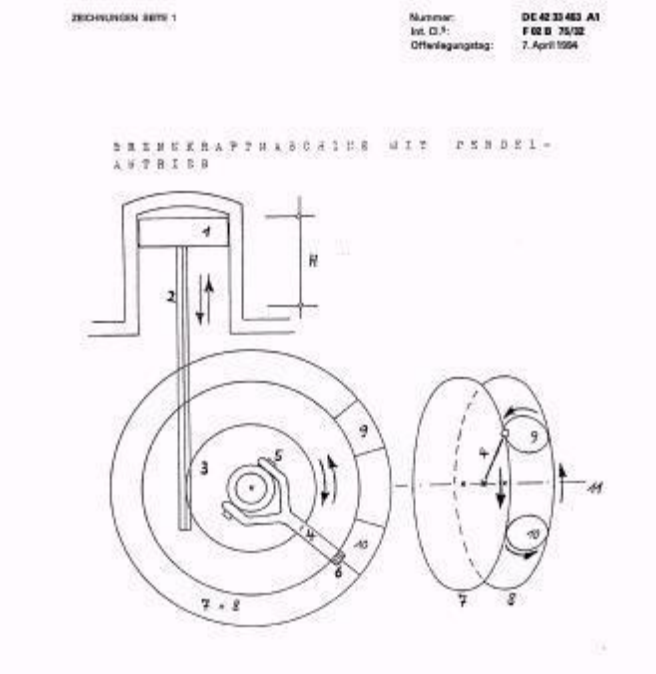


F01B 9/04

with rotary main shaft other than crankshaft

Special rules of classification within this group

Illustrative example of subject matter classified in F01B 9/04

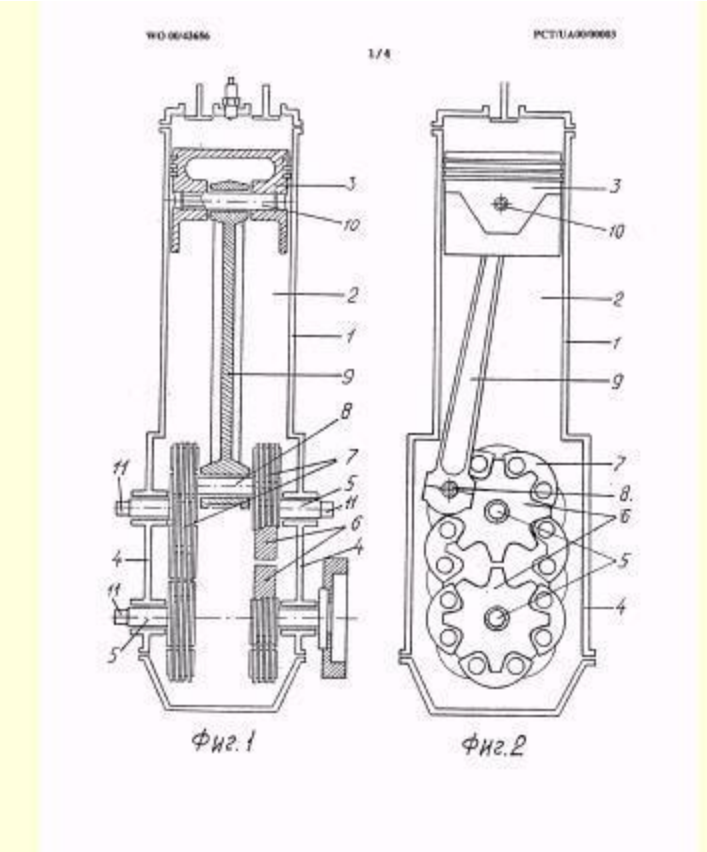


F01B 9/042

[N: the connections comprising gear transmissions]

Special rules of classification within this group

Illustrative example of subject matter classified in F01B 9/042

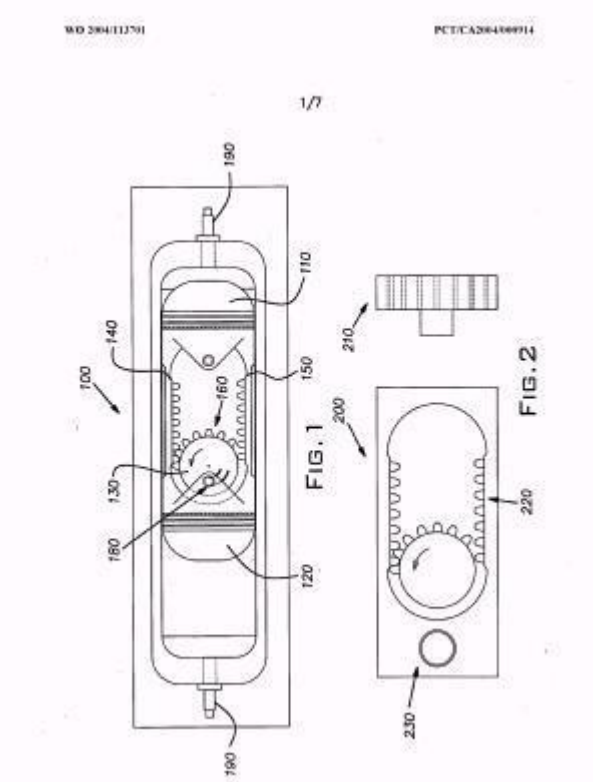


F01B 9/047

[N: with rack and pinion]

Special rules of classification within this group

Illustrative example of subject matter classified in F01B 9/047

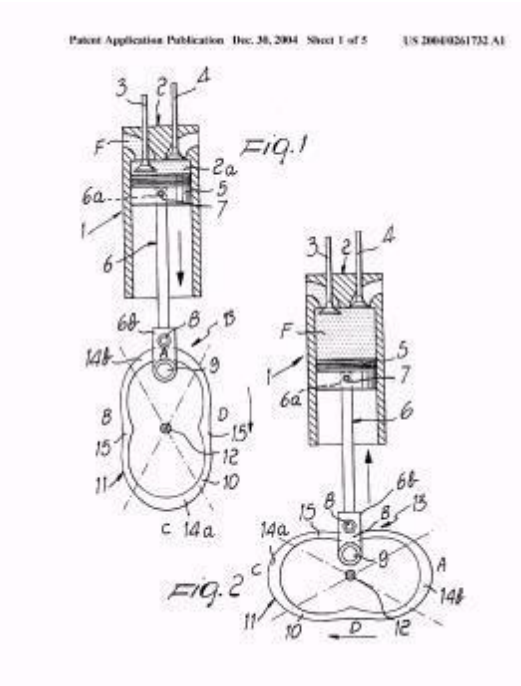


F01B 9/06

the piston motion being transmitted by curved surfaces

Special rules of classification within this group

Illustrative example of subject matter classified in F01B 9/06

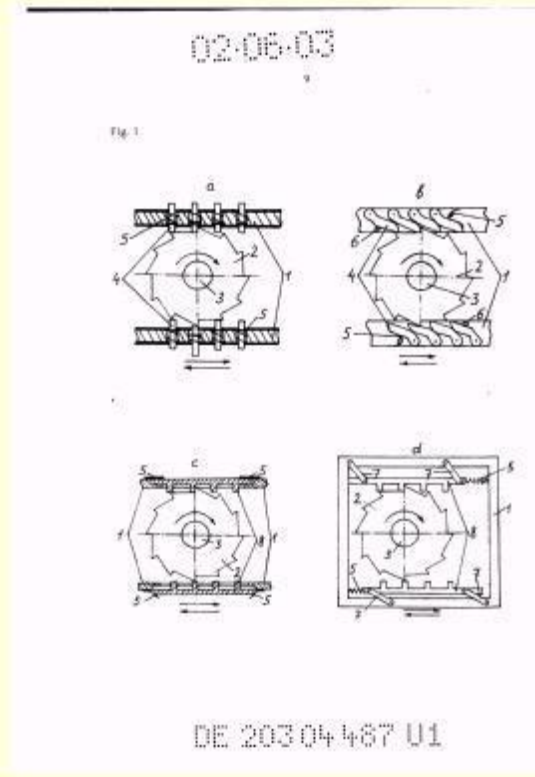


F01B 9/08

with ratchet and pawl

Special rules of classification within this group

Illustrative example of subject matter classified in F01B 9/08



F01B 11/00

Reciprocating-piston machines or engines without rotary main shaft, e.g. of free-piston type

Informative references

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

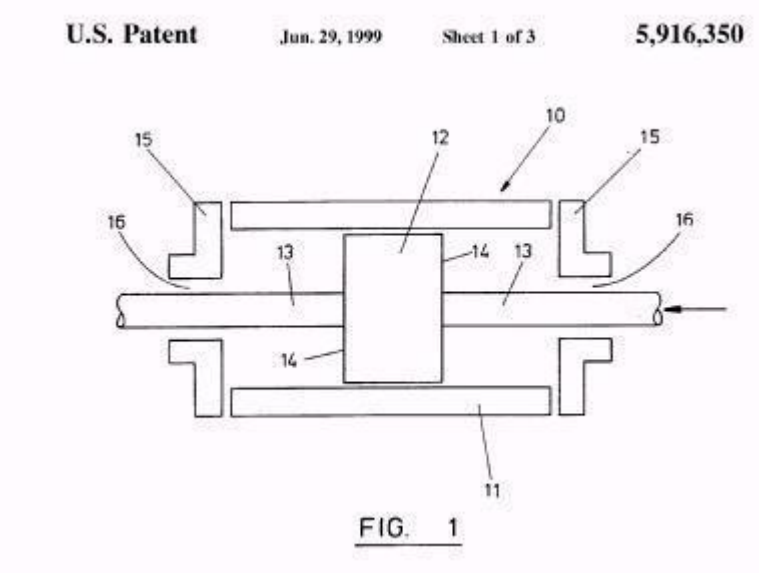
Free-piston combustion engines	F02B 71/00

F01B 11/001

[N: in which the movement in the two directions is obtained by one double acting piston motor]

Special rules of classification within this group

Illustrative example of subject matter classified in F01B 11/001

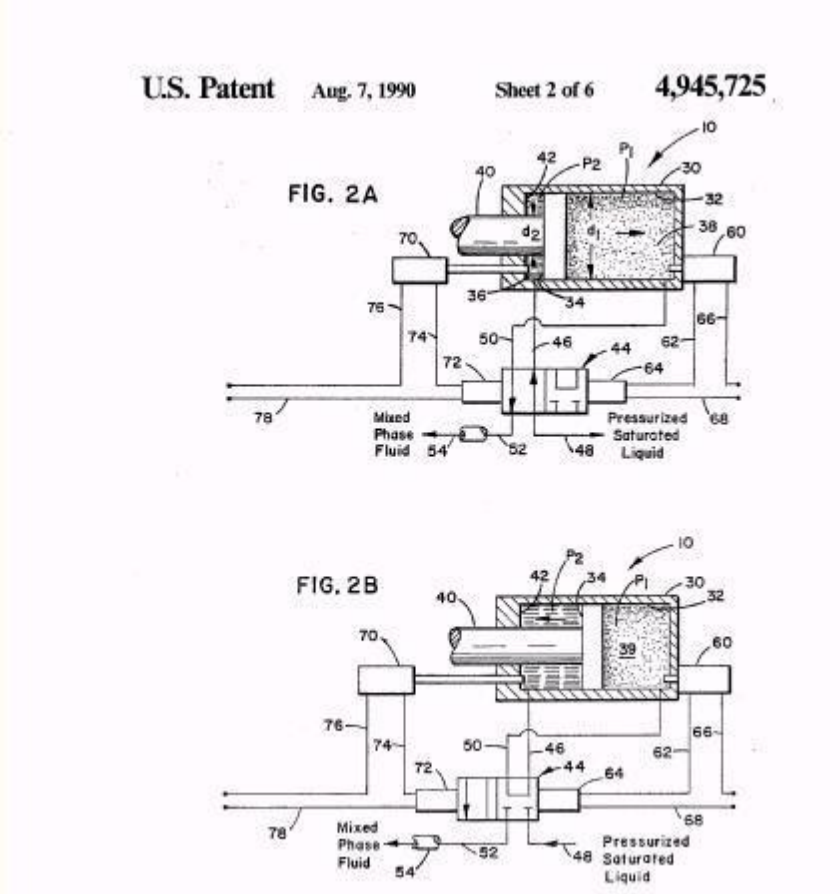


F01B 11/002

[N: one side of the double acting piston motor being always under the influence of the fluid under pressure]

Special rules of classification within this group

Illustrative example of subject matter classified in F01B 11/002

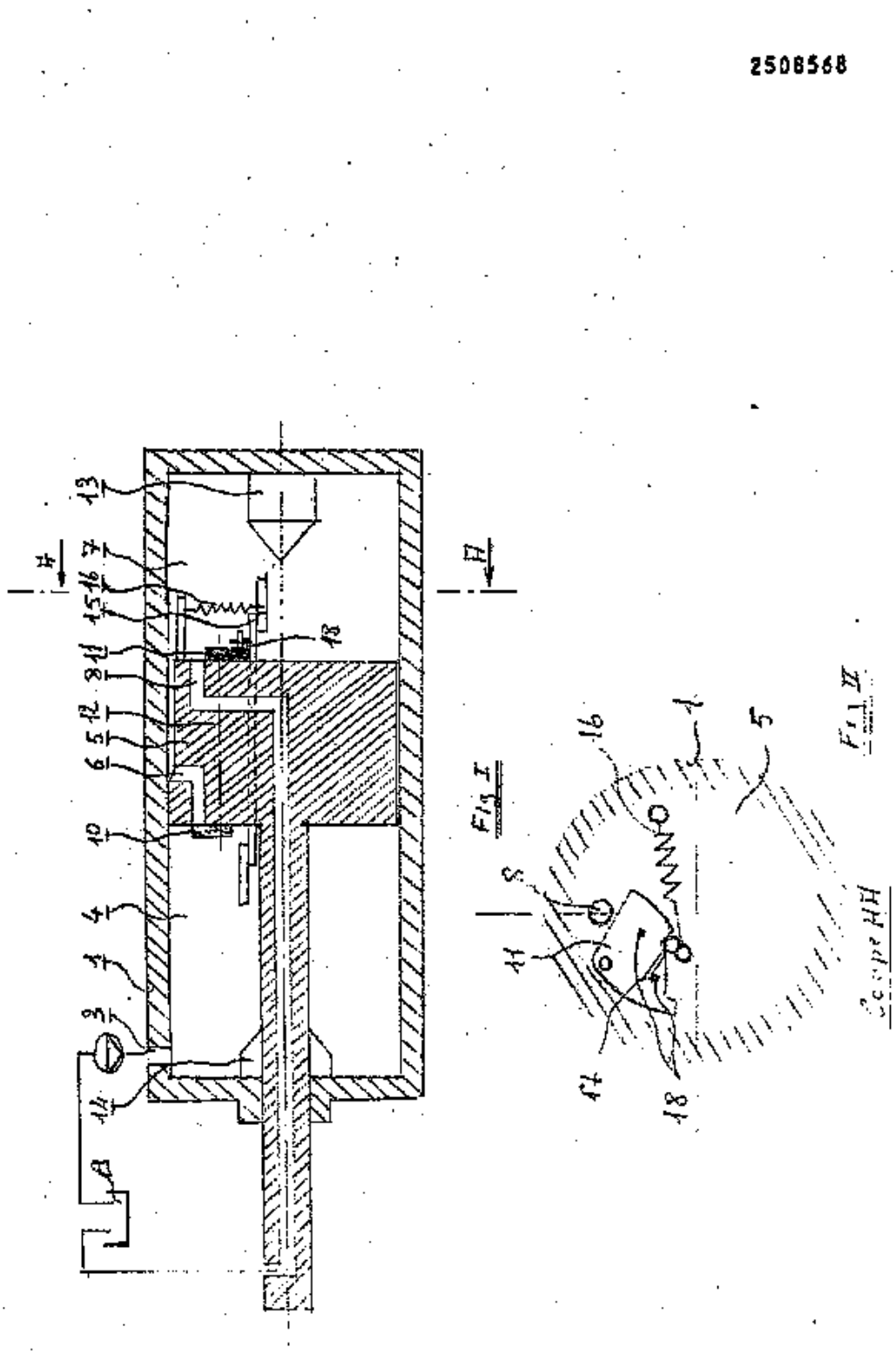


F01B 11/003

[N: the fluid under pressure being continuously delivered to one motor chamber and reacting the other chamber through a valve located in the piston, to bring the piston back in its start-position]

Special rules of classification within this group

Illustrative example of subject matter classified in F01B 11/003



FR2508568 A1

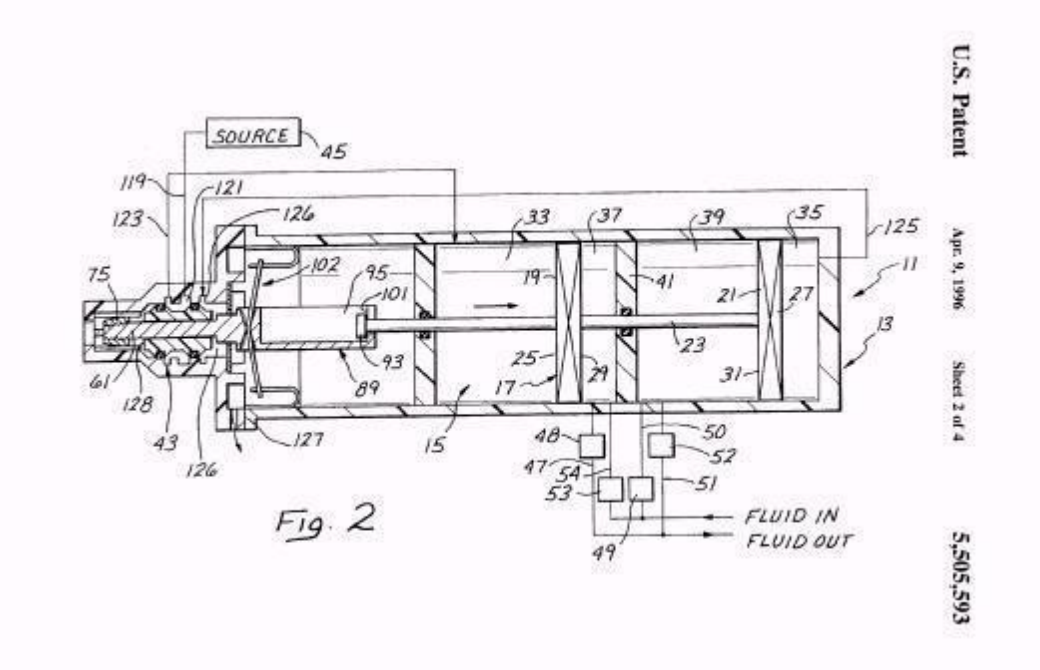
F01B 11/004

[N: in which the movement in the two directions is obtained by two single acting piston motors, each acting in one

direction]

Special rules of classification within this group

Illustrative example of subject matter classified in F01B 11/004



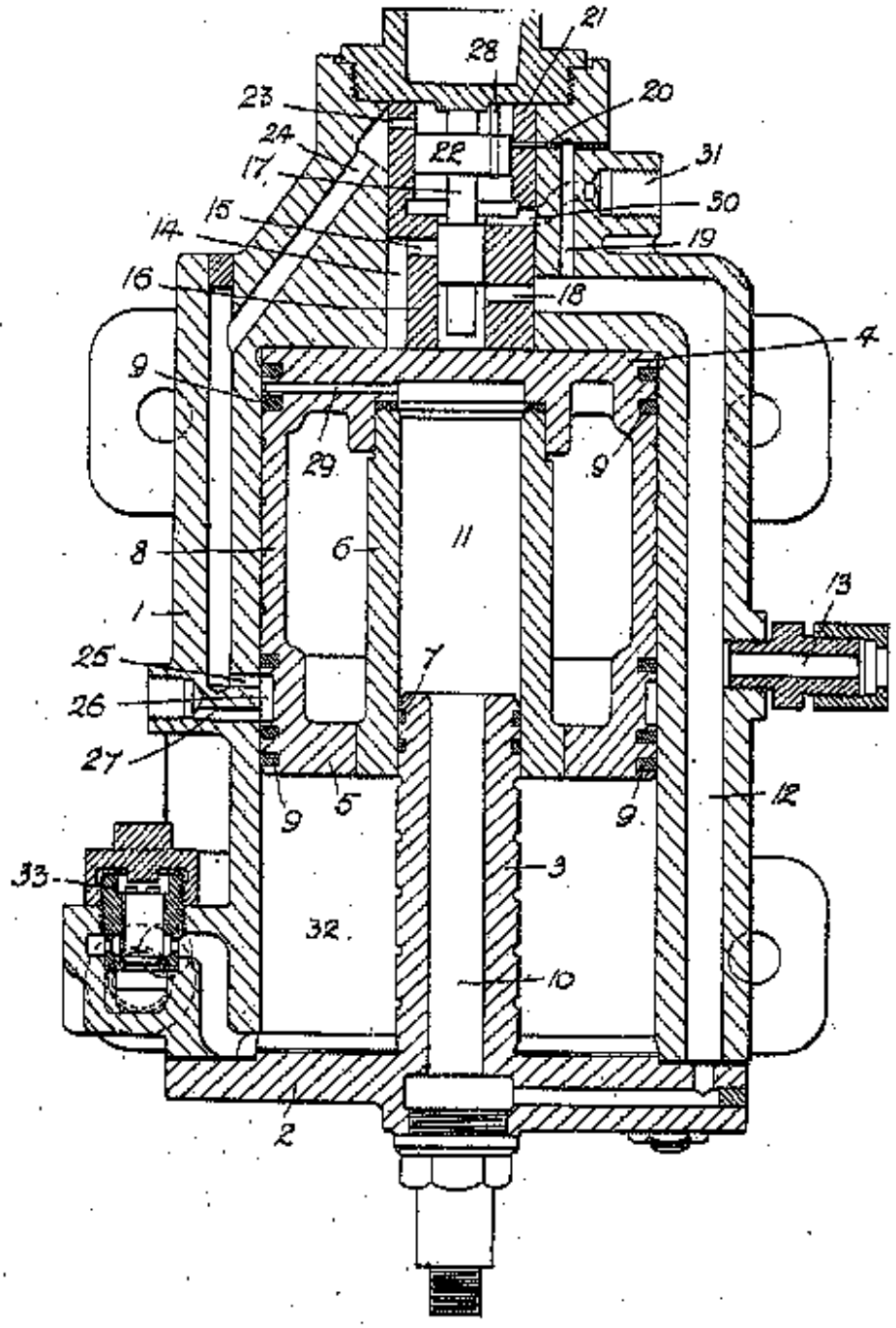
F01B 11/006

[N: one single acting piston motor being always under the influence of the fluid under pressure]

Special rules of classification within this group

Illustrative example of subject matter classified in F01B 11/006

FIG. 1.



[This Drawing is a reproduction of the Original on a reduced scale]

"...the steam supplied through the inlet 13 and the passage 12 enters the port 18, and acting upon the 1 upper face of the element 4 of the double piston (4,5), causes the latter to move downwards against the opposing action of the

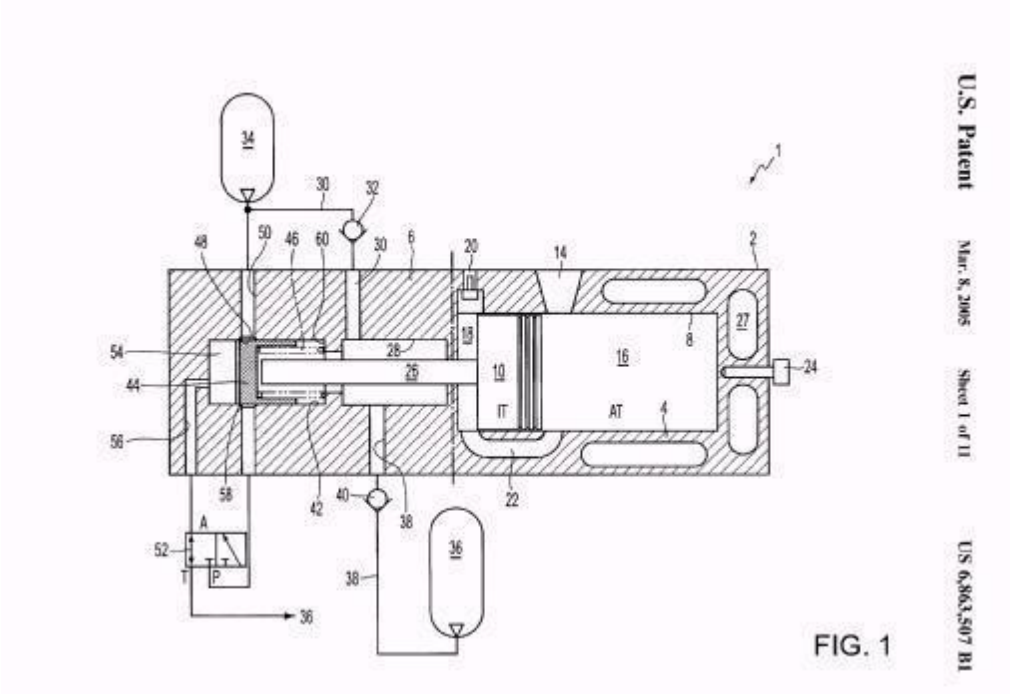
steam continuously supplied to the space 11...

F01B 11/007

[N: in which the movement in only one direction is obtained by a single acting piston motor, e.g. with actuation in the other direction by spring means]

Special rules of classification within this group

Illustrative example of subject matter classified in F01B 11/007

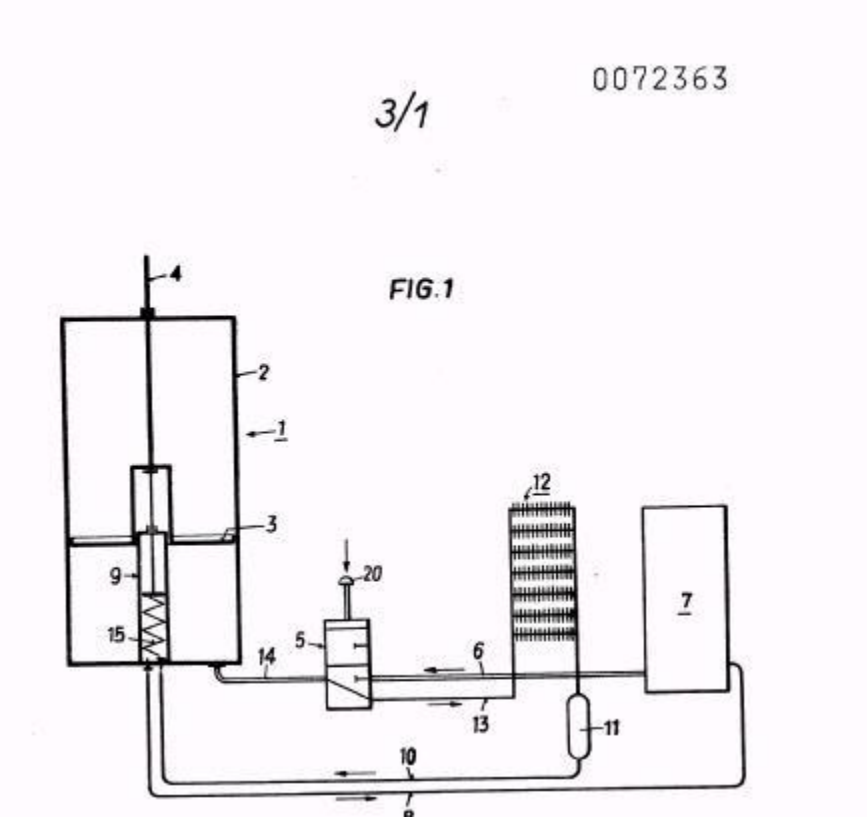


F01B 11/008

[N: with actuation in the other direction by gravity]

Special rules of classification within this group

Illustrative example of subject matter classified in F01B 11/008

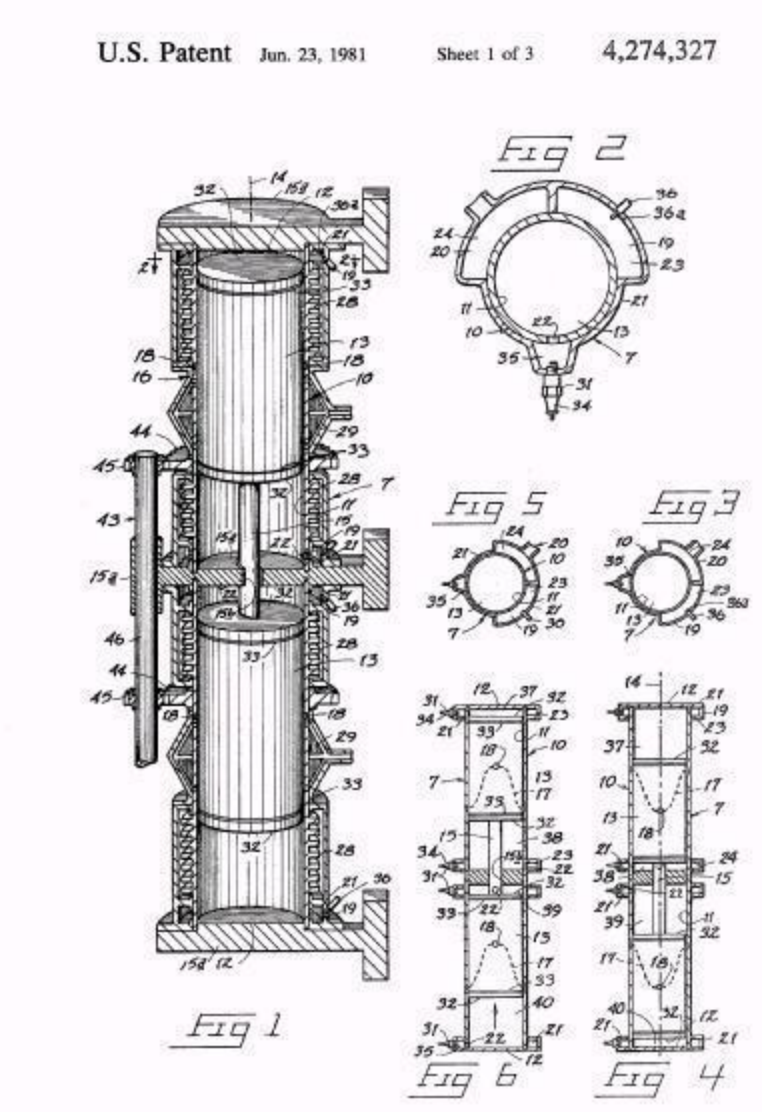


F01B 11/009

[N: in which the movement in two directions is obtained by two or more double acting piston motors]

Special rules of classification within this group

Illustrative example of subject matter classified in F01B 11/009

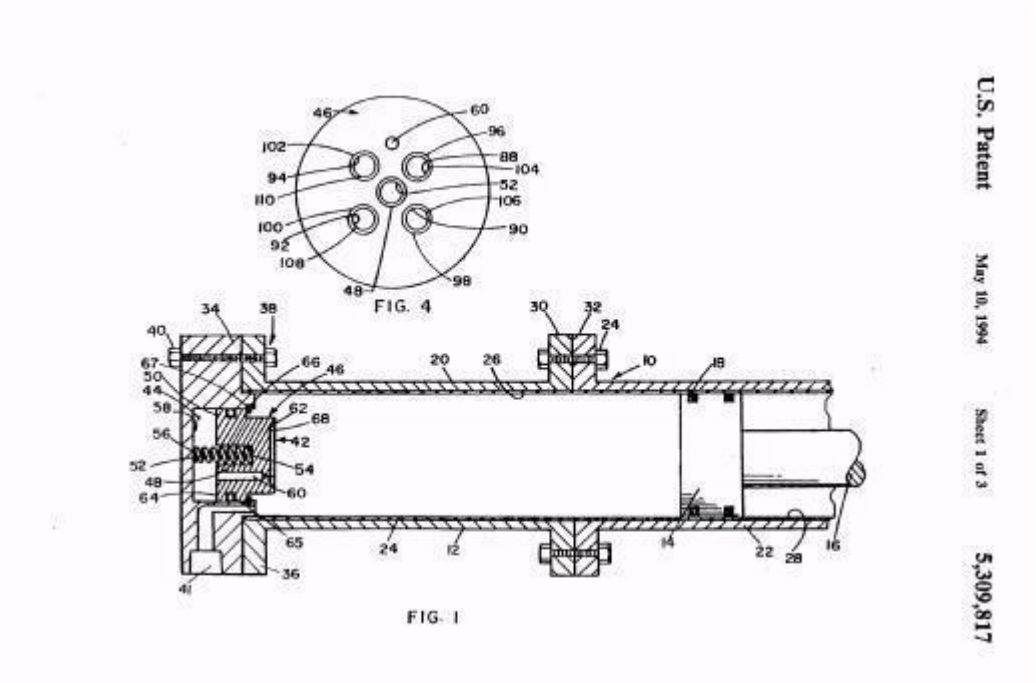


F01B 11/02

Equalising or cushioning devices

Special rules of classification within this group

Illustrative example of subject matter classified in F01B 11/02



F01B 11/04

Engines combined with reciprocatory driven devices, e.g. hammers (with pumps F01B23/08; predominating aspects of driven devices, see the relevant classes for the devices)

References relevant to classification in this group

This subclass/group does not cover:

Adaptations of engines for driving, or combinations with, pumps	F01B 23/08

Special rules of classification within this group

Illustrative example of subject matter classified in F01B 11/04

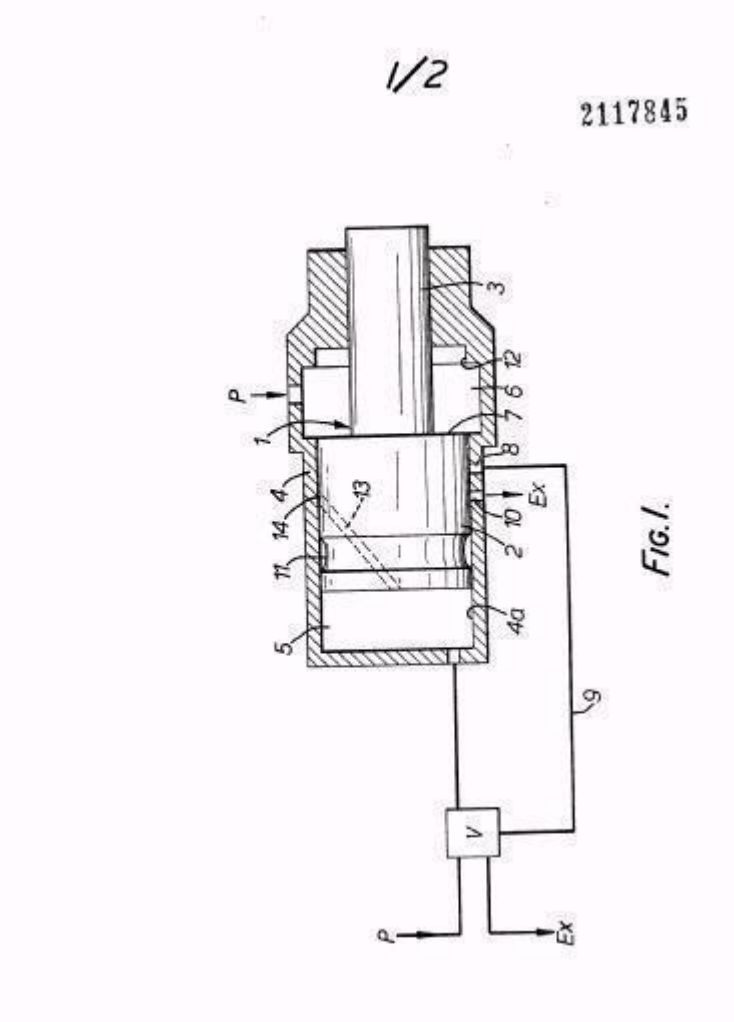


FIG. 1.

F01B 11/06

for generating vibration only

Special rules of classification within this group

Illustrative example of subject matter classified in F01B 11/06

FIG. 2

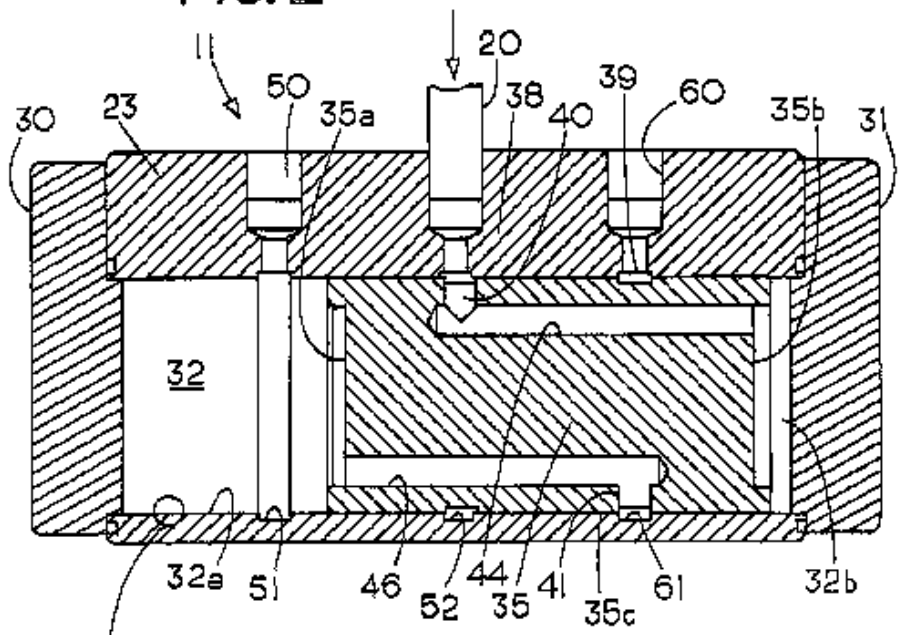


FIG. 2A

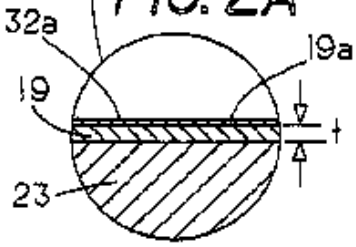
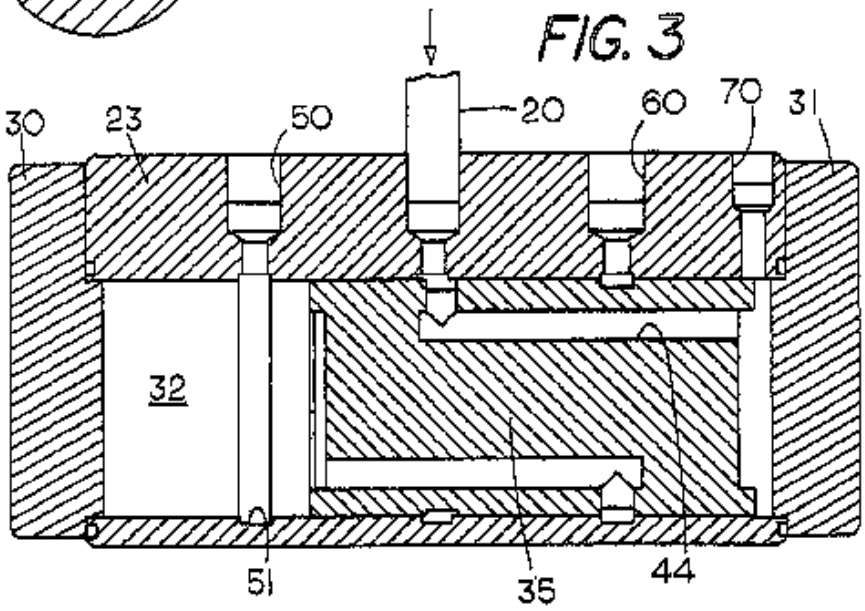


FIG. 3



F01B 11/08

with direct fluid transmission link (F01B11/02 takes precedence)

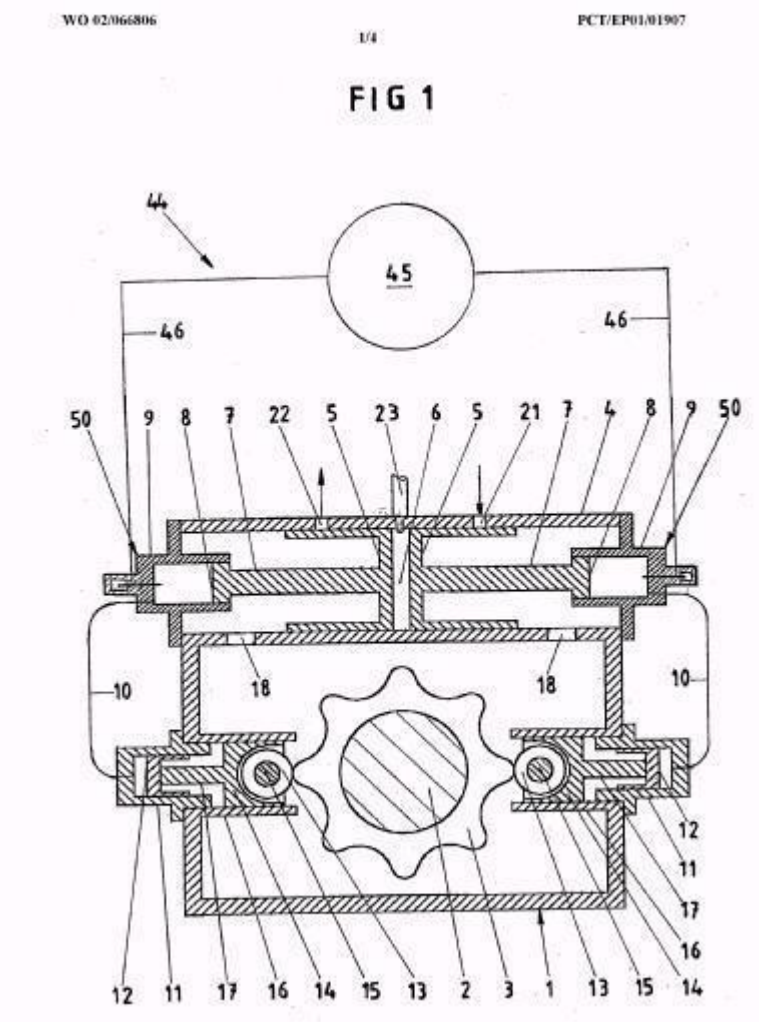
References relevant to classification in this group

This subclass/group does not cover:

Equalising or cushioning devices	F01B 11/02

Special rules of classification within this group

Illustrative example of subject matter classified in F01B 11/08



F01B 13/00

Reciprocating-piston machines or engines with rotating cylinders in order to obtain the reciprocating-piston motion (machines or engines of flexible-wall type F01B19/00)

References relevant to classification in this group

This subclass/group does not cover:

Machines or engines of flexible-wall type	F01B 19/00

Informative references

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

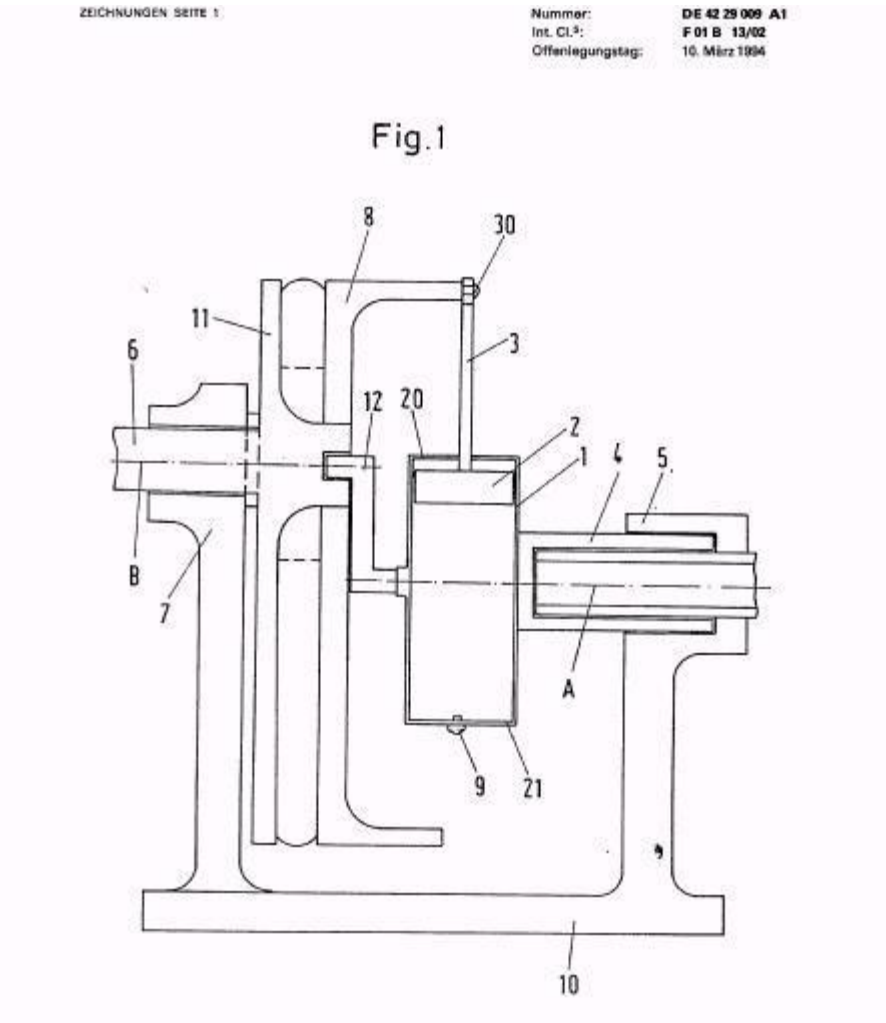
Internal combustion engine aspects	F02B 57/00

F01B 13/02

with one cylinder only

Special rules of classification within this group

Illustrative example of subject matter classified in F01B 13/02

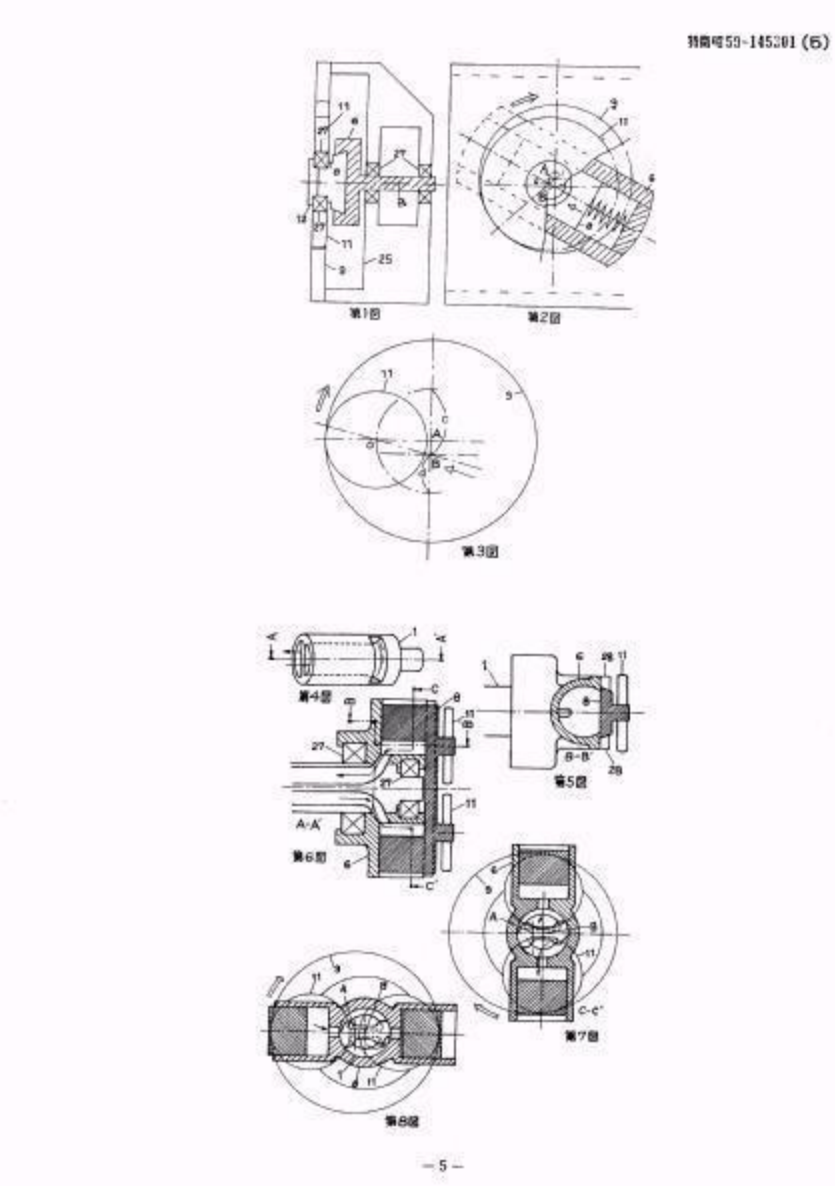


F01B 13/04

with more than one cylinder [N: (F01B3/0032 takes precedence)]

Special rules of classification within this group

Illustrative example of subject matter classified in F01B 13/04

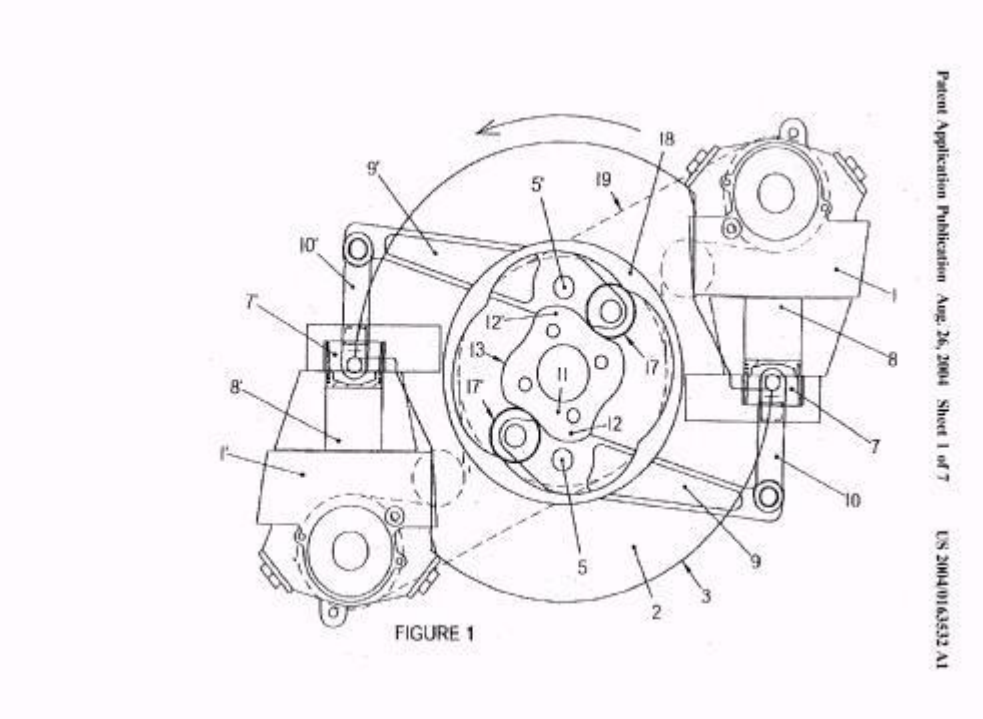


F01B 13/045

[N: with cylinder axes arranged substantially tangentially to a circle centered on main shaft axis]

Special rules of classification within this group

Illustrative example of subject matter classified in F01B 13/045

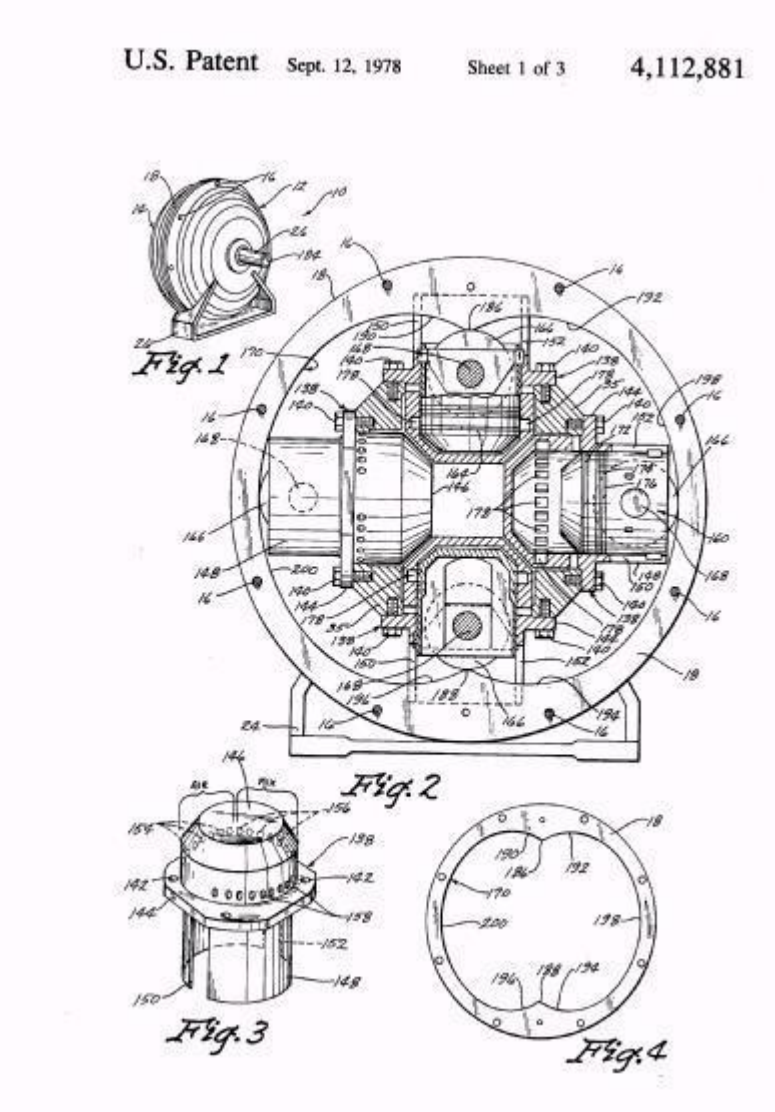


F01B 13/061

[N: the connection of the pistons with the actuated or actuating element being at the outer ends of the cylinders]

Special rules of classification within this group

Illustrative example of subject matter classified in F01B 13/061

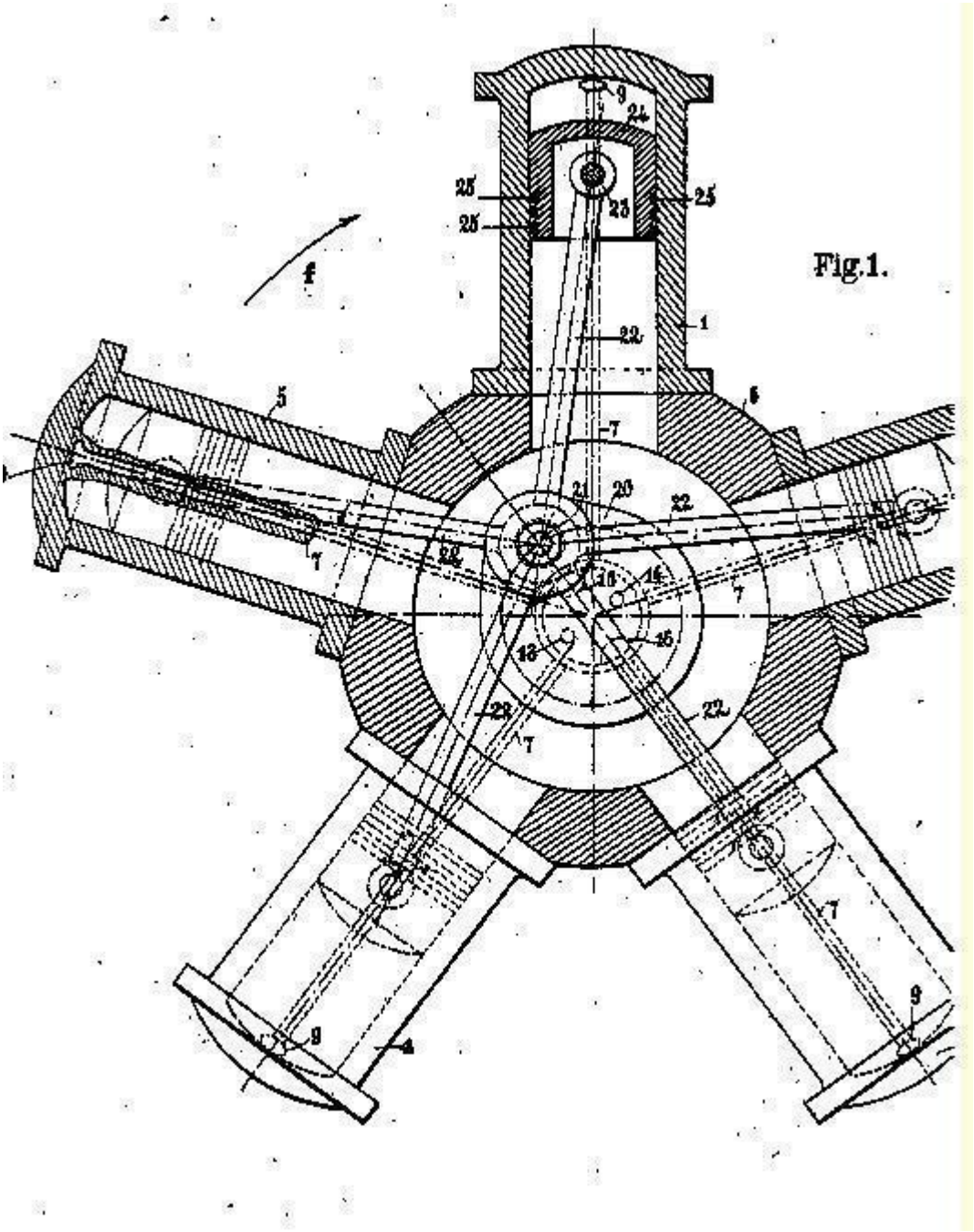


F01B 13/068

[N: the connection of the pistons with an actuated or actuating element being at the inner ends of the cylinders]

Special rules of classification within this group

Illustrative example of subject matter classified in F01B 13/068



F01B 15/00

Reciprocating-piston machines or engines with movable cylinders other than provided for in group F01B13/00 (with movable cylinder sleeves for working fluid control F01L)

Definition statement

This subclass/group covers:

Reciprocating-piston machines or engines with movable cylinders other than provided for in group F01B 13/00.

E.g. reciprocating-piston machines or engines having reciprocating cylinders or pivoting and oscillating cylinders.

References relevant to classification in this group

This subclass/group does not cover:

Movable cylinder sleeves for working fluid control	F01L

F01B 17/00

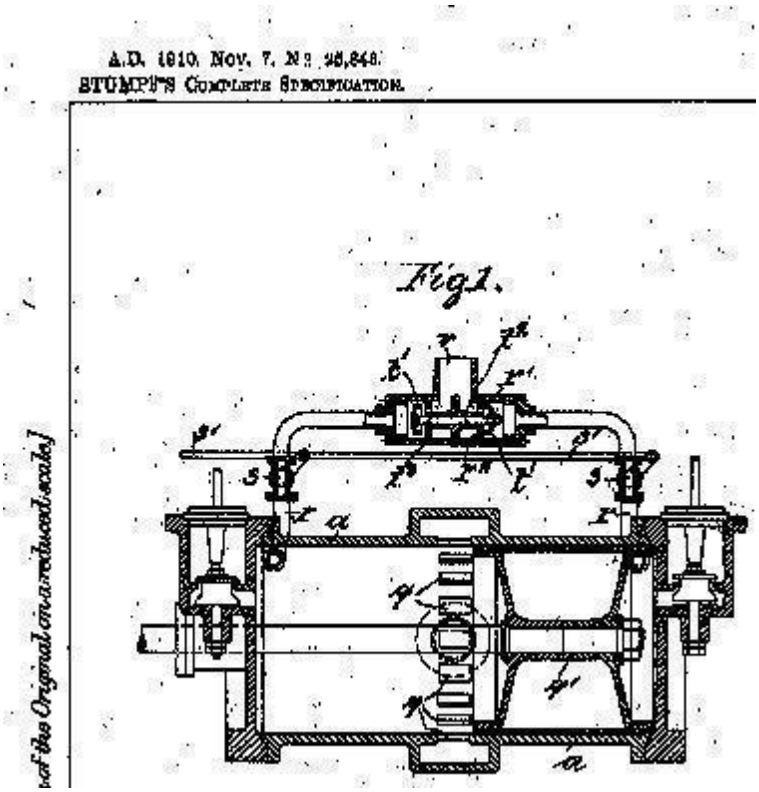
Reciprocating-piston machines or engines characterised by use of uniflow principle

Definition statement

This subclass/group covers:

Reciprocating-piston machines or engines characterised by use of uniflow principle:

E.g. compressed gas engines where the working fluid enter a working cylinder, expands and then exits the cylinder.



Glossary of terms

In this subclass/group, the following terms (or expressions) are used with the meaning indicated:

In patent document the word "uniflow" is often used with the meaning "open circuit where gas enters cylinder, expands, and is then released"

F01B 17/02

Engines

Definition statement

This subclass/group covers:

Compressed gas engines.

Informative references

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

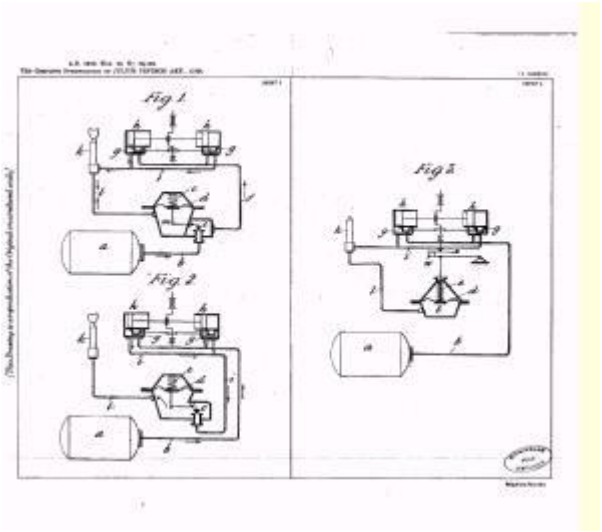
Arrangement or mounting of steam or gaseous-pressure propulsion units of the piston type in vehicles	B60K 3/02
Arrangement or mounting of plural diverse prime-moves for mutual or common propulsion, prime movers comprising combustion engines and a chargeable fluidic accumulator	B60K 6/12
Ultra-small engines, e.g. for driving models	F02B 75/34

F01B 17/022

[N: with fluid heating]

Special rules of classification within this group

Illustrative example of subject matter classified in F01B 17/022



F01B 17/027

[N: using separators]

Definition statement

This subclass/group covers:
Separators for separating liquid or oil from compressed gas for gas engines.

F01B 17/04

Steam engines

References relevant to classification in this group

This subclass/group does not cover:

Steam engine plants	F01K

Informative references

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

Ultra small engines:	F02B 75/34
Toys	A63H

F01B 19/00

Positive-displacement machines or engines of flexible-wall type

Definition statement

This subclass/group covers:

Positive-displacement machines or engines of flexible-wall type. E.g. where the piston is made of a diaphragm or bellows.

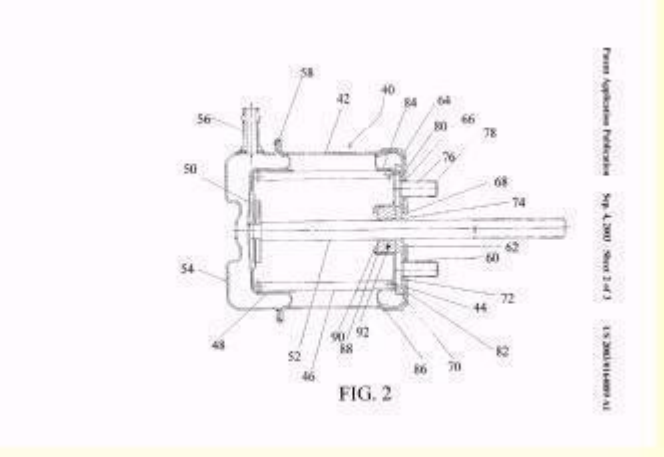


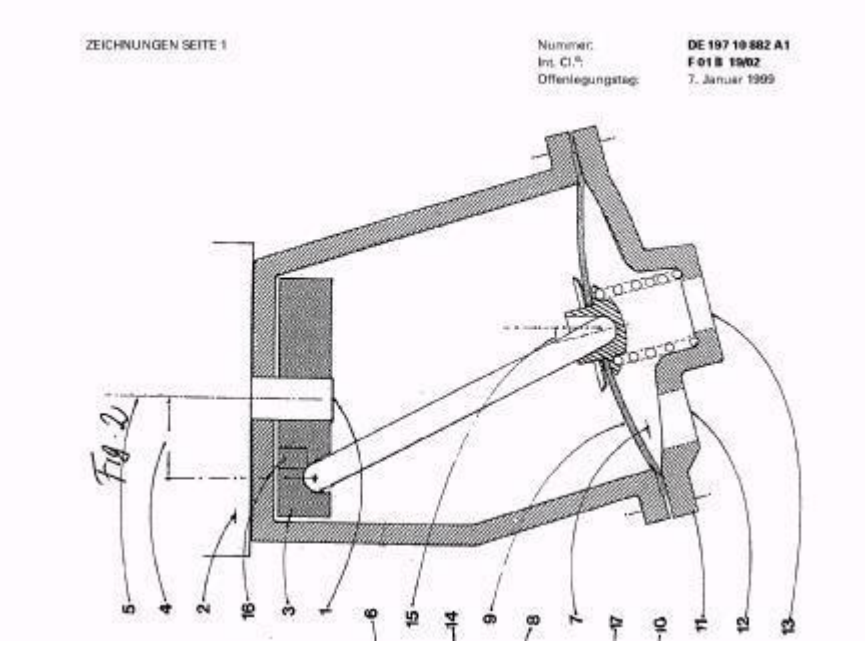
FIG. 2

F01B 19/02

with plate-like flexible members

Special rules of classification within this group

Illustrative example of subject matter classified in F01B 19/02

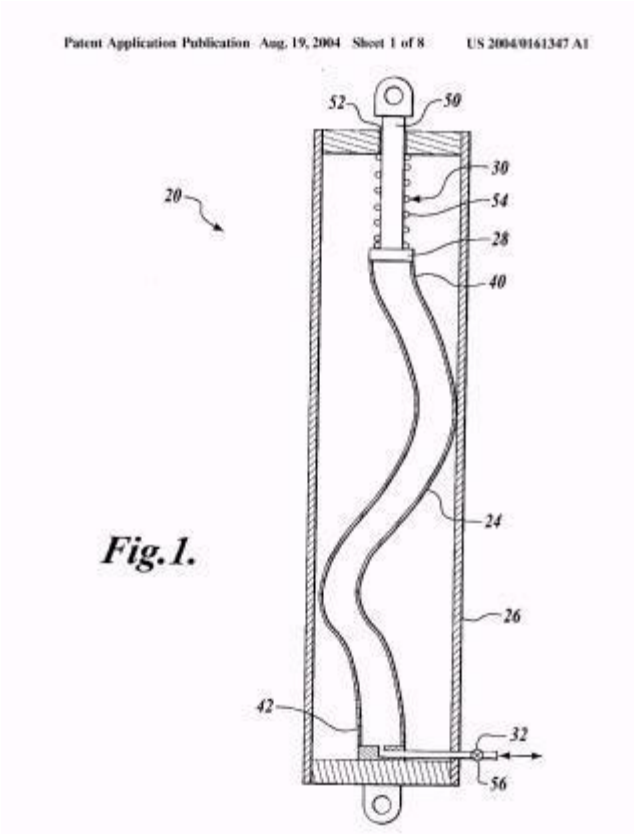


F01B 19/04

with tubular flexible members

Special rules of classification within this group

Illustrative example of subject matter classified in F01B 19/04



F01B 21/00

Combinations of two or more machines or engines (F01B23/00 takes precedence; regulating or controlling, see the relevant groups; combinations of two or more pumps F04; fluid gearing F16H)

Definition statement

This subclass/group covers:

Combinations of two or more machines or engines. E.g. a combined internal combustion engine and steam engine.

References relevant to classification in this group

This subclass/group does not cover:

Combinations of engines with devices	F01B 23/00

driven thereby	
Combinations of two or more pumps	F04

F01B 23/00

Adaptations of machines or engines for special use; Combinations of engines with devices driven thereby (F01B11/00 takes precedence; fluid gearing F16H; aspects predominantly concerning driven devices, see the relevant classes for these devices; regulating or controlling, see the relevant groups)

References relevant to classification in this group

This subclass/group does not cover:

Reciprocating-piston machines or engines without rotary main shaft, e.g. of free-piston type	F01B 11/00
Adaptations of combustion engines for driving vehicles of for driving propellers	F02B 61/00
Adaptations of combustion engines for driving pumps, hand-held tools or electric generators; portable combinations of engine with engine-driven devices, e.g. with non driven apparatus	F02B 63/00

Informative references

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

Controlling combustion engines	F02D
Fluid gearing	F16H

F01B 25/00

Regulating, controlling, or safety means (regulating or controlling in general G05)

References relevant to classification in this group

This subclass/group does not cover:

Controlling internal combustion engines	F02D
Controlling and regulating in general	G05

F01B 27/00

Starting of machines or engines (starting combustion engines F02N)

References relevant to classification in this group

This subclass/group does not cover:

Starting combustion engines	F02N

F01B 29/00

Machines or engines with pertinent characteristics other than those provided for in preceding main groups

F01B 31/00

Component parts, details, or accessories not provided for in, or of interest apart from, other groups (machine or engine casings, other than those peculiar to steam engines, F16M)

Informative references

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

Machine or engine casings, other than those peculiar to steam engines	F16M