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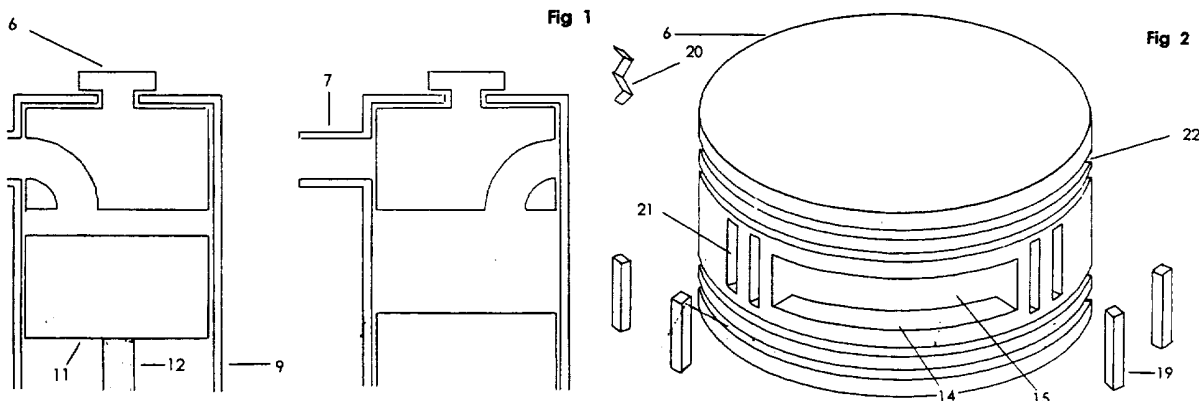
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(56) Documents Cited
GB 0632573 A GB 0537105 A GB 0317253 A
US 4867117 A US 4494500 A US 4311119 A
US 3130953 A

(58) Field of Search
UK CL (Edition O) **F1B B2Q5A**
INT CL⁶ **F01L 7/02**

(54) **Rotary valve for an i.c. engine**

(57) The rotary valve 6, which is somewhat similar in construction to a conventional i.c. engine piston, rotates inside a cylinder sleeve (9, figs. 3,10) coaxial with the engine piston 11. The valve 6 has a right-angled passage 15 which extends from an aperture in the face of the valve 6 which faces the piston 11 to a port 14 in the side of the piston. Modifications of the passage 15 are shown (fig. 9) for different compression ratios. As the valve 6 rotates, at half crankshaft speed, the side port 14 passes respective inlet and exhaust ports located in the cylinder sleeve. On the induction stroke the port in the side of the valve lines up with the induction port; on the compression stroke the side port faces the blank cylinder wall and on the exhaust stroke the side port lines up with the exhaust port. The valve 6 may be driven by a belt, worm gearing or cog wheels and may have a piston-type rings in grooves 22. Vertical sealing bars 19 may be provided on each side of the side port 14.

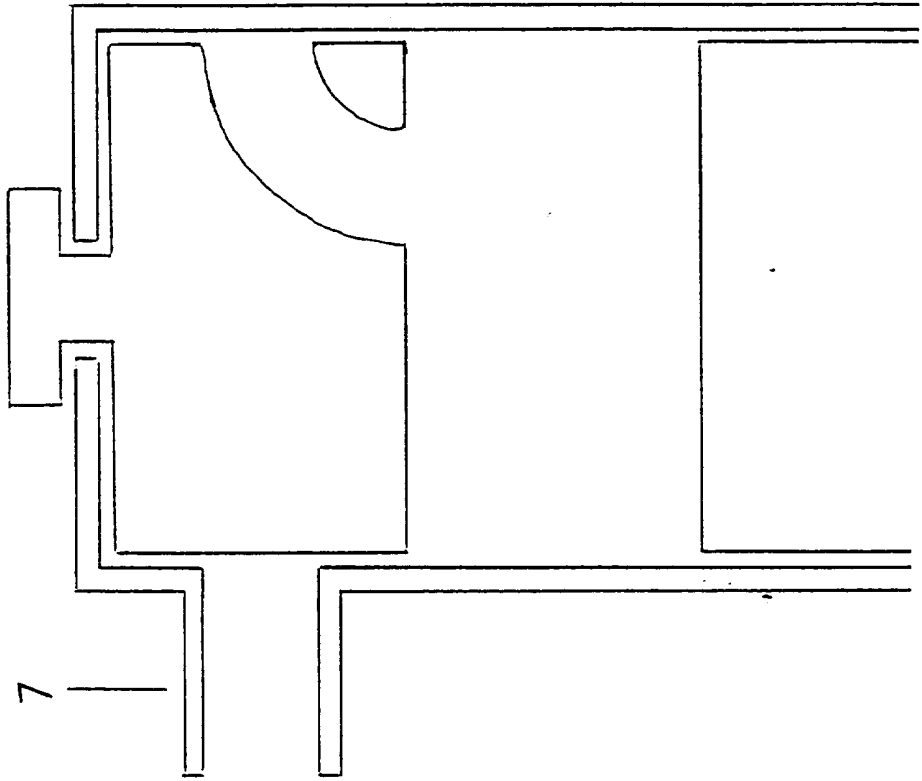
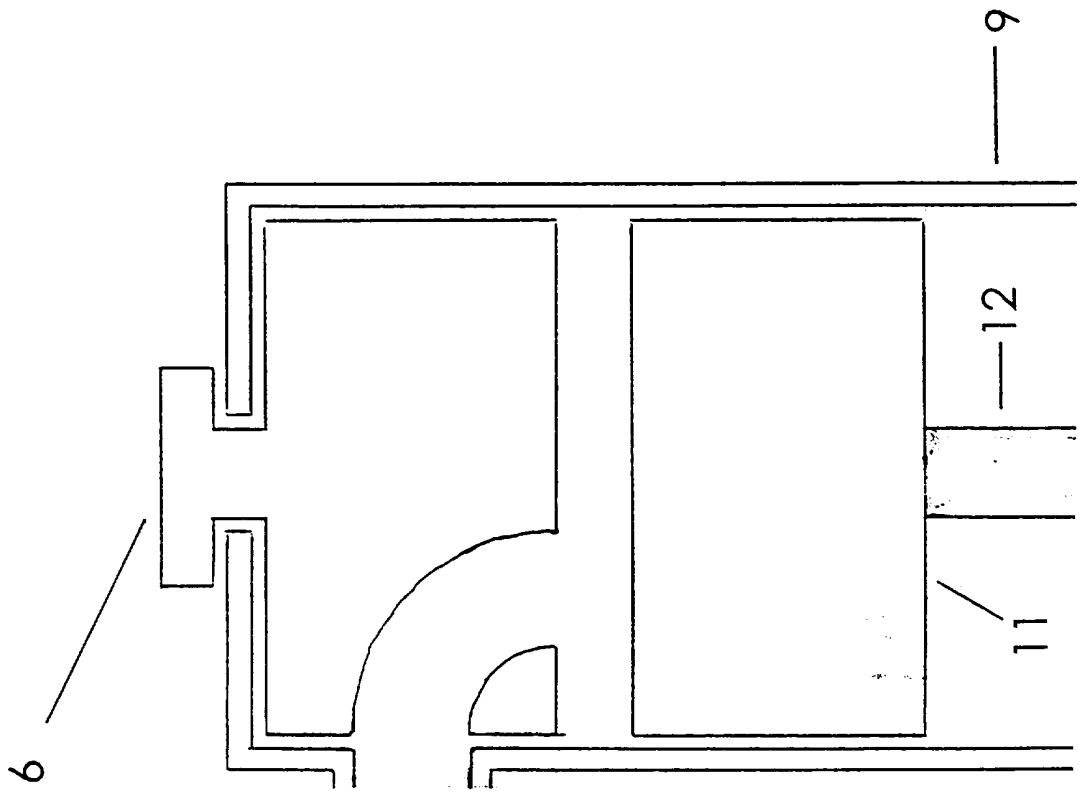


At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

This print takes account of replacement documents submitted after the date of filing to enable the application to comply with the formal requirements of the Patents Rules 1995

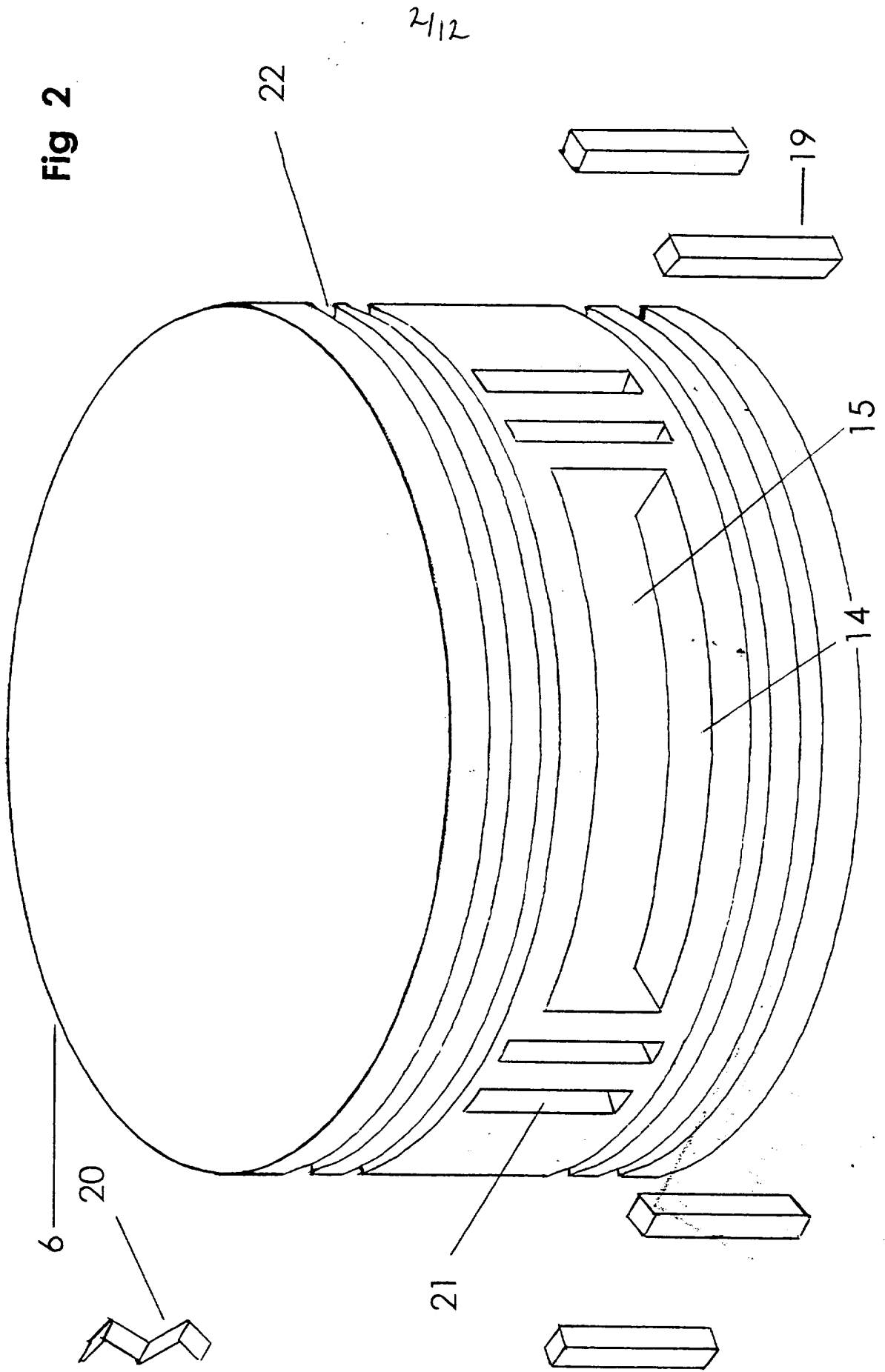
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Fig 1



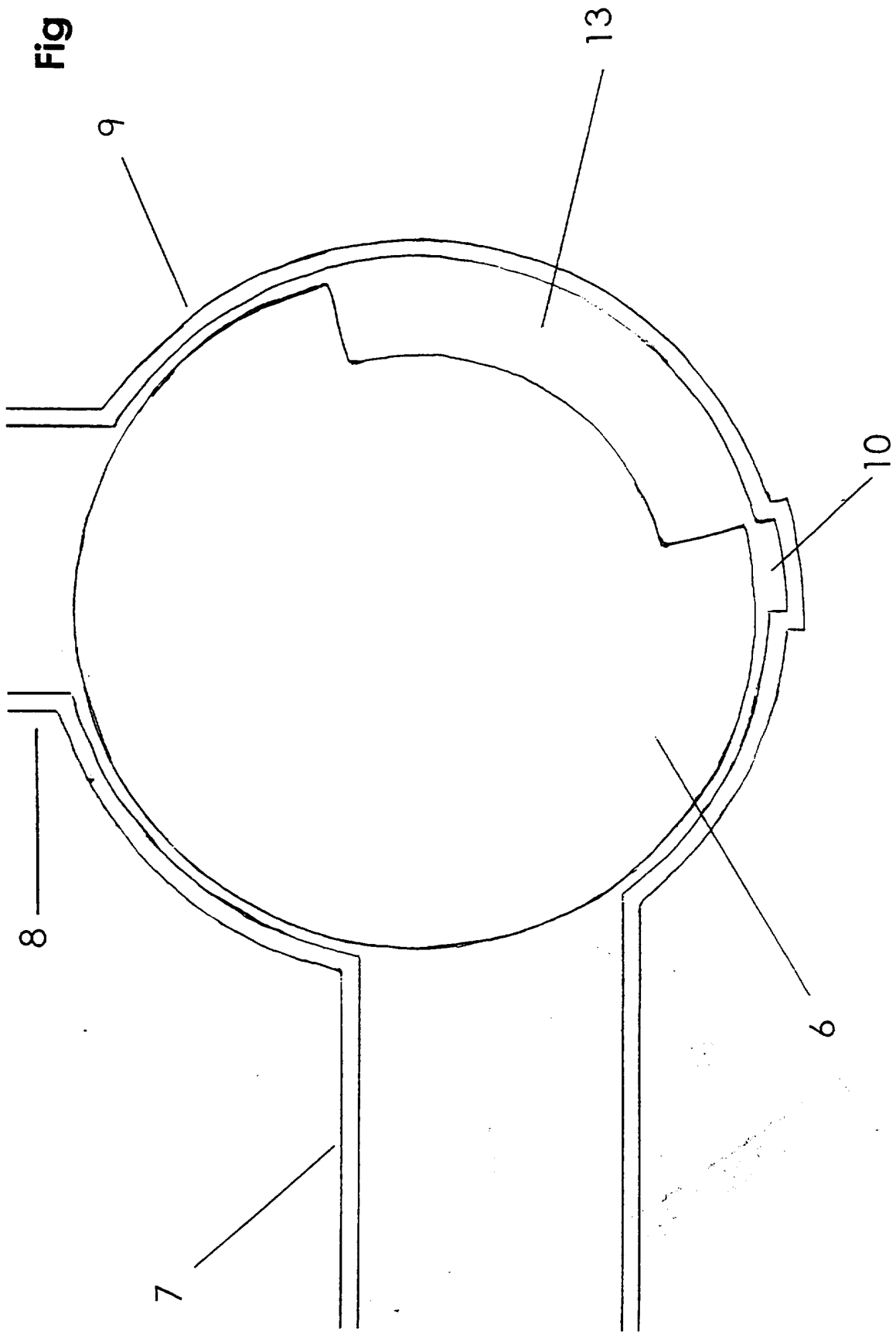
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Fig 2



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Fig 3



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Fig 4

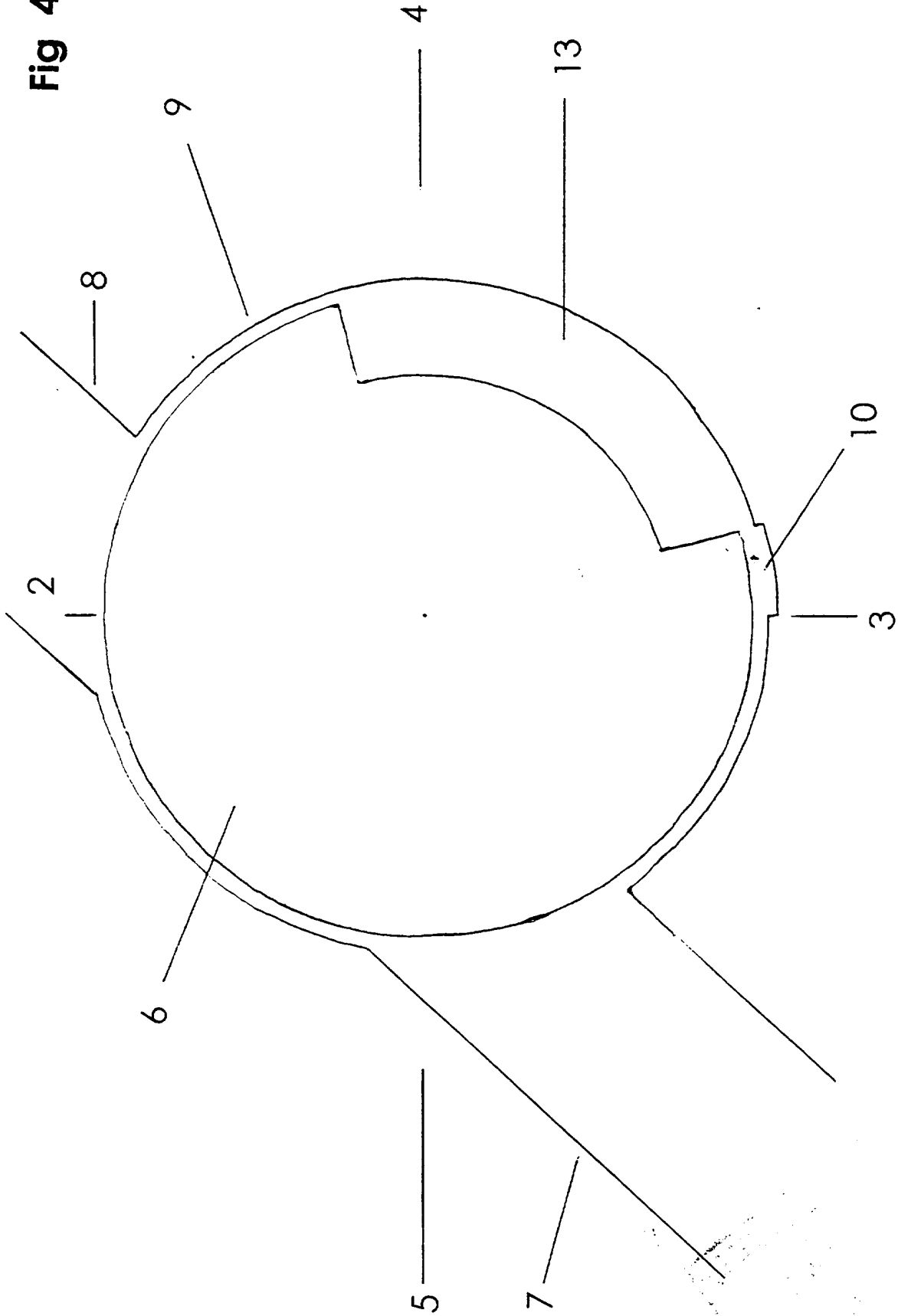
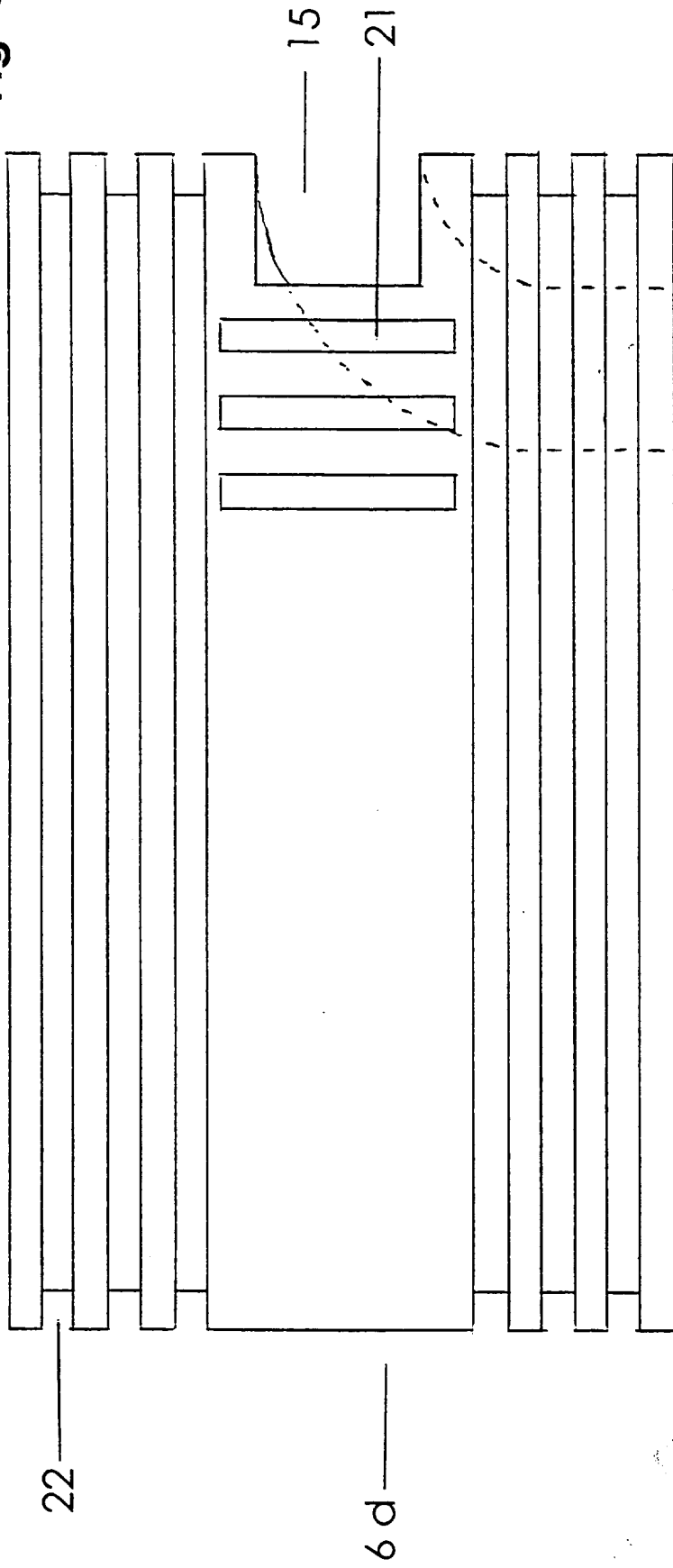


Fig 5



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Fig 6

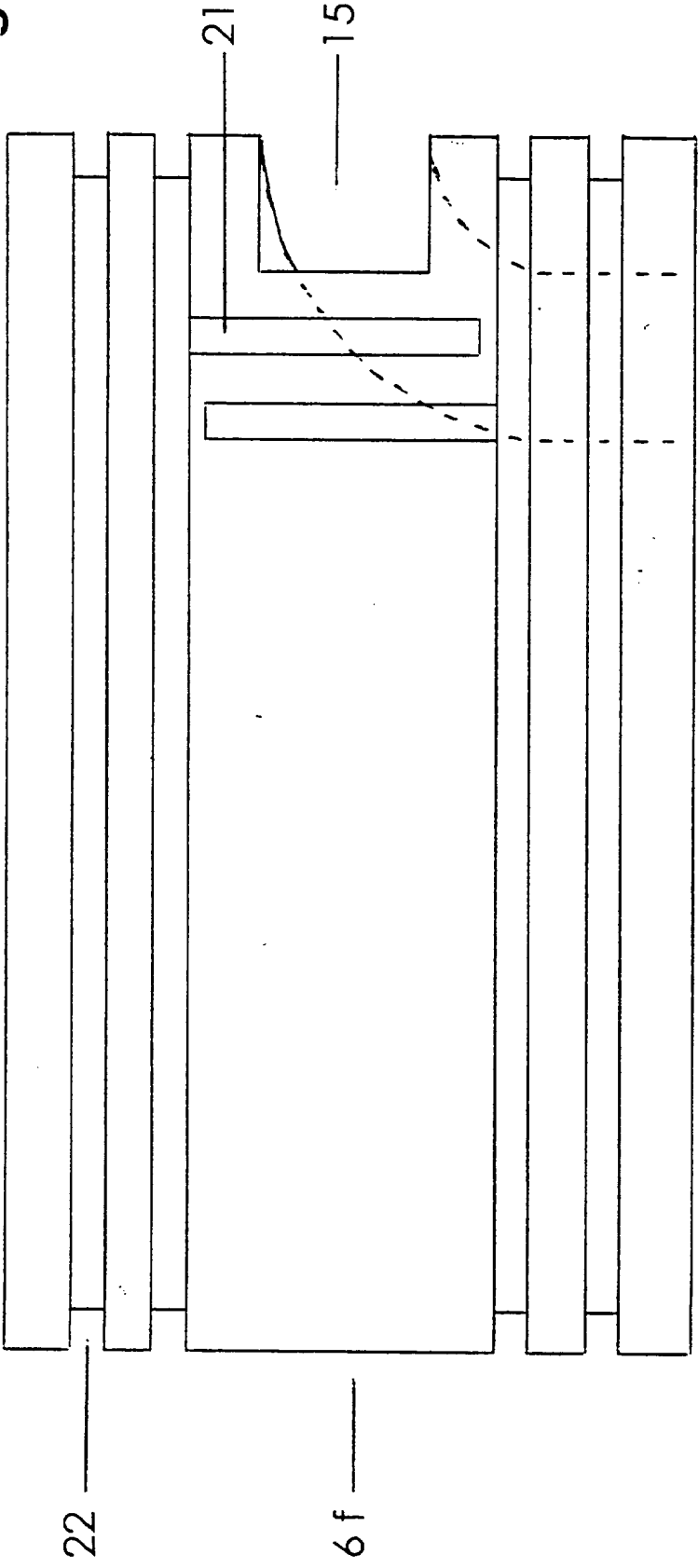
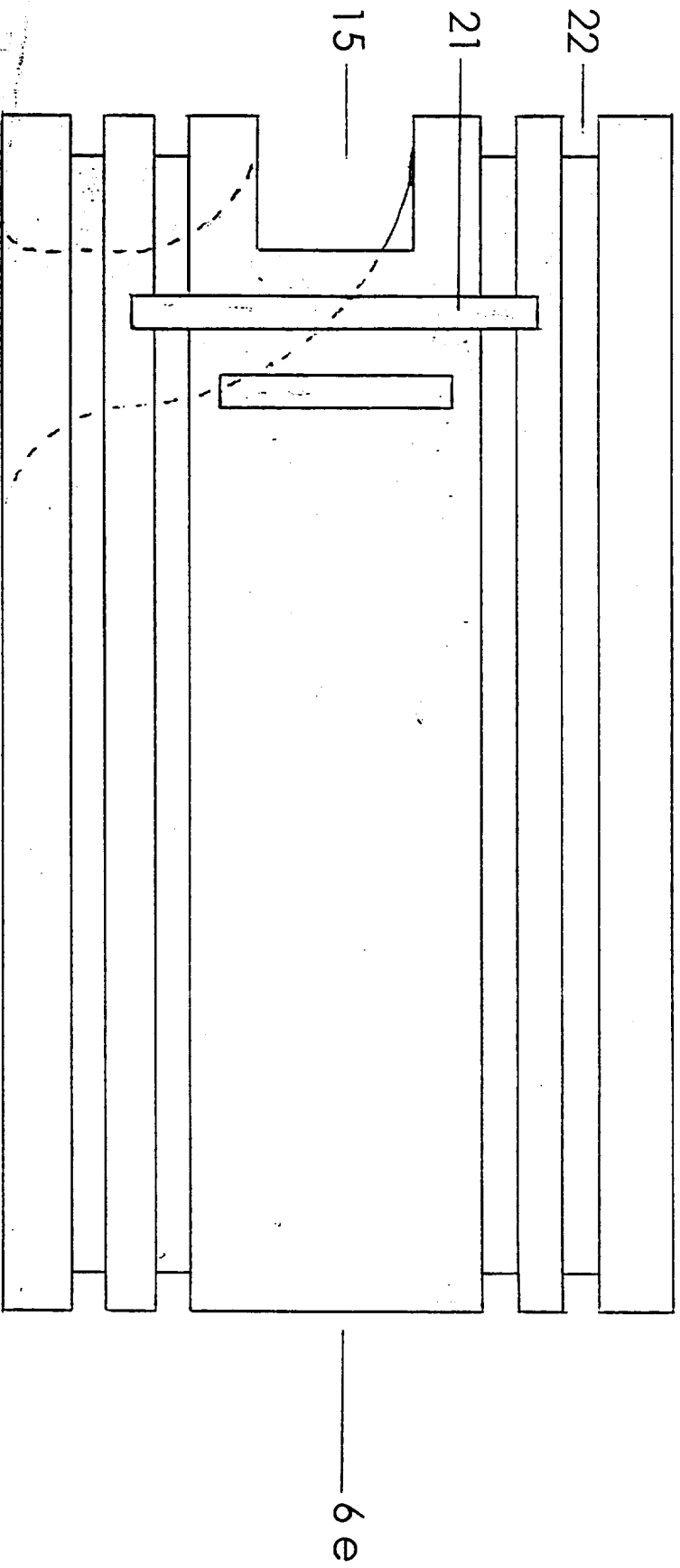


Fig 7



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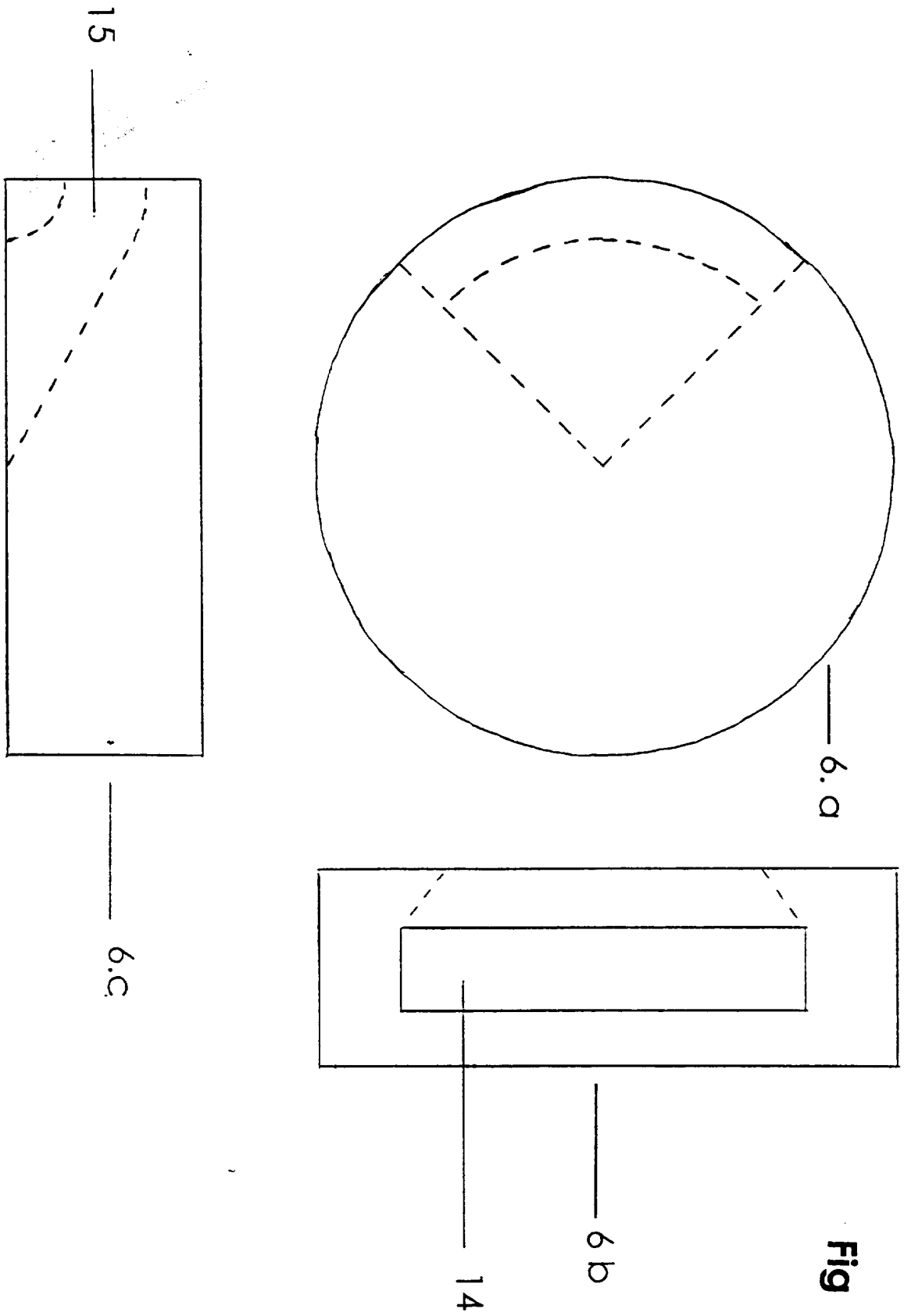


Fig 8

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Fig 9

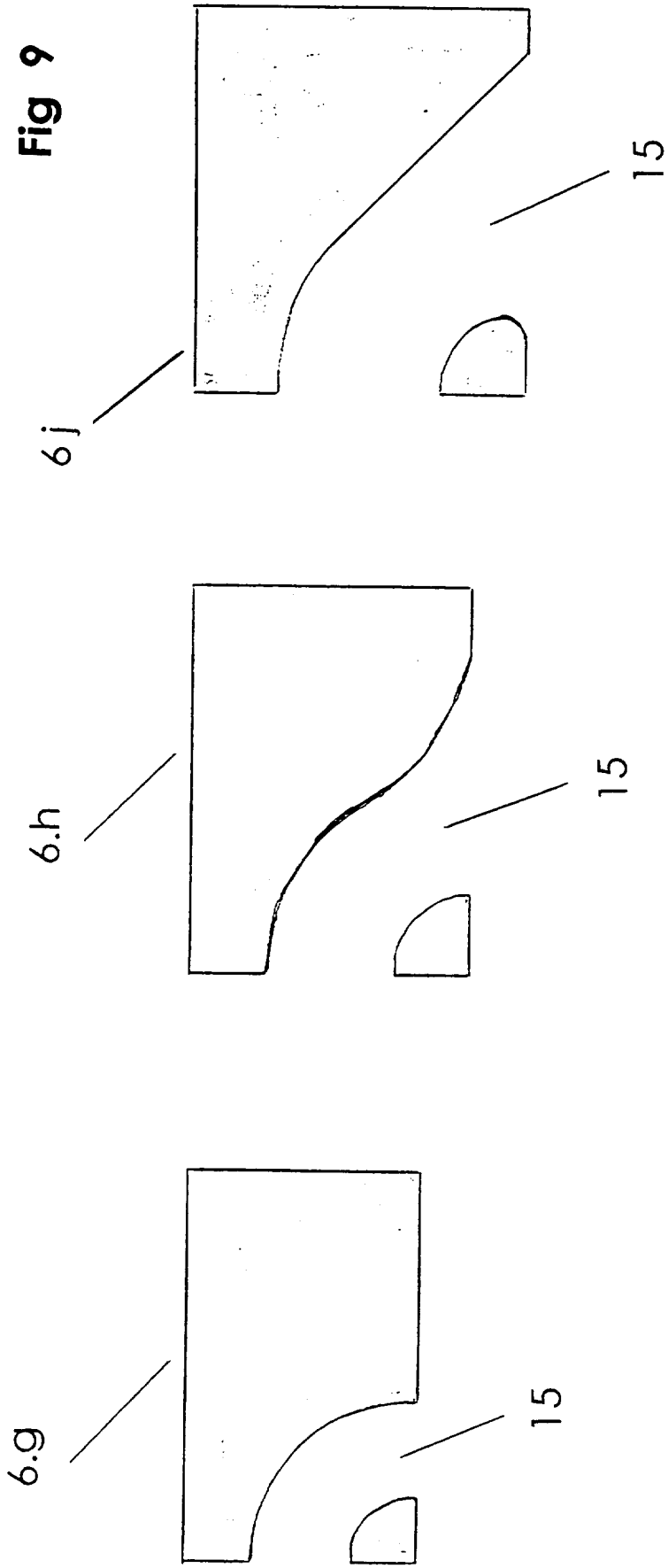
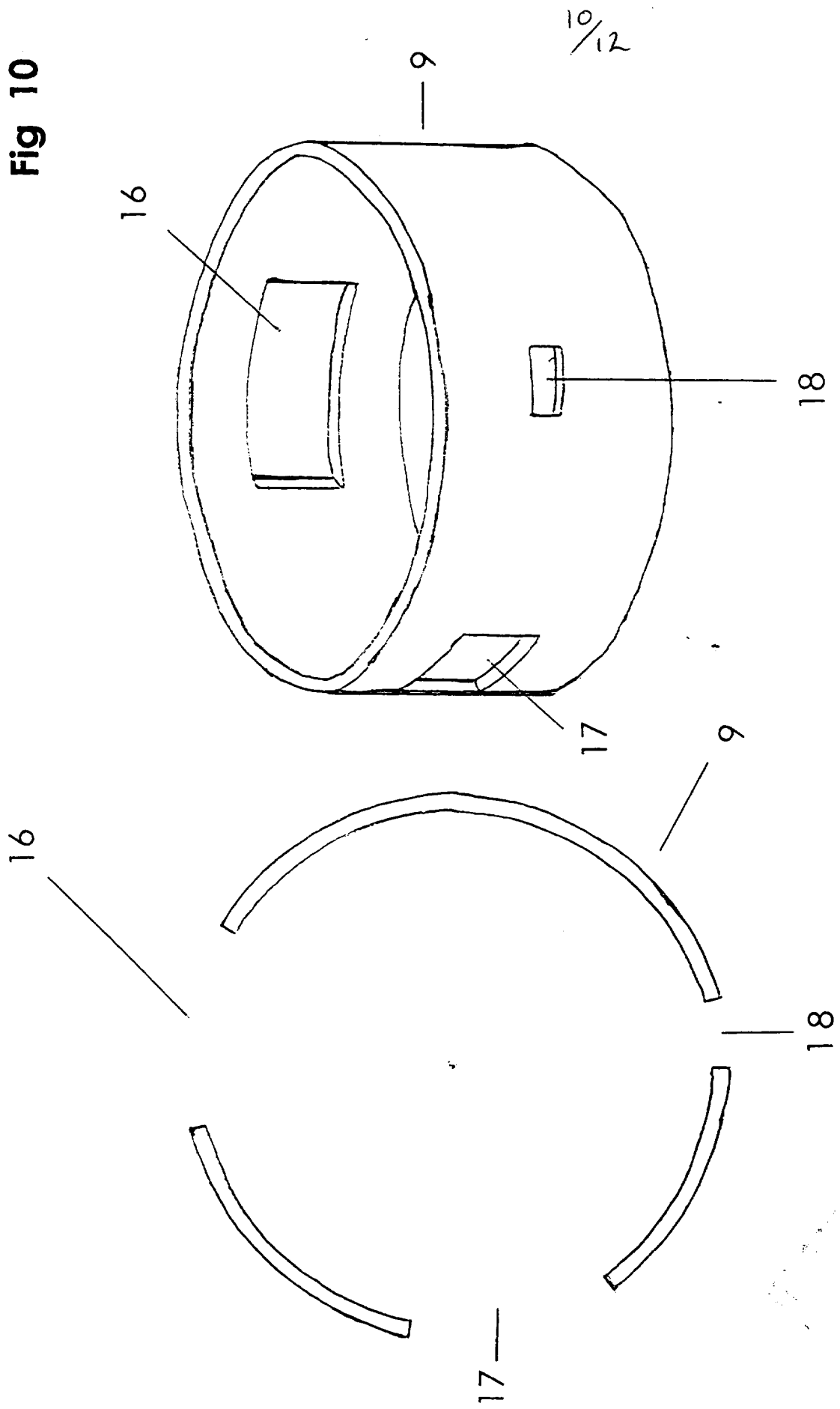
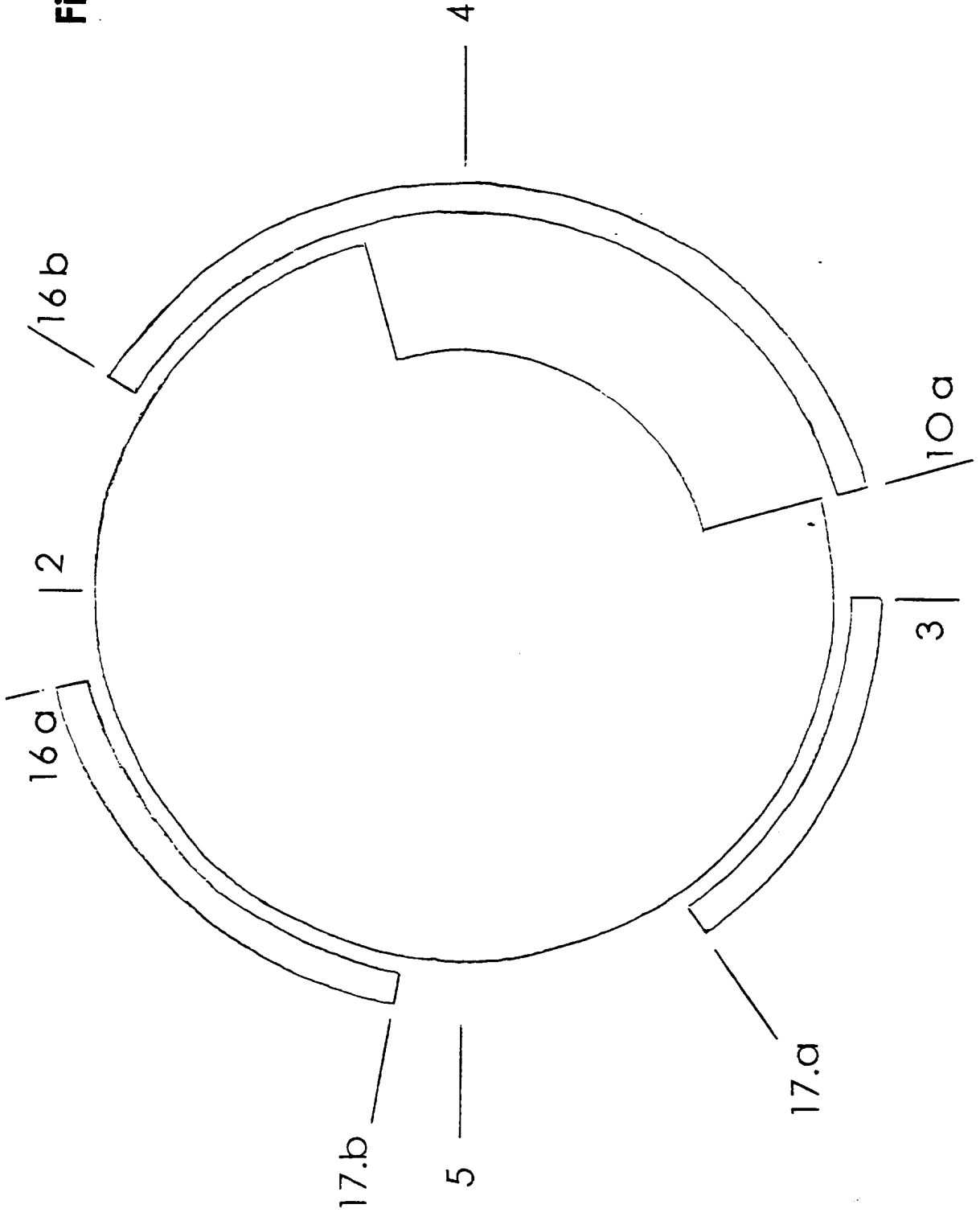


Fig 10



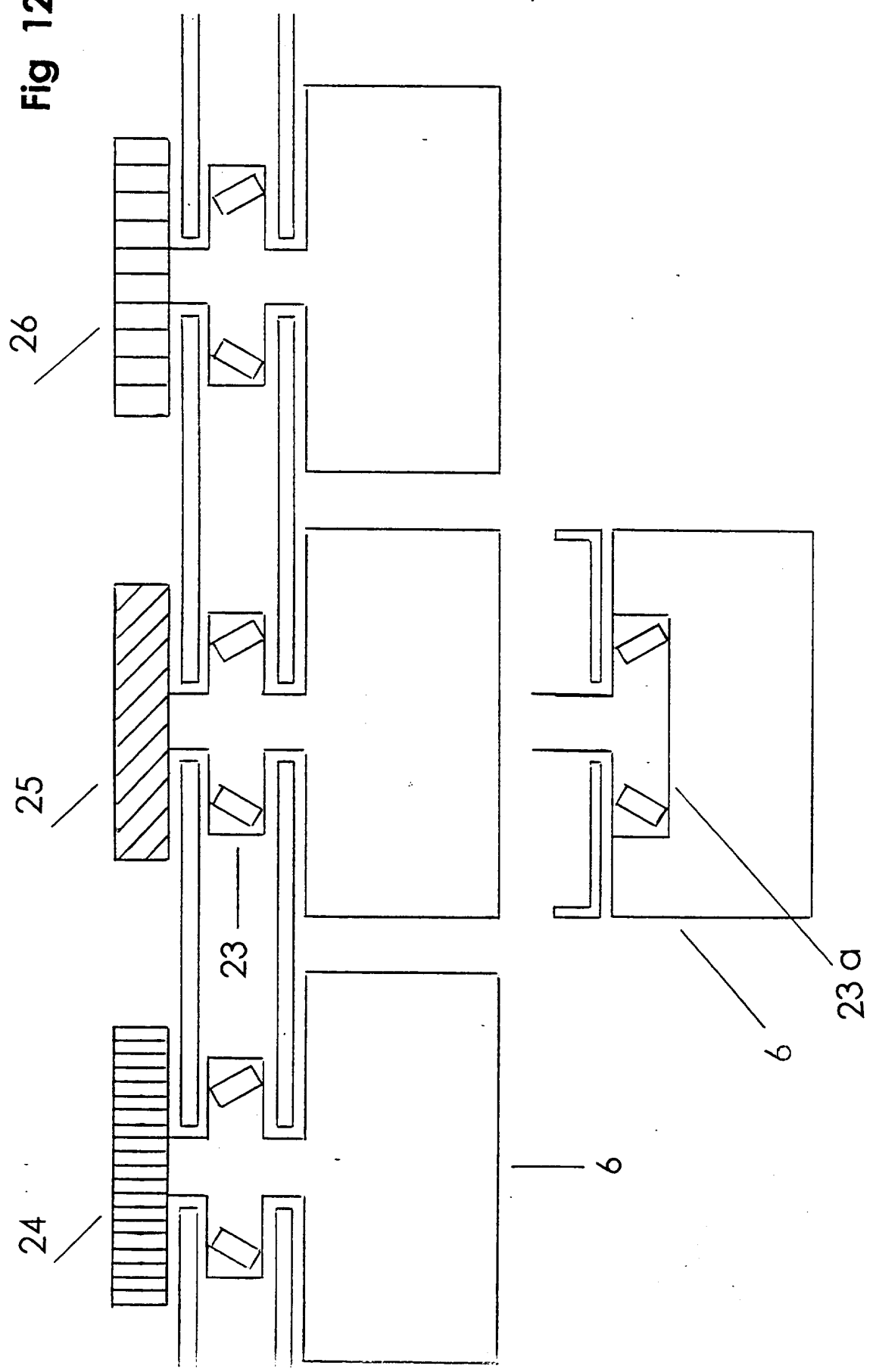
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Fig 11



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Fig 12



ROTARY PISTON VALVE

THIS INVENTION RELATES TO A ROTARY PISTON VALVE FOR AN INTERNAL COMBUSTION ENGINE.

THE COMMON POPPET VALVE, WHICH USES CAMS TO FORCE THE VALVE OPEN AGAINST COILED SPRING RESISTANCE, HAS MANY MOVING PARTS IS NOISY AND CONSUMES PART OF POWER THE ENGINE IS PRODUCING.

ACCORDING TO THE PRESENT INVENTION THERE IS ONLY ONE MOVING PART PER CYLINDER WHICH MOVES SMOOTHLY IN ONE DIRECTION ONLY AT HALF CRANKSHAFT SPEED.

A SPECIFIC EMBODIMENT OF THE INVENTION WILL NOW BE DESCRIBED BY WAY OF EXAMPLE WITH REFERENCE TO THE ACCOMPANYING DRAWINGS IN WHICH:-

FIG 1 SHOWS THE ROTARY PISTON VALVE (R.P.V. FOR SHORT) 6 IN POSITION IN THE CYLINDER SLEEVE 9 ABOVE THE CONVENTIONAL PISTON 11 AND CONNECTING ROD 12. IN THIS VIEW (LEFT) THE EXHAUST GASSES ARE BEING PUSHED OUT BY THE CONVENTIONAL PISTON 11 THROUGH THE PORT IN THE BASE OF THE R.P.V. THROUGH THE CHANNEL AND OUT THROUGH THE PORT ON THE SIDE OF THE R.P.V. AND FINALLY THROUGH THE PORT IN THE CYLINDER WALL (SLEEVE) 9 AND THE EXHAUST MANIFOLD 7. THE RIGHT VIEW ILLUSTRATES THE COMPRESSION STROKE OF THE INTERNAL COMBUSTION ENGINE (I.C.E. FOR SHORT) AND SHOWS THE SIDE PORT OF THE R.P.V. FACING THE CYLINDER WALL AND THE FUEL/AIR MIXTURE UNABLE TO ESCAPE.

FIG 2 ENLARGED VIEW OF THE R.P.V. SHOWING THE OPEN SIDE PORT 14 AND CHANNEL 15. THE PISTON RING SLOTS 22 WOULD ACCOMMODATE CONVENTIONAL I.C.E. PISTON RINGS. THE VERTICAL SEALING BARS 19 FIT INTO THE VERTICAL SLOTS 21 EITHER SIDE OF THE OF THE OPEN PORT 14 THE VERTICAL SPRING 20 GOES BEHIND THE VERTICAL SEALING BARS 19. TO PREVENT ANY GASSES FROM GOING AROUND THE SIDES OF THE R.P.V. (THE VERTICAL SEALING BARS WOULD ALSO GET ASSISTANCE FROM THE ROTATIONAL FORCES PUSHING OUT.)

FIG 3 SHOWS CUTAWAY VIEW LOOKING DOWN. THE LEADING EDGE OF THE PORT IN THE SIDE OF THE R.P.V. 6 IS AT THE IGNITION POINT 10 (0 TO 30 DEGREES BEFORE T.D.C.) THE R.P.V. IS ROTATING IN A CLOCKWISE DIRECTION. THE COMPRESSED FUEL/AIR MIXTURE 13 IS ABOUT TO FIRE. 7 IS THE EXHAUST MANIFOLD AND 8 THE INLET MANIFOLD. 9 IS THE CYLINDER WALL (SLEEVE)

FIG 4 IS THE SAME VIEW AS FIG 3 BUT WITH THE INLET AND EXHAUST MANIFOLDS FACING OPPOSITE DIRECTIONS, FOR A MULTI CYLINDER ENGINE DESIGN. ALSO ILLUSTRATED ARE TIMING MARKS 2 AND 3 ARE TOP DEAD CENTER (I.C.E.) 4 AND 5 ARE BOTTOM DEAD CENTER (I.C.E.)

FIGS 5, 6, 7. THREE SIDE VIEWS OF THE R.P.V. SHOWING VARIOUS PISTON RING AND VERTICAL SEALING BARS CONFIGURATIONS. FIG 7 THE VERTICAL SEALING BAR 21 ON THE RIGHT HAND SIDE OF THE PORT CROSSES THE ADJACENT CONVENTIONAL PISTON RINGS, THESE PISTON RINGS WOULD BE SHORTER TO ALLOW THEM TO CLIP EITHER SIDE OF THE VERTICAL BAR THUS IMPROVING THE SEALING PROPERTIES ESPECIALLY ON THE RIGHT HAND SIDE AS THIS SIDE IS CLOSEST TO THE INLET PORT AND INLET MANIFOLD. THE VERTICAL SEALING BARS ON THE LEFT HAND SIDE WOULD BE OF THE SHORTER TYPE.

FIG 8 SHOWS VIEWS OF THE R.P.V. TOP 6a SIDE 6c AND EDGE 6b
IT ILLUSTRATES THE PORT 14 AND THE CHANNEL 15.

FIG 9 SHOWS THREE EXAMPLES OF THE R.P.V. ILLUSTRATING PORT AND CHANNEL VARIOUS DESIGNS. FIRST 6g NARROW PORT AND CHANNEL GIVES HIGH COMPRESSION. SECOND 6h MEDIUM PORT AND CHANNEL GIVES MEDIUM COMPRESSION AND THIRD 6j WIDE PORT AND CHANNEL GIVES LOW COMPRESSION BUT IMPROVED BREATHING, SUITABLE FOR SUPER CHARGING OR TURBO CHARGING ETC. A DOMED I.C.E. PISTON WOULD IMPROVE COMPRESSION TO A DEGREE.

FIG 10 SHOWS THE PORTS 16 & 17 IN THE CYLINDER WALL 9. THE WIDTH OF THE PORTS ARE 90 DEGREES, THERE POSITION IS

CRITICAL FOR THE TIMING OF THE I.C.E. SEE FIG 11 FOR TIMING. THE SMALL PORT 18 IS THE IGNITION AREA WHICH IS 30 DEGREES WIDE. THE CYLINDER SLEEVE CAN BE BOLTED ONTO AN I.C.E. BLOCK IN PLACE OF THE CONVENTIONAL CYLINDER HEAD BUT IDEALLY IT WOULD BE MORE SUITABLE TO DESIGN A NEW I.C.E. BLOCK WITH THE LONGER CYLINDER SLEEVE INCLUDED TO ACCOMMODATE THE R.P.V.

FIG 11 TIMING MARKS FOR THE R.P.V.

2 & 3 = TOP DEAD CENTER

4 & 5 = BOTTOM DEAD CENTER

16a = 27 DEGREES BEFORE TOP DEAD CENTER = INLET
OPENS

16b = 63 DEGREES AFTER BOTTOM DEAD CENTER = INLET
CLOSES

17a = 71 DEGREES BEFORE BOTTOM DEAD CENTER = EXHAUST
OPENS

17b = 19 DEGREES AFTER TOP DEAD CENTER = EXHAUST
CLOSES

10a = 30 DEGREES BEFORE TOP DEAD CENTER = IGNITION
AREA

OPEN DURATION OF PORTS = 270 DEGREES

OVERLAP EXHAUST/INLET = 46 DEGREES

TO ADVANCE OR RETARD TIMINGS, ADJUSTMENTS TO THE LEADING OR TRAILING EDGES OF THE CYLINDER PORTS WOULD BE REQUIRED. ADJUSTMENTS TO THE R.P.V. SIDE PORT EDGES COULD BE MADE BUT THIS WOULD AFFECT INLET AND EXHAUST TOGETHER.

FIG 12 TURNING MECHANISM OF THE R.P.V. 6. THREE TYPES ARE ILLUSTRATED.

FIRST. 24. A CAM BELT PULLEY WHEEL, DRIVEN BY A CAM BELT (SIMILAR TO I.C.E.)

SECOND. 25. A WORM WHEEL DRIVE AND THIRD. 26.

INTERLOCKING COG WHEELS (WITH FREE RUNNING COG WHEEL BETWEEN CYLINDERS) 23 REPRESENTS THE ROLLER/BALL BEARING TO KEEP THE R.P.V. IN PLACE AND TURNING SMOOTHLY. 23a ILLUSTRATES THE BEARING INSERTED INSIDE THE R.P.V. 6. TO SAVE SPACE AND IMPROVE RIGIDITY.

CLAIMS

- 1** A ROTARY PISTON VALVE COMPRISING A PISTON, SIMILAR TO AN INTERNAL COMBUSTION ENGINE PISTON BUT WITH AN APERTURE CALLED PORT, ON THE FACE OF THE PISTON HEAD. . A CHANNEL CONNECTS THE PORT TO ANOTHER PORT LOCATED ON THE SIDE OF THE PISTON ALLOWING FUEL/AIR AND GASSES TO PASS THROUGH FROM THE COMBUSTION CHAMBER TO INLET/EXHAUST PORTS AS IT ROTATES INSIDE THE CYLINDER WALL/SLEEVE AND PASSES TWO SIMILAR PORTS IN THE CYLINDER WALL/SLEEVE.
- 2** A ROTARY PISTON VALVE AS CLAIMED IN CLAIM 1 WHERE BY THE INTAKE AND EXTRACTION OF GASSES IS FACILITATED BY A HORIZONTAL ROTARY MOVEMENT.
- 3** A ROTARY PISTON VALVE AS CLAIMED IN CLAIM 1 OR CLAIM 2, WHEREBY A MATCHED PORT IS USED FOR THE INTAKE AND EXTRACTION OF FUEL AND GAS.
- 4** A ROTARY PISTON VALVE AS CLAIMED IN CLAIM 1 OR CLAIM 2 OR CLAIM 3 WHEREBY A MATCHED PORT CAN VARY ITS SIZE AND SHAPE TO DETERMINE COMBUSTION RATIO THEREBY HAVE AN EFFECT ON PERFORMANCE AND EFFICIENCY.
- 5** A ROTARY PISTON VALVE AS CLAIMED IN ANY PRECEDING CLAIM, WHEREIN THE ROTARY PISTON IS PROVIDED WITH AT LEAST ONE PISTON RING NEAR THE TOP AND AT LEAST ONE PISTON RING NEAR THE BOTTOM.
- 6** A ROTARY PISTON VALVE AS CLAIMED IN CLAIM 5, WHEREIN THE ROTARY PISTON IS PROVIDED WITH AT LEAST ONE VERTICAL SEALING BAR ON EITHER SIDE OF THE SIDE PORT.
- 7** A ROTARY PISTON VALVE AS CLAIMED IN CLAIM 6 WHEREIN THE ROTARY PISTON VERTICAL SEALING BAR IS PROVIDED WITH AT LEAST ONE VERTICAL SEALER SPRING.
- 8** A ROTARY PISTON VALVE AS CLAIMED IN ANY PRECEDING CLAIM, WHEREIN THE ROTARY PISTON IS PROVIDED WITH A CYLINDER SLEEVE IDENTICAL OR SIMILAR TO THE INTERNAL

COMBUSTION ENGINES MEASUREMENTS TO WHICH IT WILL BE ATTACHED.

9 A ROTARY PISTON VALVE AS CLAIMED IN CLAIM 8 WHEREIN THE ROTARY PISTON IS PROVIDED WITH AN INTERNAL COMBUSTION ENGINE BLOCK WITH EXTENDED CYLINDER BORES OR SLEEVES INTO WHICH THE ROTARY PISTON WILL FIT.

10 A ROTARY PISTON VALVE AS CLAIMED IN CLAIM 8 OR CLAIM 9, WHEREIN THE CYLINDER BORE/SLEEVE IS PROVIDED WITH AT LEAST TWO PORTS AND ONE SMALL APERTURE.

11 A ROTARY PISTON VALVE AS CLAIMED IN ANY PRECEDING CLAIM, WHEREIN THE ROTARY PISTON IS PROVIDED WITH AT LEAST ONE ROLLER/BALL BEARING FOR ROTATIONAL PURPOSES.

12 A ROTARY PISTON VALVE AS CLAIMED IN CLAIM 11 WHEREIN THE ROTARY PISTON IS PROVIDED WITH A CAM LIKE PULLEY WHEEL FOR ROTATING THE ROTARY PISTON WITH A CAM LIKE BELT ALTERNATIVELY THE ROTARY PISTON IS PROVIDED WITH A WORM WHEEL TO BE DRIVEN BY A WORM DRIVE, AND ALTERNATIVELY THE ROTARY PISTON IS PROVIDED WITH A COG WHEEL TO BE DRIVEN BY INTERCONNECTING COG WHEELS

R. P. V. NUMBERS INFORMATION

2	TOP DEAD CENTER
3	TOP DEAD CENTER
4	BOTTOM DEAD CENTER
5	BOTTOM DEAD CENTER
6	ROTARY PISTON VALVE
7	EXHAUST MANIFOLD
8	INLET MANIFOLD
9	CYLINDER
10	IGNITION AREA
11	CONVENTIONAL PISTON
12	CONROD
13	COMPRESSION AREA
14	PORT
15	PORT CHANNEL
16	INLET PORT
17	EXHAUST PORT
18	IGNITION PORT
19	VERTICAL SEALERS
20	VERTICAL SEALER SPRING
21	SLOTS FOR VERTICAL SEALERS
22	PISTON RING SLOTS
23	ROTARY PISTON VALVE BEARING
24	CAM BELT WHEEL
25	WORM WHEEL
26	INTERLOCKING COG WHEEL



Application No: GB 9619480.8
Claims searched: 1 to 12

Examiner: John Twin
Date of search: 8 November 1996

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK CI (Ed.O): F1B (B2Q5A)

Int CI (Ed.6): F01L 7/02

Other:

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	GB 632573 (Caudmont)	1-3,5,8-12 at least
X	GB 537105 (Monleone)	1-3 at least
X	GB 317253 (Langer)	1-3,6 at least
X	US 4867117 (Scalise)	1-3,5,8-12 at least
X	US 4494500 (Hansen)	1-3,10-12 at least
X	US 4311119 (Menzies et al.)	1-3,10-12 at least
X	US 3130953 (Carpenter)	1-3,5,8-12 at least

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.