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(72) KARLSSON, Kurt, SE
(72) LUNDIN, Stig, SE
(71) ABB AIR PREHEATER, INC., US

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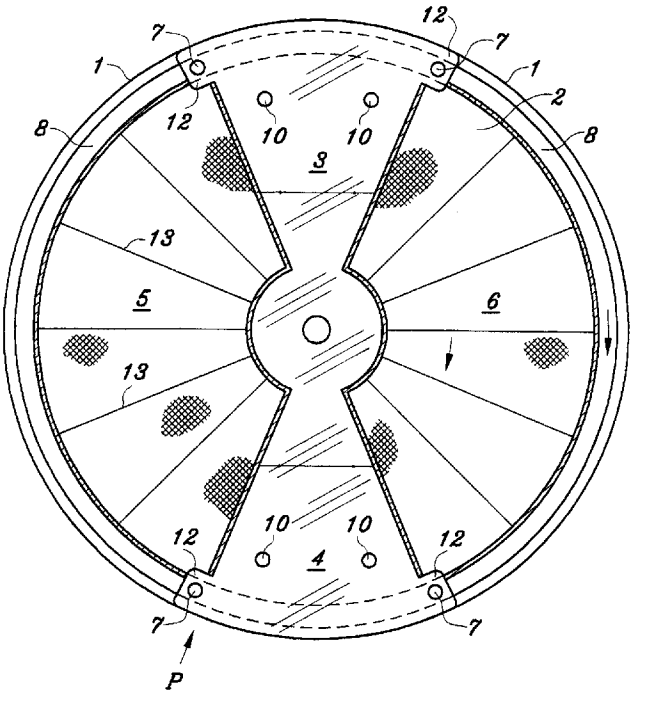
(54) **DISPOSITIF DESTINE A UNE ROUE THERMIQUE DE REGENERATION**

(54) **DEVICE OF A ROTARY REGENERATIVE HEAT EXCHANGER**



(57) La présente invention concerne un agencement conçu pour une roue thermique de régénération et destiné à détecter et régler l'espace libre entre une bride de prise (8) du rotor (1), saillant radialement vers l'extérieur autour des surfaces d'extrémité de celui-ci, et des plaques à secteurs (3, 4), lesquelles se déplacent axialement par rapport auxdites surfaces d'extrémité et séparent mutuellement les deux milieux échangeurs de chaleur (5, 6). Selon l'invention, on a monté des dispositifs de détection (7) d'espace libre sur des segments (12), lesquels saillent de manière périphérique des bords des plaques à secteurs, adjacents à la bride de prise (8) du rotor, de manière que ces dispositifs de détection soient placés dans les écoulements des milieux échangeurs de chaleur.

(57) The present invention relates to an arrangement in a regenerative, rotary heat exchanger for sensing and controlling the clearance between a flange (8) that projects radially outwards around the end surfaces of the rotor (1) and sector plates (3, 4) that move axially in relation to said end surfaces and that mutually separate the two heat exchanging media (5, 6). According to the invention, clearance sensing devices (7) are mounted on projections (12) which project out peripherally from the edges of the sector plates adjacent the rotor flange (8) such that the sensing devices are located in the flows of heat exchanging media.

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(71) Applicant *(for all designated States except US)*: SVENSKA ROTOR MASKINER AB [SE/SE]; P.O. Box 15085, S-104 65 Stockholm (SE).

(72) Inventors; and
(75) Inventors/Applicants *(for US only)*: KARLSSON, Kurt [SE/SE]; Njupkärrsvägen 5, S-135 55 Tyresö (SE). LUNDIN, Stig [SE/SE]; Åkar Pelles väg 1, S-139 00 Värmdö (SE).

(74) Agent: WALDINGER, Åke; Svenska Rotor Maskiner AB, P.O. Box 15085, S-104 65 Stockholm (SE).

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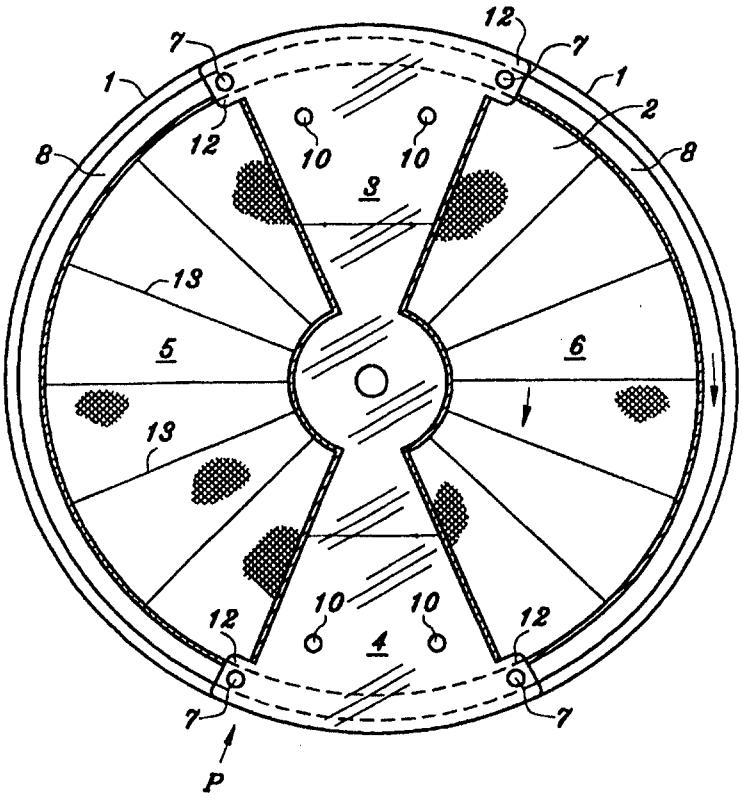
(57) Abstract

The present invention relates to an arrangement in a regenerative, rotary heat exchanger for sensing and controlling the clearance between a flange (8) that projects radially outwards around the end surfaces of the rotor (1) and sector plates (3, 4) that move axially in relation to said end surfaces and that mutually separate the two heat exchanging media (5, 6). According to the invention, clearance sensing devices (7) are mounted on projections (12) which project out peripherally from the edges of the sector plates adjacent the rotor flange (8) such that the sensing devices are located in the flows of heat exchanging media.



DEVICE OF A ROTARY REGENERATIVE HEAT EXCHANGER

The present invention pertains to an arrangement in regenerative rotary heat exchangers, particularly air preheaters, for detecting and controlling clearance between a flange that projects radially outwards around the end surfaces of the rotor and axially in relation to movable sector plates of the rotor that mutually separate the two heat exchanging media.

Arrangements of this kind have been the subject of comprehensive development over a long period of time. The problem to be solved is that clearance detecting or sensing devices in particular are often exposed to troublesome ambient conditions, namely a corrosive and dirty atmosphere with considerable variations in pressure and temperature as the rotor rotates. This is because as the rotor sectors pass in towards and out from the edges of the sector plates the heat exchanging media will flow alternately around the sensors active between the sector plates and rotor flanges at alternately high and low pressures and exert a disturbing influence thereon. Despite efforts to compensate for disturbances, the effect of the ambient conditions renders sensing unreliable. As a result, developments have leaned towards more sophisticated solutions, such as slip shoes that include forward feed arrangements for compensating wear, and air cushion arrangements.

The object of the present invention is to provide a simple and reliable sensor or detector arrangement on which ambient conditions will have substantially no effect.

This object is achieved with an arrangement that has the characteristic features set forth in the accompanying claim 1. Two separate preferred embodiments are defined in the accompanying claims 2 and 3.

As a result of placing the detectors or sensors connected with the sector plates outside the regions of said plates, i.e. in the passageways for respective heat exchange media, the ambient conditions to which the sensors are subjected will be stable in normal operation. As will be apparent from claims 2 and 3, simple, operationally reliable sensors or detectors based on through-flushing with cooling and cleansing compressed air can be used without

subjecting the sensors to worse disturbances than those that can be compensated for in an appropriate manner.

So that the invention will be understood more readily and its features made more apparent, the invention will now be described in more detail with reference to an exemplifying embodiment of an inventive sensing arrangement and with reference to the accompanying schematic drawing, in which

Figure 1 illustrates an air preheater from above; and

Figure 2 illustrates sensing and controlling of clearance between a rotor flange and a sector plate, in side view.

Figure 1 illustrates a typical rotary, regenerative air preheater intended for preheating combustion air with the aid of exhaust gases. The preheater includes a stationary housing 1 in which there is mounted a rotatable rotor which has a regeneratable mass and which is rotated at a speed of about one (1) r.p.m. Two sector plates 3, 4 are mounted for axial movement relative to the rotor and disposed close to the end surface of the rotor, both above and beneath said rotor. The sector plates 3, 4 separate a gas side 5 from an air side 6, wherewith although gas and air are able to enter beneath the edges of respective sector plates due to rotation of the rotor, there need be no direct leakage from one side to the other provided that the clearance between the sector plates 3, 4 and the ends of the rotor can be kept low in spite of the fact that the rotor ends are never completely flat but are liable to deviate markedly from a flat state as a result of thermal deformation.

The outer ends of the sector plates are each guided by two sensors 7. The sensors coact with a flange 8 that extends circumferentially around the rotor, at the top and bottom thereof respectively, as shown in Fig. 2 for the upper part of air preheater, seen in the direction of arrow P in Fig. 1, and with setting means 10 connected to said sensor and fixedly mounted in the housing 1 and hinged to the sector plate 3, 4 by means of a respective adjuster rod 11. The sensors 7 are mounted on peripheral projections 12 that extend out from a radially outermost point on each side edge of each sector plate 3, 4 and opposite an adjacently lying rotor flange 8.

The rotor 2 is divided into sectors by radially extending walls 13, the vertical edges of which are marked in Fig. 2. As the walls 13 pass the edge designated K of the sector plate 4 from right to left in the drawing, the gas side 5 will suddenly communicate with the sector 14, resulting in abrupt changes in pressure and temperature until the sector designated 15 takes the first mentioned position, i. e. precisely in that position in which clearance sensors are usually placed. Corresponding disturbances occur on the other side edge (not shown in Fig, 2) of the sector plate 4, where the air side 6 is located.

By virtue of being mounted on projections 12, the sensors 7 will be located completely within the respective gas and air sides where stable pressure and temperature conditions prevail in normal operation. Disturbances can only occur at the beginning or the end of a working operation or in the event of marked changes in load, where monitoring of the system may be necessary unless separate compensatory measures are taken. This enables the use of compressed-air driven sensors that are especially suitable in this particular context, wherewith the compressed air cools the sensors and, at the same time, blows clean that region of the heat exchanger in which the sensors are located. Clearance can be detected or sensed by means of a compressed-air jet directed towards the flange 8, the magnitude of the clearance being reflected in the changes in pressure on the pressure side. Alternatively there can be used a compressed-air operated pipe that is tuned to a specific resonance frequency. Any change in the distance between the pipe orifice and the flange 8 will result in a corresponding change in the resonance frequency of the pipe.

Claims

1. An arrangement in a regenerative, rotary heat exchanger, particularly an air-preheater, for sensing and controlling the clearance between a flange (8) that projects radially outwards around the end surfaces of the rotor (2) and axially in relation to its movable sector plates (3, 4) that mutually separate the two heat exchanging media (5, 6), **characterized** in that the sector plates (3, 4) are each provided with at least one projection (12) which projects out peripherally from one edge of the sector plates opposite the rotor flange (8) and on which a clearance sensing device (7) is mounted.

2. An arrangement according to Claim 1, **characterized** in that the clearance sensing device (7) includes means for directing a jet of compressed air onto an adjacent rotor flange (8), wherewith variations in pressure in the compressed air delivered function to control a setting means (10) for adjusting the setting of the sector plate (3, 4).

3. An arrangement according to Claim 1, **characterized** in that the clearance sensing device (7) includes a compressed-air driven pipe that is tuned to a specific resonance frequency and that has an opening located adjacent the rotor flange (8) so that changes in the clearance will be represented by changes in the resonance frequency of the pipe, said changes functioning to control a sector plate (3, 4) adjusting means (10).

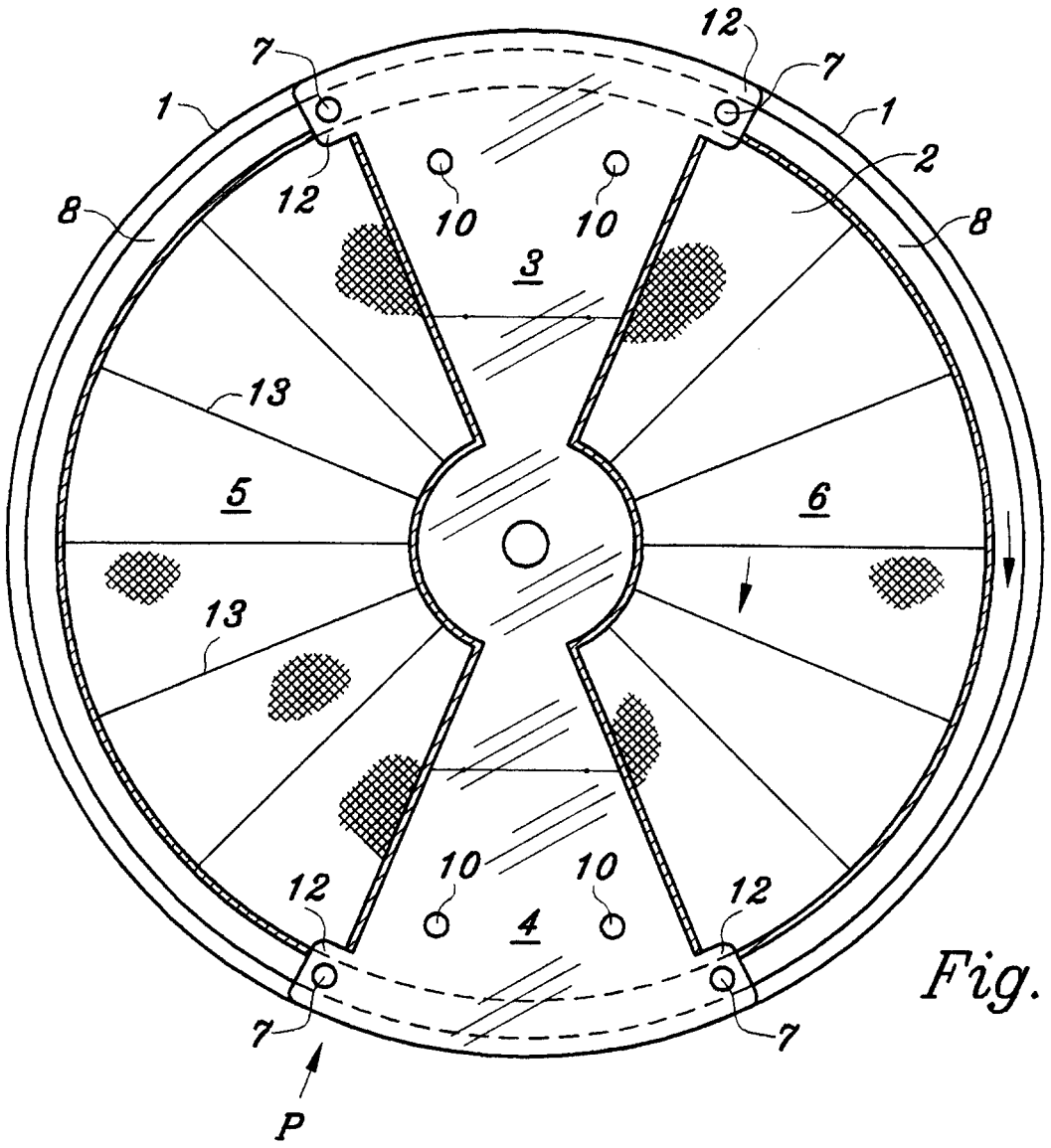

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Fig. 1

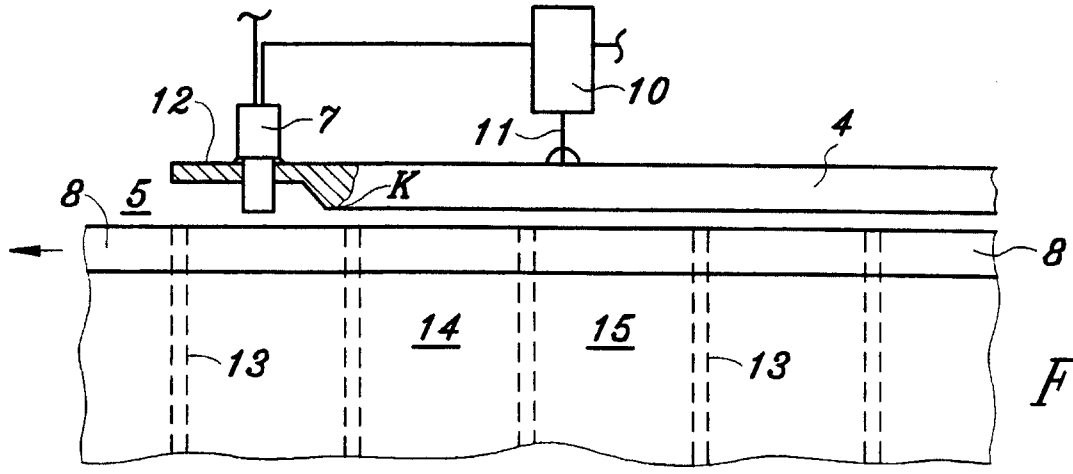
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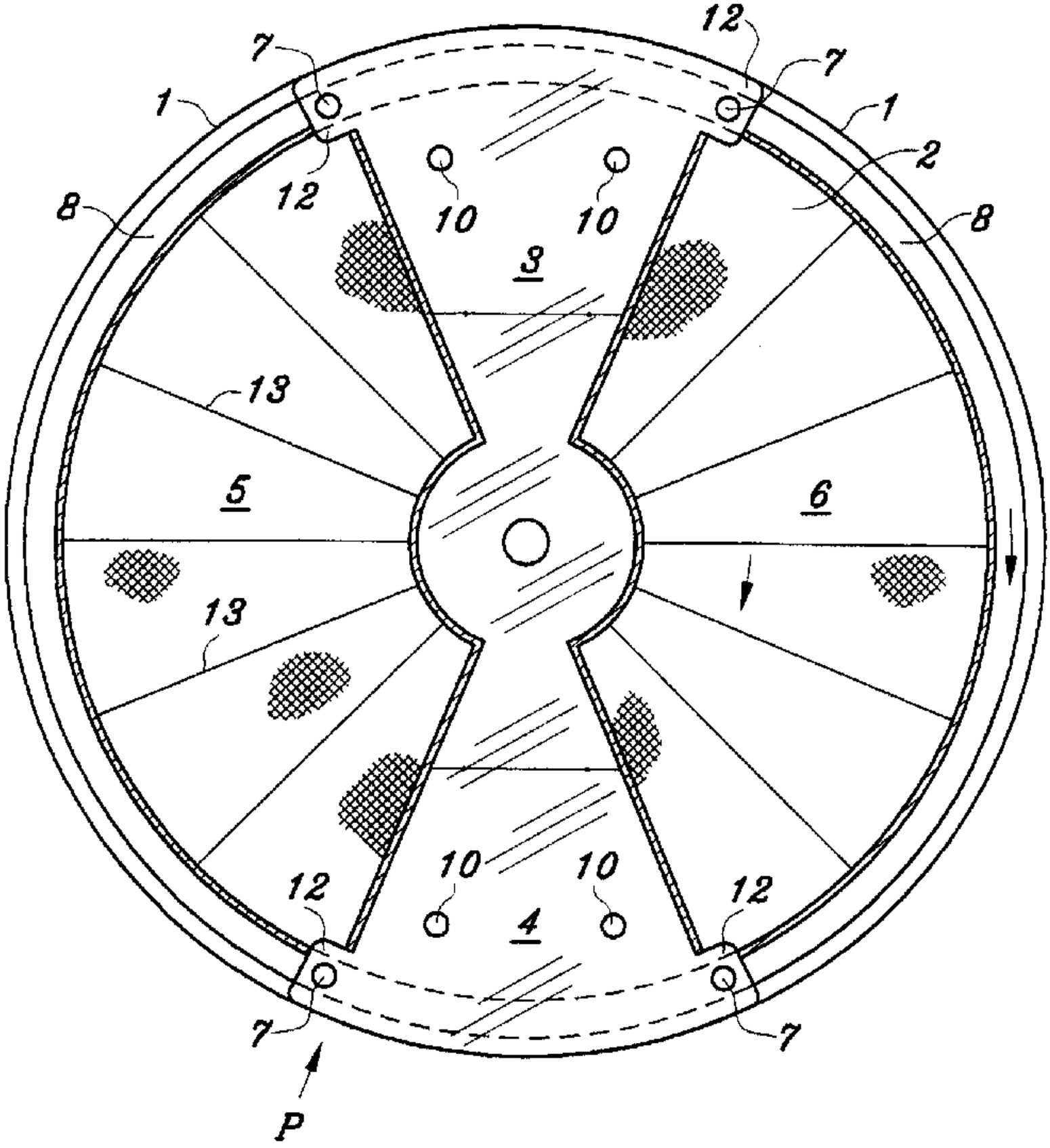
Fig. 2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