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ROTARY PNEUMATIC PRESSURE DIVIDER

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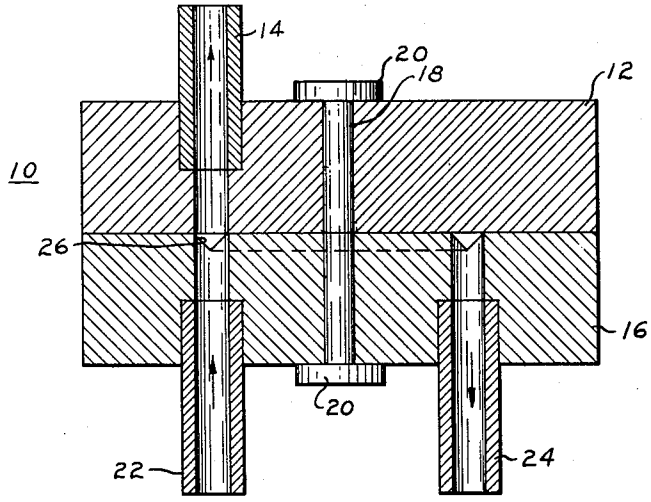

Fig. 1

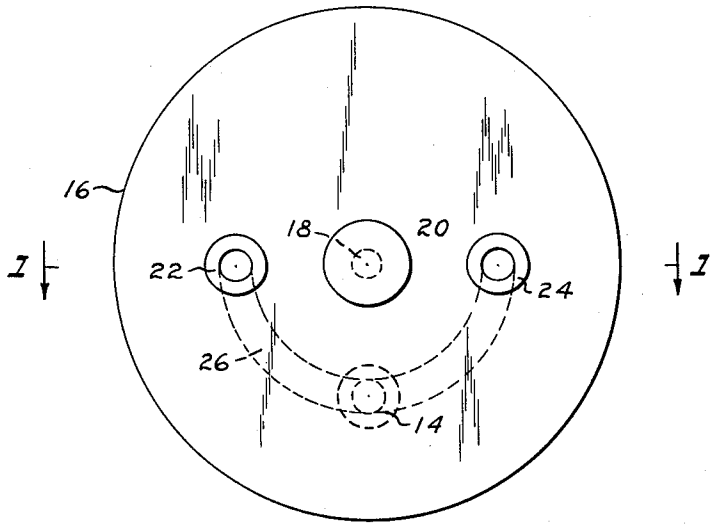

Fig. 2

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ROTARY PNEUMATIC PRESSURE DIVIDER

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This invention relates generally to pressure dividers and more particularly, to devices for providing a selectively variable output pressure from a constant pressure source.

It is an object of this invention to provide a pressure divider having a minimum number of moving parts and connections.

Another object of this invention is to provide a pressure divider for providing a selectively variable pressure drop between a constant pressure input and a controlled pressure output.

Still another object of this invention is to provide a pressure divided comprising two juxatposed circular plates having one plate relatively rotatable with respect to the other, whereby the output pressure from said pressure divider is proportional to the angular displacement of the said one plate with respect to the said other plate.

Still another object of this invention is to provide a pressure divider which is adapted for use with either a pressure source or a vacuum source.

Still another object of this invention is to provide a pneumatic pressure divider wherein the air consumption of the device is constant throughout its range of operation.

Yet another object of this invention is to provide a three terminal pneumatic pressure divider having a simple, rugged and inexpensive construction which is readily adaptable to be directly driven by mechanical drive means.

These and other objects of this invention will become apparent with reference to the following specification and drawings which relate to a preferred embodiment of the present invention.

FIGURE 1 is a cross sectional view in side elevation through a diameter of the present invention revealing all of the essential elements thereof; and

FIGURE 2 is a bottom plan view of FIGURE 1 with the elements thereof in a relative position different from that shown in FIGURE 1.

Referring in detail to the drawings, the rotary pneumatic pressure divider **10** is shown as comprising a first circular plate **12**, having a pressure pick-off outlet port **14** extending therethrough, rotatably connected in juxtaposition with a second circular plate **16**, by means of an axially disposed shaft or pin **18** having locking flanges **20** on either end thereof, the said second circular plate including a pressure supply port **22** and a pressure exhaust port **24** extending therethrough and spaced apart and interconnected via a V-shaped arcuate restricting groove **26** in that face of the second circular plate **16** which is juxtaposed with the first circular plate **12**. The juxtaposed face of the plate **12** comprises a third side for the restricting groove **26** making the said groove triangular in cross-section.

The radial position of the pressure pick-off port **14** in the first plate **12** and the radius of the arcuate groove **26** in the inner face of the second plate, with respect to the axial shaft **18**, are equal so that over the span of the arcuate restricting groove **26**, the pressure pick-off port **14** will always be in registry therewith.

In operation, a regulated pressure source, not shown, is connected to the pressure divider **10** at the supply port **22**. This causes a flow of air from the supply port **22**, through the arcuate restricting groove **26** between the circular plates **12** and **16**, and out through the exhaust port **24**.

The rate of flow of air through the arcuate restricting groove **26** is a function of the cross-sectional area of the restricting groove **26** as defined between the inner faces of the plates **12** and **16**. Thus, depending on the said cross-sectional area and the length of the restricting groove **26**, the resistance to the flow of air therein produces a pressure gradient along the said restricting groove from the supply port **22** to the exhaust port **24**.

If now a pressure receiver (not shown) is connected to the pick-off port **14** in the plate **12**, the pressure transmitted from the pick-off port **14** to the said pressure receiver may be selectively varied as a function of the relative position of the said pick-off port **14**, with respect to the supply port **22** and the exhaust port **24**, along the length of the said restricting groove **26**. The pick-off port **14** is shown in FIGURE 2 as being intermediate the supply port **22** and the exhaust port **24** along the restricting groove **26**.

The range of pressures available at the pick-off port **14** extend from the magnitude of the supply pressure, when the pick-off port **14** is moved into registry with the supply port **22** by rotating the first plate **12** about the pin **18**, to the atmospheric or exhaust pressure at the said exhaust port **24** as the plate **12** is rotated to move the pick-off port **14** along the restricting groove **26** in registry therewith.

The above operation would also apply to the use of a vacuum source at the supply port **22**.

As can be seen from the foregoing specification and drawings this invention provides a new and novel variable pressure divider having a rugged, simple and accurate structure.

It is to be understood that the embodiment shown and described herein is for the purpose of example only and is not intended to limit the scope of the appended claims.

What is claimed is:

1. A pneumatic pressure divider comprising a first body, a second body having one face thereof coextensive with a face of said first body in juxtaposition therewith, a pressure supply port and a pressure exhaust port in said second body extending therethrough and spaced apart therein, a restricting groove in said second body confined between the said juxtaposed faces of said first and second bodies and connecting said supply port to said exhaust port, whereby a pressure gradient is provided along the length of said restricting groove, said first body being relatively movable with respect to said second body and a pressure pick-off port in said first body and extending therethrough into registry with said restricting groove, whereby relative movement between said first body and said second body causes said pick-off port to translate along said restricting groove to any selected position from said supply port to said exhaust port to cause the pressure at said pick-off port to assume any desired value determined as a function of the pressure gradient between said supply port and said exhaust port and the position of said pick-off port relative thereto along said restricting groove.

2. The invention defined in claim 1, wherein said first body and said second body each comprise a flat plate.

3. The invention defined in claim 1, wherein said first and second bodies comprise, respectively, first and second circular plate means and further including axial means for mounting said first and second plate means for relative rotation.

4. The invention defined in claim 3, wherein said pick-off port, said supply port and said exhaust port are all positioned, in their respective plates, an equal radial distance from said axial means and wherein said restricting groove defines an arcuate sector between said supply and exhaust ports of substantially the same radius.

5. The invention defined in claim 1, wherein said restricting groove comprises a V-shaped cavity having first and second side walls in that face of the said second body in juxtaposition with the adjacent face of said first body, said cavity being provided with a third side wall by said adjacent face of said first plate, whereby said restricting groove is triangular in cross-section.

6. The invention defined in claim 5, wherein said first body and said second body each comprise a flat plate.

7. The invention defined in claim 5, wherein said first and second plates comprise, respectively, first and second circular plate means and further including means for axially mounting said first and second plate means for relative rotation.

8. The invention defined in claim 7, wherein said pick-off port, said supply port and said exhaust port are all positioned, in their respective plates, an equal radial distance from said axial means and wherein said restricting groove defines an arcuate sector between said supply and exhaust ports of substantially the same radius.

References Cited in the file of this patent

UNITED STATES PATENTS

1,999,808	Goodman	Apr. 30, 1935
2,675,830	Vuillemin	Apr. 20, 1954
2,833,311	Baldelli	May 6, 1958
2,840,096	DuBois	June 24, 1958
2,911,008	DuBois	Nov. 3, 1959
2,943,643	Pinter et al.	July 5, 1960