March 24, 1959 A. MONTANI 2,879,483

ROTARY DISTRIBUTORS

Original Filed May 15, 1952

Fig_1

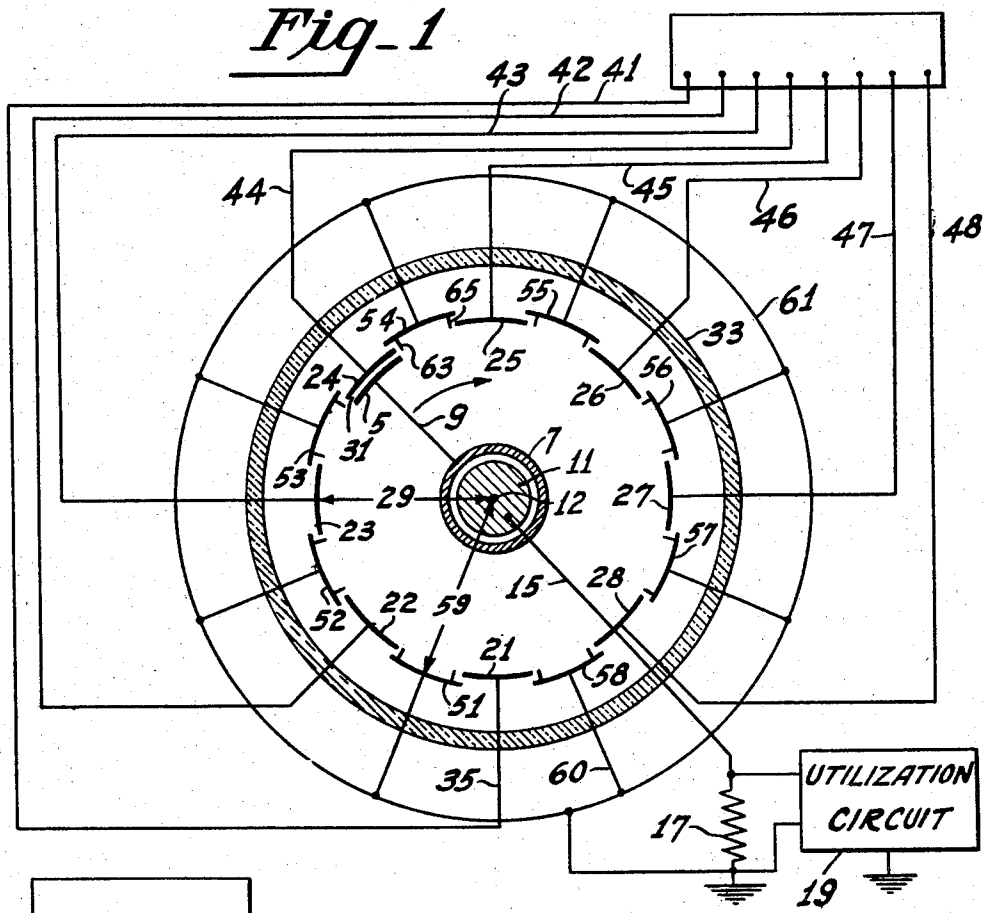
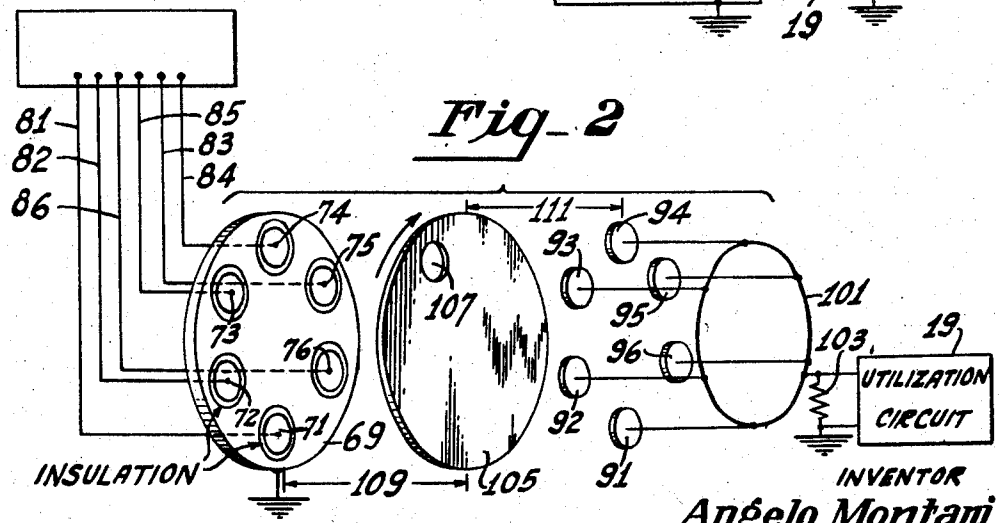


Fig_2



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2,879,483

ROTARY DISTRIBUTORS

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Original application May 15, 1952, Serial No. 287,993, now Patent No. 2,762,016, dated September 4, 1956. Divided and this application August 27, 1956, Serial No. 613,591

2 Claims. (Cl. 333—7)

This is a divisional application of my copending U.S. Patent application Serial Number 287,993, filed May 15, 1952, now U.S. Patent 2,762,016, granted September 4, 1956.

This invention relates to rotary distributors of the type used in multiplex signalling apparatus.

A rotary distributor may be used, for example, to obtain, in an output channel, a signal which is a series of samples of signals present in a plurality of input channels.

A widely used rotary distributor is a segmental contact device in which a rotary contact or brush passes successively over a plurality of stationary contacts. Distributors of the rotary contact type have some in inherent drawbacks which have been a cause of considerable trouble.

One of these drawbacks is the unavoidable chatter of the contacts. Another drawback is the wear of the contacts. A third drawback is a limitation on the speed of the rotary distributor, as both chatter and wear increase with speed. A fourth drawback is the possible deposit, at the contacts, of metallic particles which may bridge two segments and introduce objectionable crosstalk.

It is an object of the present invention to provide a signal distributor which avoids using segmental contact devices.

It is another object of the present invention to eliminate transient effects due to chatter in high speed rotary distributors.

It is a further object of the present invention to eliminate the effects of contact wear in rotary distributors.

According to the present invention, these drawbacks are eliminated through the use of a rotary distributor in which signal coupling is effected capacitively, the segmental contacts having been eliminated.

Other and incidental objects of the present invention will be apparent from a reading of the following specification and an inspection of the accompanying drawings in which:

Figure 1 is a cross-sectional view of one embodiment of the present invention, and

Figure 2 is an exploded view of another embodiment of the present invention.

Referring to Figure 1, there is shown a surface of conductive material **5**. This surface **5** is mechanically and electrically connected to a hollow cylinder **7** by means of arm **9**. A cylinder **11** is concentrically located inside cylinder **7**, the common center being designated as **12**. Both cylinders **7** and **11** are made of conductive material, and are separated by an air gap **13**. Cylinder **7** is mounted so as to rotate about cylinder **11**, which is stationary.

A lead **15** electrically connects cylinder **11** to a terminal of a resistor **17**, the other terminal of which is grounded. The terminals of resistor **17** are the input terminals of utilization circuit **19**.

Eight surfaces **21** through **28**, made of conductive material, are arranged around a circumference which is concentric with cylinders **7** and **11**, and has a radius **29**. Radius **29** is larger than the radius between center **12**

and surface **5**, the difference between these radii forming an air gap **31**. The surfaces **21** through **28** are mechanically mounted on an insulating member **33** by means of stems such as **35**. Surfaces **21** through **28** are electrically connected to input channels **41** through **48** respectively.

Eight surfaces **51** through **58**, made of conductive material, are arranged around a circumference having its center at **12**, and having a radius **59**. Radius **59** is slightly greater than radius **29**. Surfaces **51** through **59** are mechanically mounted on insulating member **33** by means of stems such as **60**. Surfaces **51** through **59** are electrically grounded by means of common ground connection **61**.

The surfaces **21** through **28** may be called "input plates," while the surfaces **51** through **58** may be called "ground plates." Surface **5** may be called an "output plate." It can be seen that input plates and ground plates are so disposed that, as the output plate **5** rotates around center **12**, the output plate **5** alternately faces an input plate and a ground plate.

The input plates **21** through **28**, and the ground plates **51** through **58**, are in spaced relationship from each other, so that there is no electrical contact between a ground plate and an input plate. The ground plates are shown to be wider than the input plates; they are also shown to be provided with ridges such as **63** and **65**. These ridges may extend to the circumference of radius **29**.

The operation of the distributor shown in Figure 1 is as follows. Alternating or unidirectional potentials, derived from input channels **41** through **48** are applied to the input plates **21** through **28**. A synchronous motor (not shown) makes output plate **5**, arm **9** and hollow cylinder **7** rotate about stationary cylinder **11** and center **12**.

When the output plate **5** faces an input plate, such as input plate **24**, the signal present on plate **24** is capacitively coupled to cylinder **7**. Cylinders **7** and **11**, separated by air gap **13**, also form a coupling condenser, so that the signal present on plate **24** is capacitively coupled to resistor **17** and to the utilization circuit **19**.

When output plate **5** faces one of the grounded plates, such as **54**, the output plate **5** is momentrailly grounded. This grounding is due to the capacitive coupling between the output plate **5** and the grounded plate, there being no physical contact therebetween. This grounding avoids "crosstalk" between input channels due to the carrying over of electrostatic charges from one channel to another. This momentary grounding of plate **5** by means of the grounded plates is helped by the fact that the maximum (or fully meshed) capacity between the output plate **5** and any of the grounded plates **51** through **58**, is considerably smaller than the maximum (or fully meshed) capacity between the output plate and any of the input plates **21** through **28**.

The ridges **63** and **65** reduce considerably the capacity coupling between two consecutive input plates, and help in eliminating crosstalk.

The geometry of the whole arrangement is such that an observer, placed inside the circumference of radius **29**, cannot see the insulating member **33**. Thus any erratic electrostatic charge on insulating member **33** will not influence the potential on output plate **5**.

If an alternating potential is applied to one of the input plates **21** to **28**, the frequency of that potential should be such that the duration of one cycle is considerably shorter than the time the output plate **5** and the input plate are effectively coupled.

If a unidirectional potential is applied to one of the input plates, the corresponding output potential will be a bipolar pulse having a positive and a negative amplitude

proportional to the unidirectional potential on the input plate.

In both cases, the potential across resistor **17** comprises a series of samples, each sample being proportional to its corresponding input potential.

Referring to Figure 2, there is shown a surface **69** of conductive material. Located within windows of surface **69** are shown six input surfaces or plates **71** through **76**. These input plates **71** through **76** are made of conductive material and are electrically connected to input channels **81** through **86** respectively. The input plates **71** through **76** are electrically insulated from surface **69**, and surface **69** is grounded.

Facing the input plates **71** through **76** are the output surfaces or plates **91** through **96**. These output plates are made of conductive material, and are electrically connected together by means of lead **101**. Lead **101** is connected to one terminal of a resistor **103**, the other terminal of which is grounded. The output plates **91** through **96** may be mechanically supported by a surface (not shown) similar to surface **69** supporting the input plates **71** through **76**.

Between the input and output plates which are stationary, there is located a rotating plate **105**. Plate **105** may be rotated by means of a synchronous motor (not shown). Plate **105** is made of conductive material. Eccentrically located within it is a window **107**. In this window **107** there may be air or any other dielectric material.

It will be noted that the input plates **71** through **76**, the output plates **91** through **96**, and the window **107** are located around three circumferences having radii of the same length, and whose centers are on an axis perpendicular to these radii.

As plate **105** revolves, the window **107** couples capacitively and in succession each of the input plates **71** through **78** to each of the corresponding output plates

91 through **98**. The potential across resistor **103** comprises a series of samples, each sample being proportional to its corresponding input potential.

It will be noted that Figure 2 is an exploded view. In practice, the distances **109** and **111** amount to only a few thousandths of an inch.

Crosstalk between the input plates **71** through **76** is avoided by grounding plate **69** as shown. The rotating plate **105** and plate **69** forming a condenser to ground, plate **105** is also grounded for alternating potentials.

It is seen that the previously mentioned drawbacks of segmental contacts are avoided in the rotary distributors constructed in accordance with the present invention.

What is claimed is:

1. A rotary signal distributor comprising a plate of conductive material having therein a plurality of windows circumferentially disposed about an axis, a plurality of input elements of conductive material positioned in said windows, insulating means to insulate said input elements from said plate and from each other, input terminals connected to said input elements, a plurality of output elements disposed circumferentially around said axis and electrically connected together, output terminals connected to said output elements, said output elements and input elements facing each other, a plate of conductive material positioned between said input elements and said output elements, said last named plate being rotatable about said axis and having therein an eccentric window of dielectric material, said window being positioned with respect to said axis so as to couple successively said input elements to said output elements.

2. A rotary signal distributor according to claim 1, wherein said plate of conductive material is grounded.

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