United States Patent

[11] 3,633,621

[72] Inventor Ned C. Myers
Elkhart, Ind.

[21] Appl. No. 11,046
[22] Filed Feb. 13, 1970
[45] Patented Jan. 11, 1972

[73] Assignee Robertshaw Controls Company
Richmond, Va.

[54] SNAP-FITTED PNEUMATIC SELECTOR VALVE HAVING A TUBULAR CONDUIT FOR FLUID FLOW SWITCHING

14 Claims, 6 Drawing Figs.

[52] U.S. Cl. 137/625.11, 251/297, 137/625.15
[51] Int. Cl. F16k 11/00
[50] Field of Search 137/625.11, 625.15, 625.41, 625.46; 251/145, 368, 297

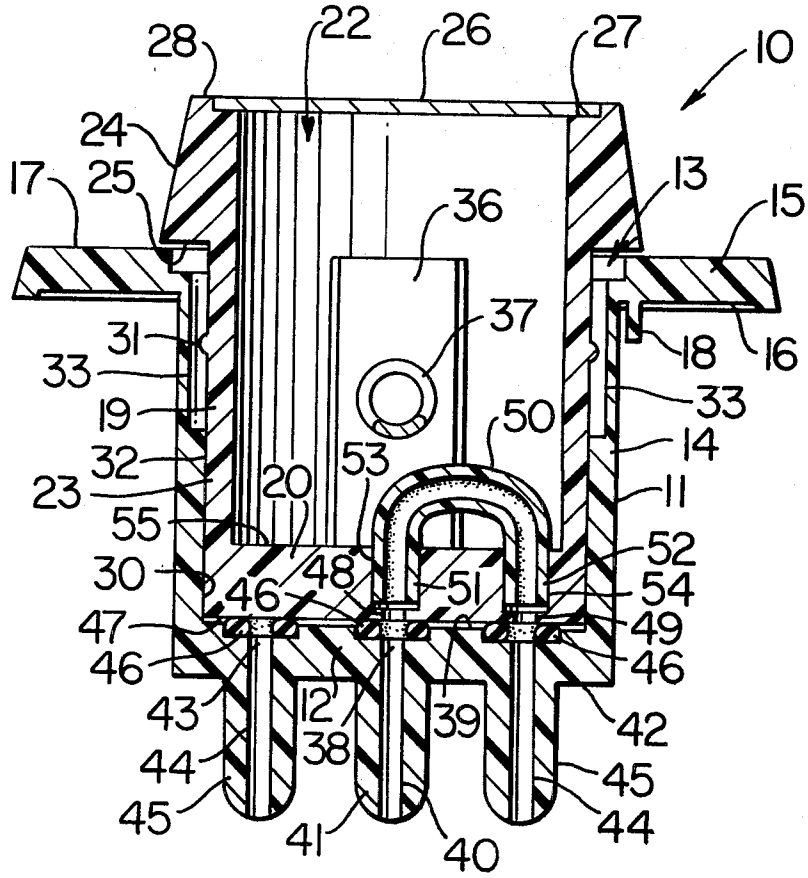
[56] References Cited

UNITED STATES PATENTS

3,443,592	5/1969	Felmlee	137/625.11
3,422,848	1/1969	Liebman et al.	137/625.15
3,481,367	2/1969	Deuschle	251/368 X
1,826,330	10/1931	Thiele	251/297
2,974,681	3/1961	Whitehurst	137/625.11 X

Primary Examiner—William R. Cline
Attorneys—Auzville Jackson, Jr., Robert L. Marben and Candor, Candor and Tassone

ABSTRACT: A pneumatic selector switch having a body member provided with a pneumatic source port and a plurality of actuator ports spaced from the source port and from each other. A movable valve member is carried by the body member for selectively interconnecting the source port to a selected actuator port depending upon the position of the valve member relative to the body member. The valve member includes a tubular conduit bent in substantially a U-shape with one of the opposed open ends thereof always in alignment with the source port and the other open end alignable with any one of the selected actuator ports.



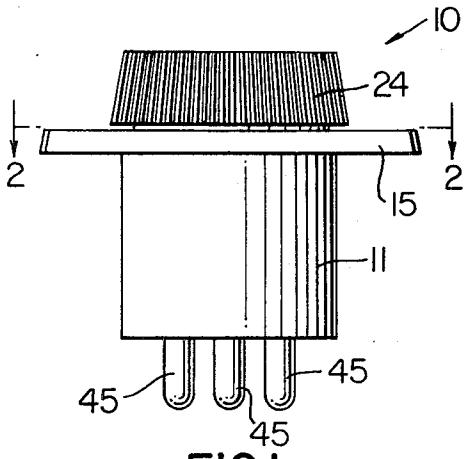


FIG.1

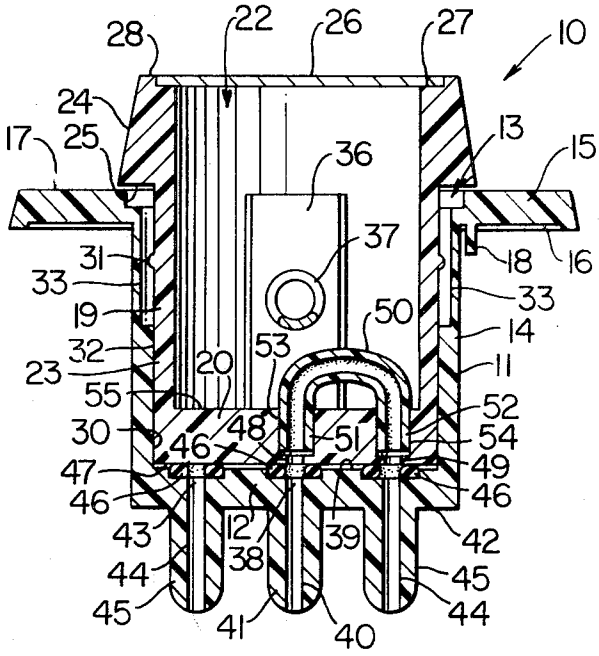


FIG.3

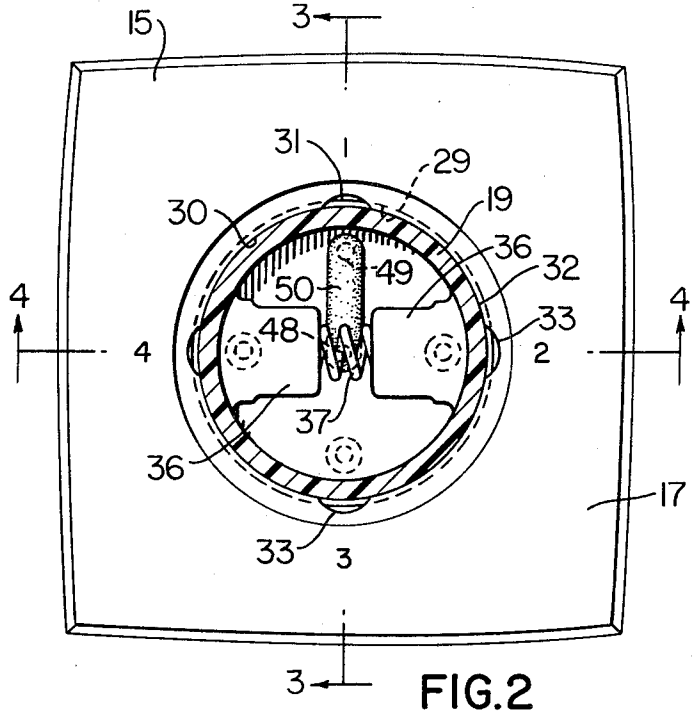


FIG.2

INVENTOR.
NED C. MYERS

BY
Cauda, Cauda & Tessmer
HIS ATTORNEYS

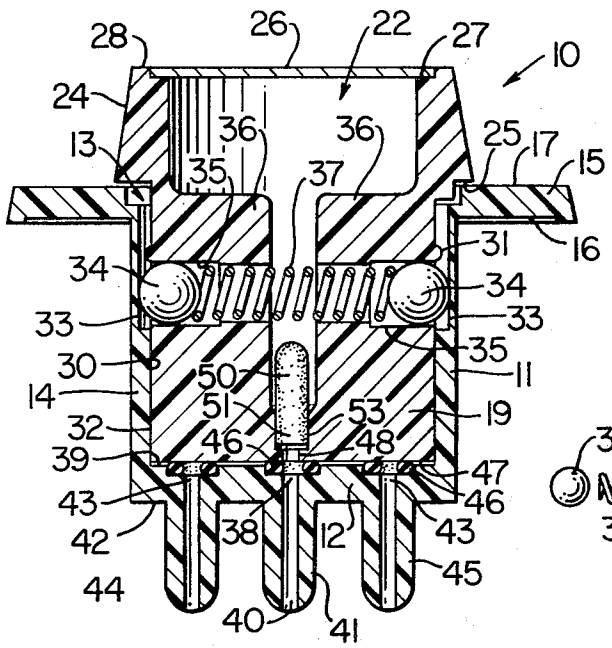


FIG. 4

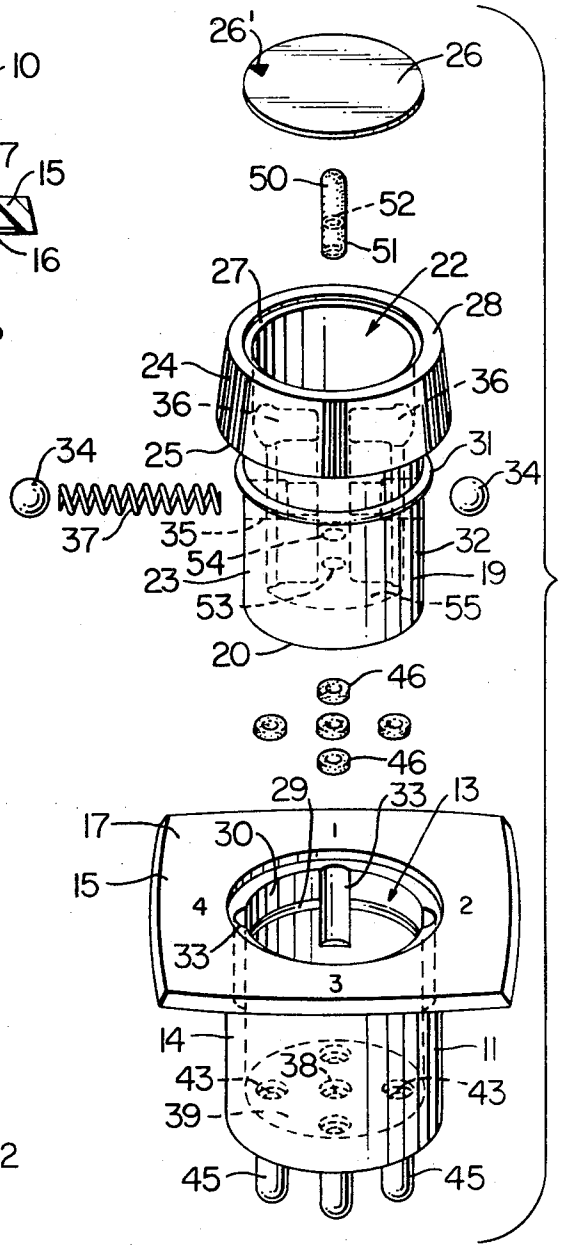


FIG. 6

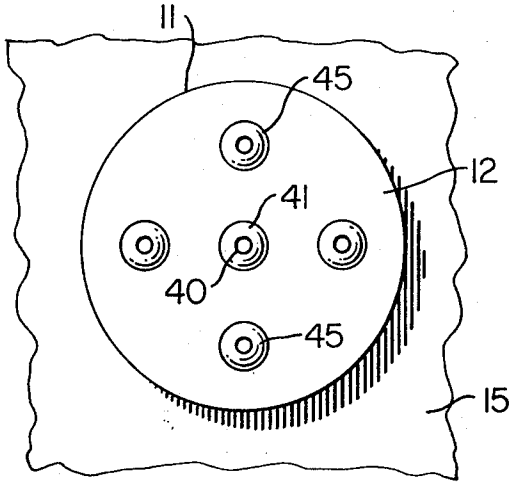


FIG. 5

INVENTOR.
NED C. MYERS

BY

Cauley, Cauley & Tassone

HIS ATTORNEYS

SNAP-FITTED PNEUMATIC SELECTOR VALVE HAVING A TUBULAR CONDUIT FOR FLUID FLOW SWITCHING

This invention relates to an improved pneumatic selector switch.

It is well known that pneumatic selector switches have been provided in the past wherein a pneumatic source is adapted to be interconnected to any one of a plurality of ports that lead to pneumatically operated devices, such as pneumatically operated actuators or the like.

It is a feature of this invention to provide such a pneumatic selector switch having improved parts that facilitate the assembly thereof as well as provide an economy in the fabrication thereof.

In particular, one embodiment of this invention provides a cup-shaped body member having the closed end wall thereof interrupted by a central source port and a plurality of actuator ports disposed circumferentially about the source port. A valve member is rotatably mounted in the body member and has an end extending out of the open end of the body member to provide a manual means for grasping the valve member and rotating the same relative to the body member. The valve member includes a conduit means bent into a substantially U-shape so that one open end thereof is always alignable with the source port and the other end thereof will transcribe the circle defined by the actuator ports whereby upon proper positioning of the valve means relative to the body member, the source port will be interconnected to a selected actuator port. Detent means are provided to indicate and hold the valve means in a selected operating position thereof. The valve member and body member are so constructed and arranged that the same can be snap fitted together without auxiliary fastening means with the snap fitting means itself providing for the rotational movement therebetween.

Accordingly, it is an object of this invention to provide an improved pneumatic selector switch having one or more of the novel features set forth above or hereinafter shown or described.

Other objects, uses and advantages of this invention are apparent from a reading of this description which proceeds with reference to the accompanying drawings forming a part thereof and wherein:

FIG. 1 is a side view of the improved pneumatic selector switch of this invention.

FIG. 2 is an enlarged cross-sectional view taken on line 2—2 of FIG. 1.

FIG. 3 is a cross-sectional view taken on line 3—3 of FIG. 2.

FIG. 4 is a cross-sectional view taken on line 4—4.

FIG. 5 is an enlarged fragmentary bottom view of the selector switch of FIG. 1.

FIG. 6 is an exploded perspective view of the selector switch of FIG. 1.

While the various features of this invention are hereinafter described and illustrated as being a four-position, five-branch, manually operated pneumatic selector valve or switch, it is to be understood that the various features of this invention can be utilized singly or in any combination thereof to provide other types of selector switches as desired.

Therefore, this invention is not to be limited to only the embodiment illustrated in the drawings, because the drawings are merely utilized to illustrate one of the wide variety of uses of this invention.

Referring now to the drawings, the improved pneumatic selector switch or valve of this invention is generally indicated by the reference numeral **10** and comprises a substantially cup-shaped body member **11** provided with a substantially flat closed end wall **12** and an opposed open end **13** defined at the upper end of a substantially cylindrical sidewall means **14** thereof, the open end **13** terminating at an outwardly directed flange means **15** that surrounds the open end **13** thereof to provide not only a means for mounting the switch **10** in a control panel or the like, but also to carry suitable position indicating means such as positions "1," "2," "3" and "4" as illustrated in FIG. 2. However, the body member **11** can be made from molded plastic material of a transparent type so that a separate information-carrying sheet can be disposed against the underside **16** of the flange means **15** to viewable through the same at the top side **17** thereof with the body member **11** having a position locating extension **18** for properly positioning such sheet means against the underside **16** thereof.

A movable valve member **19** is rotatably mounted in the body member **11** in a manner hereinafter described and is also substantially cup-shaped with a closed flat end wall **20** and an opposed open end **22** at the upper end of a cylindrical portion **23** thereof.

The substantially cylindrical sidewall **23** of the valve member **19** is formed at the upper open end **22** thereof to define a substantially frustoconical grasping portion **24** being ribbed as illustrated in FIG. 1 to facilitate grasping thereof, if desired, and having its lower end **25** completely spanning the open end **13** of the body member **11** while being slightly spaced above the top surface **17** of the flange means **15** of the body member **11**. A circular plate **26** is adapted to be received in annular recess **27** formed at the upper end **28** of the frustoconical grasping portion **24** so as to close off the open end **22** of the valve member **19**, the plate **26** being provided with a pointer **26'** printed thereon as illustrated in FIG. **6** to cooperate with the information on flange **15**.

As illustrated in FIG. **6**, the cylindrical sidewall **14** of the body member **11** is provided with an annular recess **29** in the internal surface **30** thereof which is adapted to snap fittingly receive an outwardly directed annular tongue **31** formed on the exterior surface **32** of the sidewall means **23** of the valve member **19** so as to hold the same together in the telescoped relation illustrated in FIGS. 3 and 4 while permitting rotational movement therebetween as the annular tongue **31** will ride in the groove **29** as the valve member **19** is turned relative to the body member **11**.

The internal surface **30** of the sidewall means **14** of the body member **11** is also provided with four recesses **33** therein of substantially semicircular transverse cross-sectional configuration and each being adapted to respectively mate with a detent ball **34** carried in a diametric opening means **35** passing through bosslike projections **36** in the cup-shaped valve member **19** as illustrated in FIGS. 2 and 4. The opposed detent balls **34** are urged radially outwardly of the opening means **35** of the valve member **19** by a compression spring **37** disposed within the opening means **35** between the detent balls **34**.

In this manner, when the valve member **19** is rotated relative to the body member **11**, the opposed balls **34** are adapted to be cammed inwardly to permit rotational movement therebetween and will snap outwardly into opposed grooves **33** in the body member **11** when aligned therewith so as to indicate a selected position and hold the same in such selected rotational position until the valve member **19** is manually moved therefrom.

The closed end wall **12** of the body member **11** is provided with a central port **38** that interrupts the inside flat surface **39** thereof and is interconnected to a passage means **40** extending through an outwardly directed nipple means **41** extending from the outside surface **42** of the end wall **12**. A plurality of other ports **43** also interrupt the surface **39** and respectively are interconnected to passage means **44** passing through outwardly directed nipples **45**, the other ports **43** being circularly arranged about the central port **38**. In this manner, the central port **38** can be interconnected to a pneumatic source, such as a pressure source or a vacuum source such as by being coupled thereto by a flexible conduit being telescoped over the nipple means **41**, if desired, whereas the other ports **43** can be respectively coupled to various pneumatically operated actuators or the like in a similar manner. Thus, the port **38** will be hereinafter called a "source port" and the ports **43** will hereby be hereinafter called "actuator ports," but it is to be understood that the ports **38** and **43** could have other uses and this invention is not to be limited to such use.

A plurality of resilient O-ring sealing members **46** are respectively disposed in the ports **38** and **43** to not only bear against the body member **11** outboard of the respective passages **40** and **44** as illustrated in FIGS. **3** and **4**, but also to project above the inside surface **39** of the end wall **12** so as to seal against the bottom surface **47** of the valve member **19** when the same is assembled to the body member **11** in the snap fit relation illustrated in FIG. **3**.

The surface **47** of the end wall **20** of the valve member **19** is interrupted by a port **48** that is coaxial with the source port **38** and is disposed inboard of the sealing member **46** thereof so as to always be in fluid communication with the port **38** regardless of the rotational position of the valve member **19** relative to the body member **11**. The surface **47** is also interrupted by another port **49** which is alignable with any one of the actuator ports **43** inboard of the sealing member **46** thereof as the port **49** will transcribe the circle defined by the actuator ports **43** when the valve member **19** is rotated relative to the body member **11**.

In order to fluidly interconnect the port **48** of the valve member **19** with the port **49** thereof, a conduit means **50** is provided and has its opposed open ends **51** and **52** respectively secured in openings **53** and **54** interrupting the inside surface **55** of the end wall **20** of the valve member **19** and being respectively alignable and in fluid communication with the ports **48** and **49** whereby the conduit means **50** provides fluid transfer means from the central port **48** to the other port **49**.

If desired, the opposed ends **51** and **52** of a flexible conduit **50** can be press fitted into the openings **53** and **54** of the valve member **19** as the flexibility of the conduit means **50** will render the same self-sealing therein, particularly when the switching means **10** is being utilized with a vacuum source. However, it is to be understood that the opposed ends **51** and **52** of a flexible or rigid conduit means could be adhesively bonded in place in the openings **53** and **54**, if desired.

Therefore, it can be seen that switching means **10** of this invention can be formed from a plurality of relatively inexpensive parts that are adapted to be assembled together to provide a pneumatic switching function in a simple and economical manner.

In particular, when the various parts of this invention have been assembled in the manner previously described to form the switching device **10**, it can be seen that the central nipple **41** can be interconnected by a flexible conduit to a pneumatic source and the other nipples **45** can be interconnected respectively to pneumatically operated actuators by flexible conduits so that the operator or the like can manually switch the pneumatic source to any one of the pneumatically operated devices respectively interconnected to the actuator ports **43**.

Since the grooves **33** of the body member **11** are respectively located adjacent the actuator ports **43**, the ball detent means **34** will locate the valve member **19** and hold the same in aligned relation with a selected actuator port **43** so that the conduit means **50** will transfer the pneumatic source from the port **38** to the port **43** having been selected by the operator in a continuous manner until the valve member **19** is rotated from that particular position. Because of the snap fit relation between the two cup-shaped members **11** and **19**, the opposed surfaces **29** and **47** of the end walls **12** and **20** thereof are respectively sealed at the ports **38**, **43**, **48** and **49** thereof by the O-ring sealing means **46** so that the only transfer of fluid between the members **11** and **19** takes place when the conduit means **50** has been aligned with one of the actuator ports **43** as illustrated in FIG. **3**.

Therefore, it can be seen that this invention provides an improved pneumatic selector switch or valve means, as well as improved parts therefor or the like.

While the form of the invention now preferred has been described as required by the statutes, other forms may be used all of which fall within the scope of the accompanying claims.

I claim:

1. A pneumatic selector switch comprising a cup-shaped body member having a pneumatic source port and a plurality of actuator ports spaced from said source port and from each other, said cup-shaped body member defining an open end thereof and a closed end thereof that is interrupted by said ports, a cup-shaped movable valve member disposed within the open end of said body member and being snap-fitted thereto for selectively interconnecting said source port to a selected actuator port, said valve member comprising a tubular conduit means having opposed open ends respectively fluidly interconnected to the closed end of said cup-shaped valve member, one of said open ends always being in alignment with said source port and the other open end being alignable with a selected actuator port, and a plurality of annular sealing members disposed between said closed ends of said body member and said valve member and being respectively disposed about said ports, said sealing members being compressed between said closed ends by the snap fit relation between said body member and said valve member whereby said ports are sealed from each other between said closed ends.

2. A pneumatic selector switch as set forth in claim **1** wherein the open end of said valve member comprises a manual manipulator to be grasped and manually moved relative to said body member for said port selectivity.

3. A pneumatic selector switch as set forth in claim **2** wherein said open end of said valve member that comprises said manual manipulator projects out of said open end of said body member.

4. A pneumatic selector switch as set forth in claim **3** wherein said body member and said valve member respectively have means snap fitting the same together to provide said snap fit relation.

5. A pneumatic selector switch as set forth in claim **4** wherein said means of said body and valve members permits rotational movements between said members.

6. A pneumatic selector switch as set forth in claim **5** wherein said means of said body member comprises an annular groove means therein and wherein said means of said valve member comprises an outwardly directed annular flange snap fittingly received in said groove means.

7. A pneumatic selector switch as set forth in claim **3** wherein said valve member is rotatable in said cup-shaped body member, said body and valve members having detent means for indicating and holding said valve member in a selected position thereof where said valve member in interconnecting said source port to a selected actuator port.

8. A pneumatic selector switch as set forth in claim **7** wherein said detent means comprises a plurality of grooves in said body member corresponding respectively to said actuator ports, and spring biased ball means carried by said valve member alignable with said at least one of said grooves in each selected position of said valve member relative to said body member.

9. A pneumatic selector switch as set forth in claim **8** wherein said spring biased ball means of said valve member comprises an opening passing diametrically through said valve member, a compression spring disposed in said opening of said valve member and having opposed ends, and a ball at each end of said spring being urged outwardly by said spring into engagement with said body member.

10. A pneumatic selector switch as set forth in claim **1** wherein said valve member is rotatable in said body member about an axis of rotation, said source port being coaxial with said axis and its respective open end of said conduit means being coaxial with said axis.

11. A pneumatic selector switch as set forth in claim **10** wherein said actuator ports are radially disposed from said source port.

12. A pneumatic selector switch as set forth in claim **11** wherein said actuator ports define a circle about said source port, said conduit means being substantially U-shaped with the other open end thereof being positioned to transcribe said circle.

13. A pneumatic selector switch as set forth in claim 1 wherein said valve member is rotatable relative to said body member about an axis of rotation, said body member having said source port coaxial with said axis, the open end of said conduit means for said source port also being coaxial with said axis.

14. A pneumatic selector switch as set forth in claim 13 wherein said actuator ports define a circle about said source port, said conduit means being substantially U-shaped with the other open end thereof being positioned to transcribe said circle.

* * * * *