Nov. 23, 1965 R. C. HUPP 3,219,053

SECTIONAL FLUID MANIFOLD ASSEMBLY

Filed Aug. 28, 1961 2 Sheets-Sheet 1

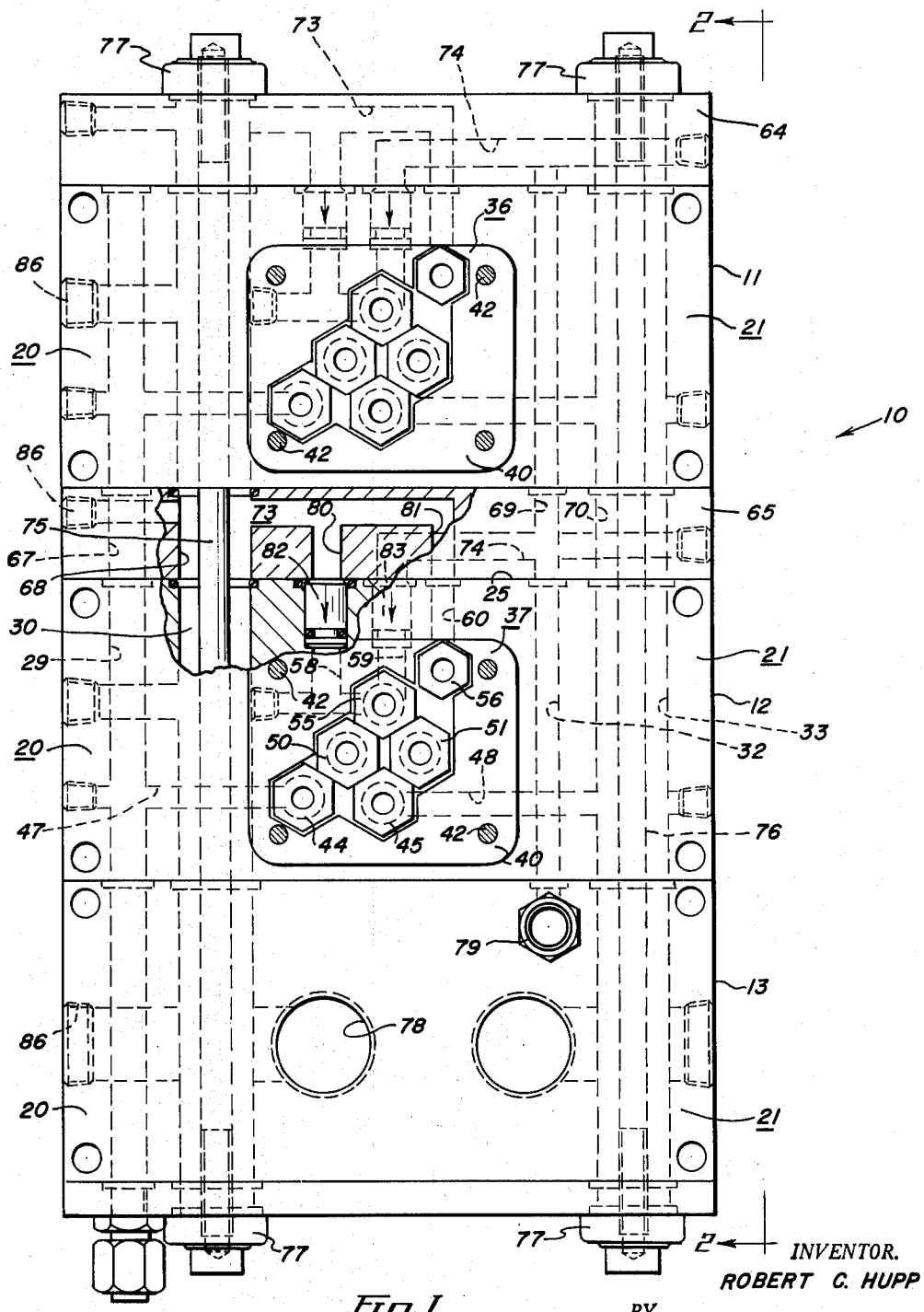


Fig. 1

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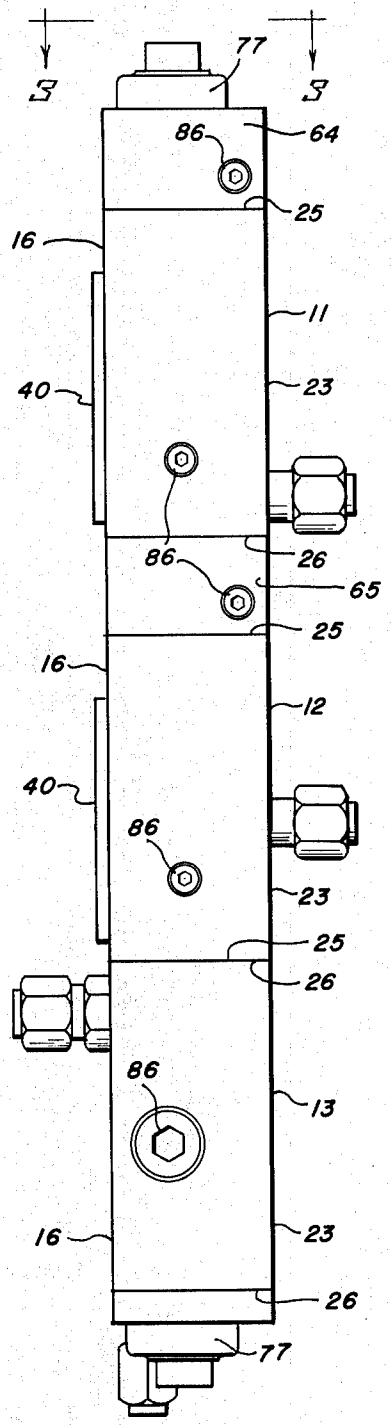


Fig. 2

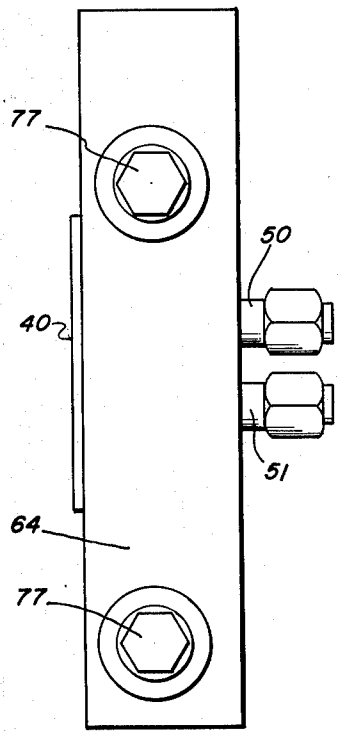


Fig. 3

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3,219,053

SECTIONAL FLUID MANIFOLD ASSEMBLY

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3 Claims. (Cl. 137—269)

The invention relates in general to manifold assemblies which are made up of a plurality of blocks some of which mount fluid control components and at least one of which serves as an economical and convenient means of directing fluid in accordance with the requirements of a particular fluid circuit.

An object of the present invention is to provide a sectional manifold assembly which usually includes two or more mounting blocks but which may comprise only one, with a directional block which serves as the means of directing fluid between two points on the same mounting block or between two points on different mounting blocks.

Another object of the present invention is to provide a sectional manifold assembly which is economical and convenient to design and assemble as well as being capable of being disassembled so as to accommodate possible subsequent fluid circuit changes.

Another object of the present invention is to provide a sectional manifold assembly which includes at least one mounting block and a directional block mounted in edge to edge relationship with matching fluid ports or passages and with their front faces usually lying in the same plane and with a means for holding the blocks together so that they can be conveniently assembled and disassembled if desired.

Another object of the present invention is to provide a manifold assembly construction which can be made economically which by alternate methods would be uneconomical.

Other objects and a fuller understanding of this invention may be had by referring to the following description and claims, taken in conjunction with the accompanying drawings, in which:

FIGURE 1 is an elevational view of a sectional manifold assembly constructed under the teachings of the present invention and comprising three mounting blocks and two directional blocks;

FIGURE 2 is a view taken generally along the line 2—2 of FIGURE 1; and

FIGURE 3 is a view taken generally along the line 3—3 of FIGURE 2.

The sectional manifold assembly of the present invention shown in the accompanying figures comprises, for the sake of illustration, first, second and third mounting blocks **11**, **12** and **13** respectively. It will be appreciated by those skilled in the art, after a detailed discussion of the present application, that the sectional manifold assembly may be made up of any number of mounting blocks within reason, however, for the sake of illustration, only three mounting blocks have been selected. The sectional manifold assembly is indicated generally by the reference numeral **10**. The mounting blocks shown herein are adapted for mounting fluid control components on the front face **16** thereof, however, none of these fluid control components have been illustrated herein. The general construction of the device shown and illustrated herein is shown in applicant's copending United States patent application Serial No. 817,658, filed June 2, 1959, now United States Patent No. 3,025,878. In this application (Serial No. 817,658), valve **16** has generally been shown and the details of the fluid component in the instant embodiment are similar. Each of the mounting blocks **11**, **12** and **13** comprise a generally rectangular metal member constructed in many instances of aluminum, however, it will be readily appreciated that it may be constructed of other material. Each of the mounting

blocks is provided with first and second side portions **20** and **21** respectively and also a rear face **23** and top and bottom edges **25** and **26** respectively. The first side portion **20** of each of the mounting blocks **11**, **12** and **13** are provided with drilled openings **29** and **30** respectively which extend between the top and bottom edges **25**, **26** and when assembled together are in line with each other and serve to make up what may be referred to as drain and low pressure passages respectively.

The second side portion **21** of the mounting blocks **11**, **12** and **13** are similarly provided with drilled openings **32** and **33** which serve respectively as high pressure and return passages. The front face **16** of mounting blocks **11** and **12** are provided with sub-plate mounting assemblies **36** and **37** respectively. Each of these sub-plate assemblies are similar in nature and are patterned after the disclosure made in United States Patent No. 2,826,436, issued March 11, 1958, in the name of Robert C. Hupp et al., and more specifically, is in the nature of the construction shown in FIGURE 5 of this patent. The sub-plate assembles **36** and **37** each include a lock plate **40** which has a plurality of hexagonal openings therein (in this instance six in number). The lock plates are suitably secured to the front faces of the mounting blocks **11** and **12** respectively by friction pins **42**. These two blocks **11** and **12** are identical in nature and only one will be described in detail. The lower two hexagonal openings in the lock plates received hexagonally headed insert members **44** and **45** respectively with insert member **44** being connected to drain **29** by means of drilled conduit **47** and insert member **45** is in fluid communication with the return passage **33** by means of drilled conduit **48**. Immediately above the insert members **44** and **45** are provided hexagonally headed insert members **50** and **51** respectively and these two insert members extend completely through the mounting block as seen in FIGURES 2 and 3 of the drawing with the portion adjacent the front face of the lock plate being in communication with an appropriate hydraulic component, for example the valve **16** which is shown in United States patent application Serial No. 817,658 filed June 2, 1959 (FIGURE 3 thereof), now United States Patent No. 3,025,878. Hexagonally headed insert members **55** and **56** are also provided and drilled conduits **58** and **59** extend from the insert member **55** to the top edge **25** of the mounting block and drilled conduit **60** extends from insert member **56** to the top edge **25** of the mounting block.

At least one of the functions of the directional blocks **64** and **65** which are respectively located at the top and bottom edges of the first mounting block **11**, is to direct fluid between the manifold passages, that is passages **29**, **30**, **32** and **33**, and the insert members on the face of the mounting blocks which are in turn connected to the valve or other fluid component or cylinder ports mounted thereon. In this embodiment the ports and passages in the directional blocks connect only with pressure passages **30** and **32**, however, it will be appreciated that they may connect to passages **29** and **33** or merely extend from one mounting block to another. It will be apparent to one skilled in the art that the directional blocks **64** and **65** serve the function of enabling the sectional manifold assembly to be fabricated at a cost which is economically feasible. The usefulness of the present invention will best be appreciated by observing the relationship of the directional block **64** with the mounting block **11**. Utilizing the same width, height, and depth dimensions, or working within the same envelope dimensions, it would be difficult if not impossible to produce the communicating passageways which have been shown herein by cross drilling a single block having the same size as combined blocks **64** and **11**. By utilizing the separate directional block **64** this can be accomplished. Another advantage

in this particular design is that it is possible to manufacture the mounting blocks **11**, **12** and **13** on more of a standardized basis. The cross drilling variables can be more easily resolved by use of the directional blocks **64** and **65**.

The directional blocks **64** and **65** are quite similar in nature and block **65** is the only one which will be described. Block **65** is provided with four drilled openings which extend from the top to the bottom faces thereof numbered **67**, **68**, **69** and **70** respectively, and these openings are lined up with openings **29**, **30**, **32** and **33** respectively in the blocks **11**, **12** and **13**. A cross drilled opening **73** is provided which is again drilled from the bottom face thereof at **80** and **81** to provide for communication between the low pressure conduit **30** and the opening **58** in the mounting block as well as the opening **60**. These two openings as observed from above, lead respectively to the insert members **55** and **56**. A cross drilled opening **74** leads from the high pressure conduit **32** through conduit **59** to the insert member **55** which in turn is connected to the valve not shown. Directional block **64** is the same but opening **67** has been omitted and opening **69** does not extend completely through the block.

The first, second, and third mounting blocks **11**, **12** and **13**, as well as the directional blocks **64** and **65** respectively may be secured together by suitable means which in this embodiment is by tie rod members. The specific use of tie rods in this particular embodiment illustrates a means which enables the various blocks which make up the assembly to be readily assembled and disassembled in the event a subsequent circuit change occurs. The tie rod means of connection is quite similar to that shown in United States patent application Serial No. 817,658, now United States Patent No. 3,025,878, and includes first and second tie rods **75** and **76** which extend through the low pressure conduit **30** and the return passage **33** respectively. The tie rods are held in position at either end by means of tie rod nuts **77**.

In general, the operational use of the specific manifold assembly which has been shown is to introduce low pressure fluid into conduit **30** by means of port **78** on mounting block **13** and high pressure fluid into conduit **32** by means of fitting **79** also located on mounting block **13**. The fluid enters through the low pressure and high pressure ports **78** and **79** respectively and follows their respective conduits through insert member **55** to the pressure input port of the fluid valves. The valve spool then directs the fluid out cylinder port insert **50** where it serves to actuate a cylinder or other device, at the same time fluid returning from the cylinder enters at cylinder port insert **51**. This fluid in turn being directed by the valve spool out the return conduit **33** by way of insert **45**. It is understood that the shift of the valve spool changes the relative function of the cylinder ports. It will be noted that fluid can enter into the valve from two sources, low pressure and high pressure from conduits **30** and **32** respectively. Check valves **82** and **83** are provided in conduit **58** and **59** to isolate high and low pressure as required.

This particular embodiment of the invention has been utilized to describe only one specific fluid circuit and it will be appreciated that the component which is mounted on the front face of the mounting block may vary as well as the fluid circuitry required in the directional blocks to accommodate these changing situations. As a result, the purpose of the embodiment shown herein is to illustrate the utility of the directional blocks having both the cross drilled holes and holes from the top to the bottom face in order to make a workable sectional manifold assembly. It will be noted from the drawings that the cross drilled openings in both the mounting and directional blocks are plugged by pipe plugs **86** at the edge surfaces. All of these plugs are indicated with the same reference numeral.

Although this invention has been described in its preferred form with a certain degree of particularity, it is understood that the present disclosure of the preferred form has been made only by way of example and that numerous changes in the details of construction and the combination and arrangement of parts may be resorted to without departing from the spirit and the scope of the invention as hereinafter claimed.

What is claimed is:

1. A sectional manifold assembly for mounting fluid control components including in combination at least two mounting blocks, each said mounting block comprising a generally rectangular metal member having first and second side portions, a front face and top and bottom edge surfaces, a first manifold passage extending through said first side portion of each said metal member, a second manifold passage extending through said second side portion of each said metal member, means on said front face of each said metal member for mounting fluid control components, passageway means in each said metal member for connecting fluid control components to said top edge surface of each said metal member, a directional block having first and second side portions, a front face and top and bottom edge surfaces, a first manifold passage extending through said first side portion of said directional block from said top to said bottom surface thereof, a second manifold passage extending through said second side portion of said directional block from said top to said bottom surface thereof, drilled openings extending from said bottom edge surface of said directional block and also laterally to said first manifold passage therein and said second manifold passage therein, said directional block having only passages and openings therein, said bottom edge surface of one of said mounting blocks being in engagement with said top edge surface of said directional block and said bottom edge surface of said directional block being in engagement with said top edge surface of the other of said mounting blocks with said first manifold passages and said second manifold passages in said blocks being in register with each other, said front faces of said blocks all lying substantially in the same plane, said passageway means being in communication with said drilled openings in said directional block to connect fluid control components with said first and second manifold passages, and means acting on said blocks for holding said blocks together.

2. A sectional manifold assembly for mounting fluid control components including in combination at least two mounting blocks, each said mounting block comprising a metal member having first and second side portions, a front face and top and bottom edge surfaces, a first passage extending through said first side portion of each said metal member, a second passage extending through said second side portion of each said metal member, means on said front face of each said metal member for mounting fluid components, passageway means in each said metal member for connecting fluid components to said top edge surface of each said metal member, a directional block having first and second side portions, and top and bottom edge surfaces, a first passage extending through said first side portion of said directional block from said top to said bottom surface thereof, a second passage extending through said second side portion of said directional block from said top to said bottom surface thereof, wall means defining openings extending from said bottom surface of said directional block and also laterally to said first passage and said second passage therein, said directional block having only passages and openings therein, said bottom edge surface of one of said mounting blocks being in engagement with said top edge surface of said directional block and said bottom edge surface of said directional block being in engagement with said top edge surface of the other of said mounting blocks with said first passages and said second passages

in said blocks being in register with each other, said passageway means being in communication with said wall means which define said openings in said directional block, and means acting on said blocks for holding said blocks together.

3. A sectional manifold assembly for mounting fluid control components including a mounting block, said mounting block comprising a metal member having first and second side portions, a front face and top and bottom edge surfaces, a first passage extending through said first side portion of said metal member, a second passage extending through said second side portion of said metal member, means on said front face of said metal member for mounting fluid components, passageway means in said metal member for connecting fluid components to said top edge surface of said metal member, a directional block having first and second side portions and top and bottom edge surfaces, a first passage extending through said first side portion of said directional block from said top to said bottom surface thereof, a second passage extending through said second side portion of said directional block from said top to said bottom surface thereof, wall means defining openings extending from said bottom surface of said directional block and also laterally to said first passage and said second passage

therein, said directional block having only passages and openings therein, said bottom edge surface of said directional block being in engagement with said top edge surface of said mounting block with said first passages and said second passages in said blocks being in register with each other, said passageway means being in communication with said wall means acting on said blocks which define said openings in said directional block, and means for holding said blocks together.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

November 23, 1965

Patent No. 3,219,053

Robert C. Hupp

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 2, line 21, for "assembles" read -- assemblies --; column 6, line 7, strike out "acting on said blocks" and insert the same after "means" in line 9, same column 6.

Signed and sealed this 2nd day of August 1966.

(SEAL)

Attest:

ERNEST W. SWIDER

Attesting Officer

EDWARD J. BRENNER

Commissioner of Patents