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[54] **VALVE CONTROLLED FLUID PROGRAMMER**
10 Claims, 10 Drawing Figs.

[52] U.S. Cl. 137/608,
 137/612.1
 [51] Int. Cl. F16d 1/00
 [50] Field of Search 137/608,
 612.1

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ABSTRACT: A fluid programmer utilizing a plurality of manually actuated valves for programming fluid-controlled machines to enable the function, sequence or timing thereof to be accurately and rapidly varied, by altering or adjusting the fluid circuits thereto emanating from a plurality of fluid supply sources which feed into the programmer, and which are selectively directed from the programmer through desired outlet circuits for the fluid to the machine being controlled.

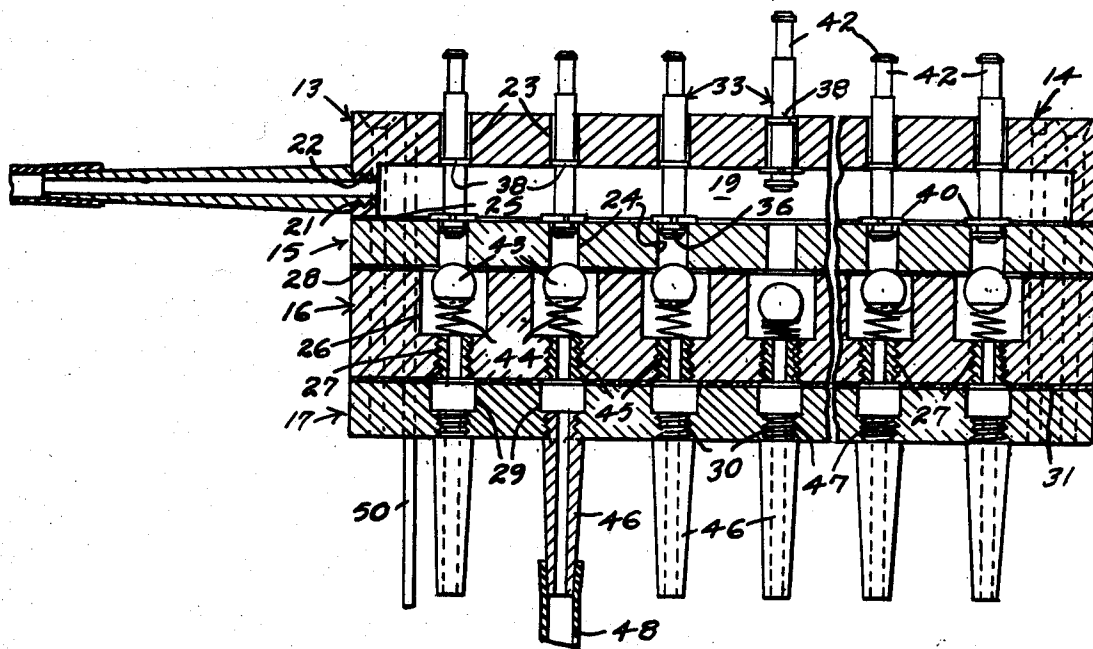


FIG. 1.

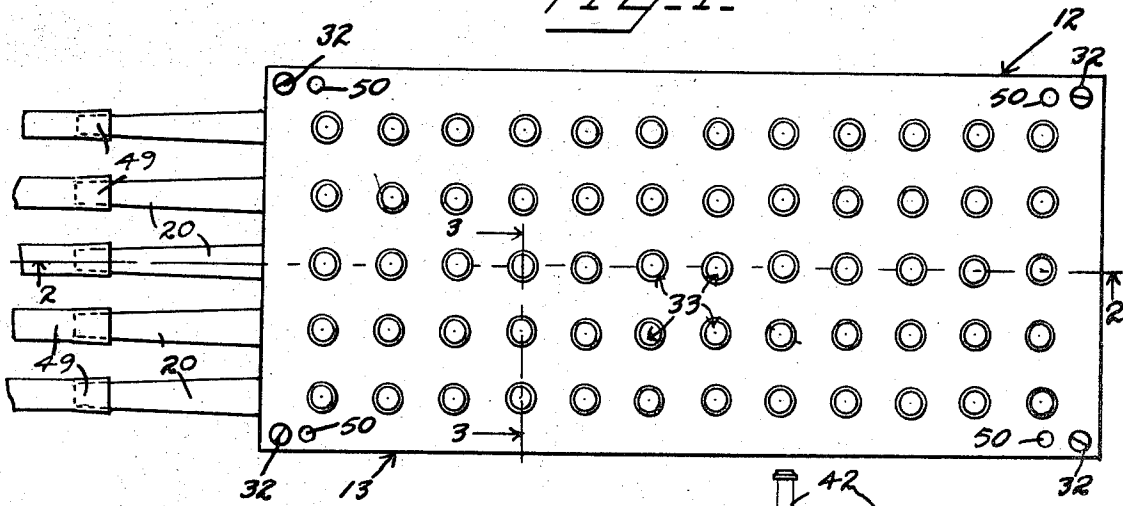
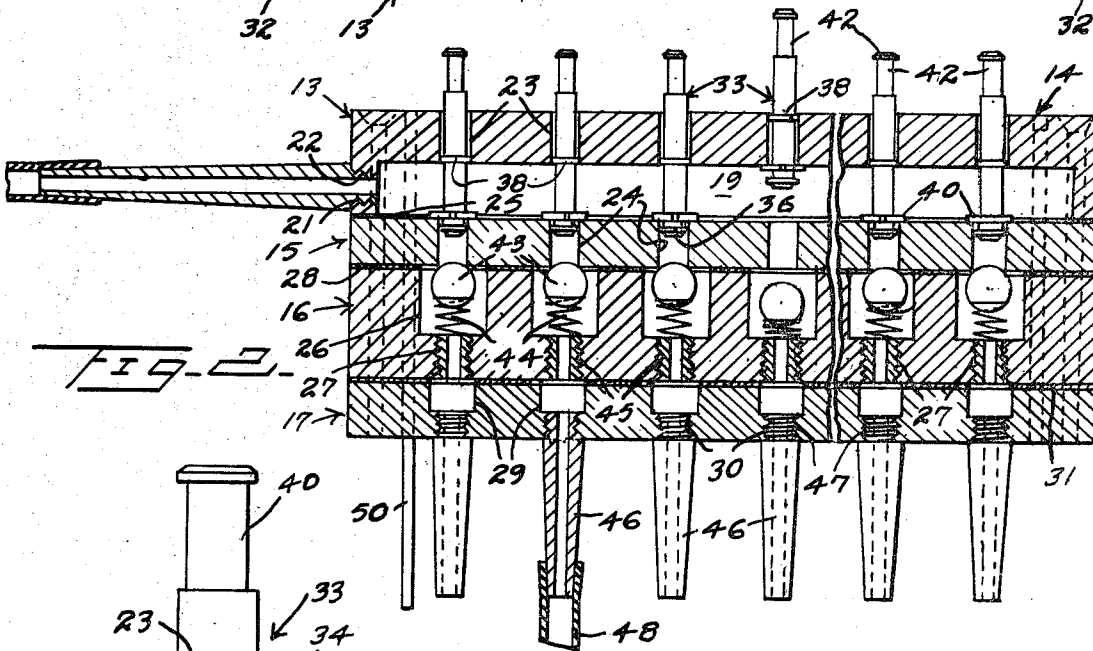
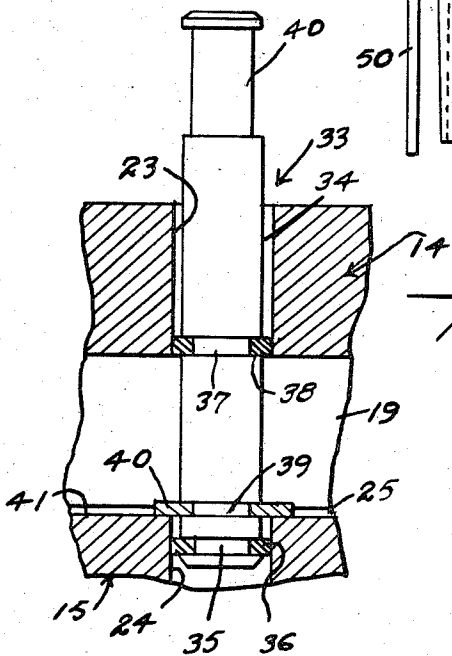


FIG. 3.



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FIG. 3

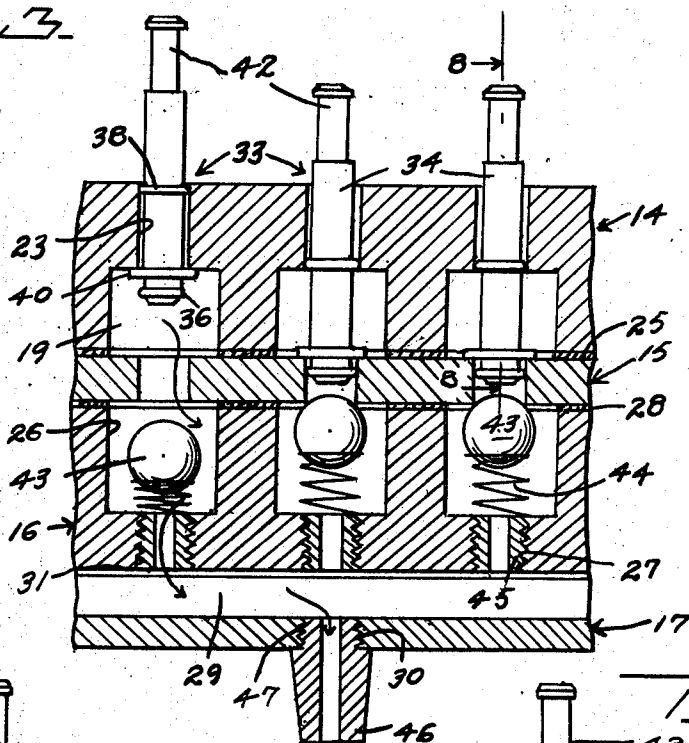
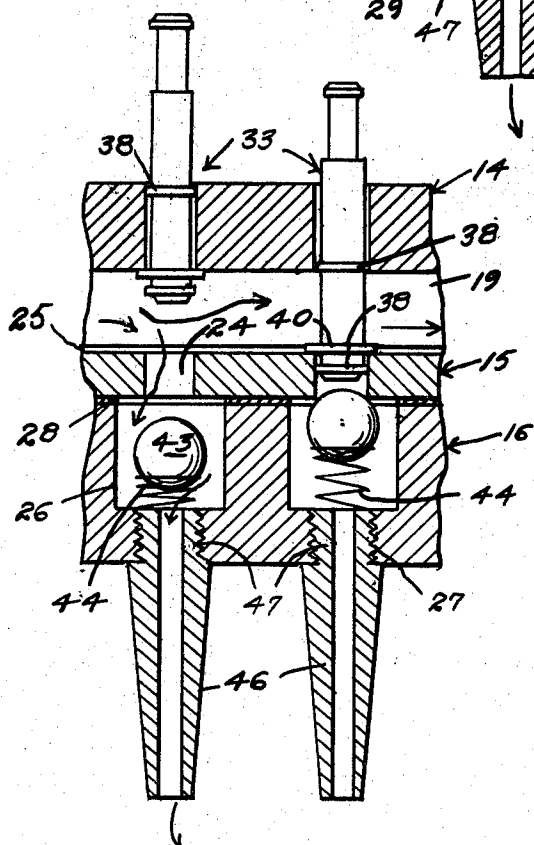
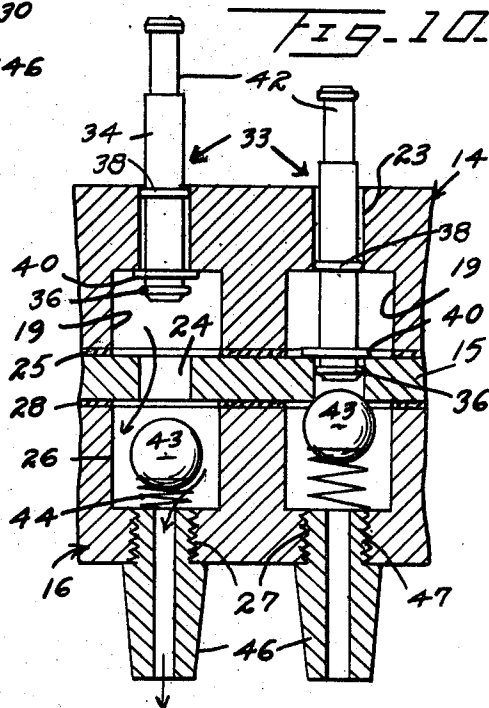


FIG. 9

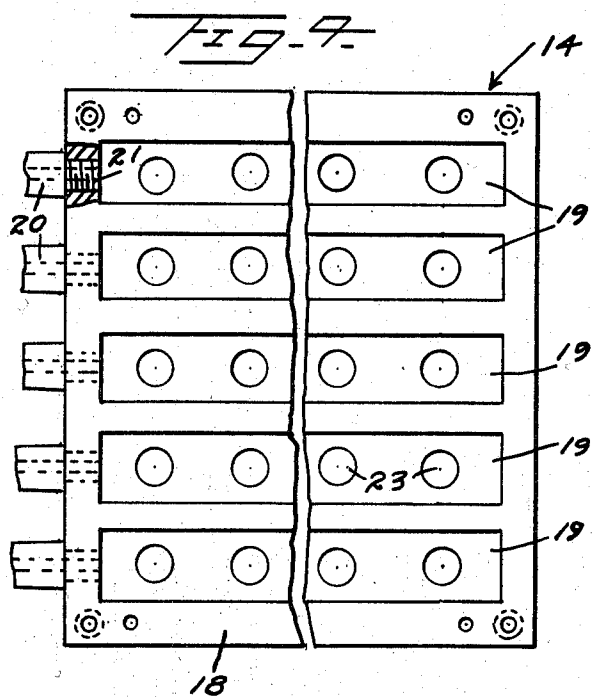
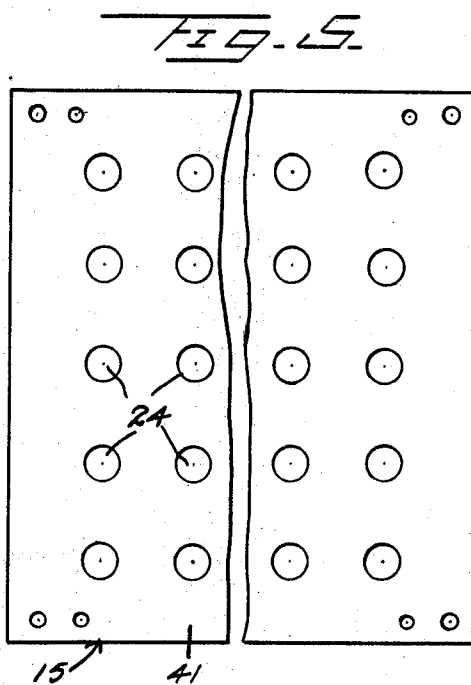
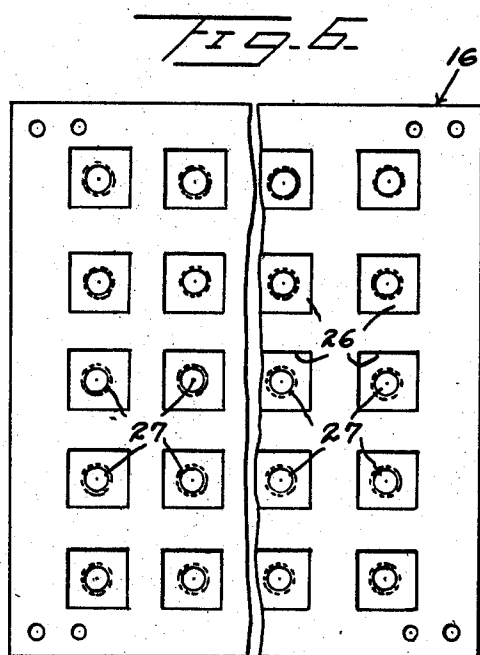
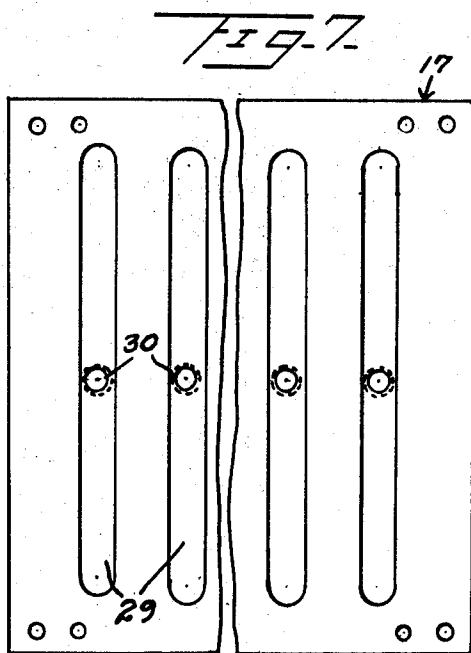


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VALVE CONTROLLED FLUID PROGRAMMER**BACKGROUND OF THE INVENTION**

This invention relates to the art of programming fluid-controlled machines.

The prior art discloses programmers or selectors employing slidably mounted valve members having ports movable into and out of registration with one another for creating selected passages between a common supply chamber containing the fluid under pressure and a plurality of outlet ports.

SUMMARY

A primary object of the present invention is to provide a programmer of extremely simple construction for receiving fluid from a number of inlets and for selectively supplying the fluid from each inlet to any one of a plurality of outlets each connected to a machine to be controlled, so that any one of a number of patterns of fluid circuits can be created between the fluid supply sources and the machine.

Another object of the invention is to provide a device of extremely simple construction employing a number of manually actuated valves for selectively opening and closing the outlets thereof and wherein the pattern of the fluid circuit or circuits can be visually read by observing the positions of the different valves.

A further object of the invention is to provide a programmer having means to prevent back feed from any of the outlets thereof and which could otherwise change the pattern to which the programmer was set.

Various other objects and advantages of the invention will hereinafter become more fully apparent from the following description of the drawings, illustrating presently preferred embodiments thereof and wherein:

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a top plan view, partly broken away, of a preferred embodiment of the fluid programmer;

FIG. 2 is an enlarged fragmentary longitudinal sectional view thereof, taken substantially along a plane as indicated by the line 2-2 of FIG. 1;

FIG. 3 is an enlarged fragmentary cross-sectional view, taken substantially along a plane as indicated by the line 3-3 of FIG. 1;

FIG. 4 is an enlarged fragmentary bottom plan view of a top member of the programmer housing;

FIG. 5 is an enlarged fragmentary plan view of a second member of said housing;

FIG. 6 is an enlarged fragmentary top plan view of a third member of the housing;

FIG. 7 is an enlarged fragmentary top plan view of a fourth or bottom member of the housing;

FIG. 8 is a detailed vertical sectional view, partly in elevation, taken substantially along the line 8-8 of FIG. 3;

FIG. 9 is an enlarged fragmentary longitudinal sectional view illustrating a slight modification of the programmer; and

FIG. 10 is an enlarged fragmentary cross-sectional view of said modified form.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring more specifically to the drawing, and first with reference to FIGS. 1 to 8, the programmer in its entirety is designated generally 12 and includes an elongated laminated housing designated generally 13 composed generally of a top member 14, a second member 15, which is disposed immediately beneath the top member 14, a third member 16 which is disposed beneath the member 15, and a bottom member 17. Each of said members 14, 15, 16 and 17 extend from end-to-end and from side-to-side of the housing 13.

The under side 18 of the top member 14 is recessed to provide spaced apart, substantially parallel longitudinally extending passageways 19, each of which extends to adjacent the ends of said member 14. Inlet nipples 20 have restricted

threaded ends 21 which engage threaded openings 22 in one end of the member 14, so that a nipple 20 communicates with each passageway 19, as seen in FIGS. 2 and 4. The member 14 has a plurality of bores 23 which open upwardly through its top surface and downwardly into the passageways 19, so that a row of bores 23 communicates with each passageway 19.

The member 15 constitutes a flat plate having bores 24 extending from top to bottom therethrough and which are disposed in alignment with the bores 23. A sealing gasket 25 is interposed between the members 14 and 15 and around the passageways 19 for sealing off said passageways from one another. The member 16, which is substantially thicker than the member 15, is recessed to provide upwardly opening sockets 26 which are disposed to align and communicate with the bores 24 but which are substantially larger than said bores. The member 16 has threaded bores 27 which open upwardly into the sockets 26 and outwardly through the bottom surface of said member. A sealing gasket 28 is interposed between the members 15 and 16 and around the sockets 26 for sealing off the upper ends of the sockets 26 from one another and the lower ends of the bores 24 from one another.

The bottom member 17 has channels or grooves 29 formed in its top surface and which provide passages which are disposed crosswise of said member 17 and of the housing 13. Each groove 29 communicates with a transverse row of sockets 26 through the bores 27 thereof which open into said groove 29, as seen in FIG. 3. Each groove 29 communicates with a threaded bore 30 of the member 17 which opens upwardly into said groove and outwardly through the underside of said member. A sealing gasket 31 is interposed between the underside of the member 16 and the upperside of the member 17 and around the passages 29 for sealing off said passages from one another. The members forming the housing 13 are secured together by screw fastenings 32 which extend through the corners thereof and which compress the gaskets 25, 28 and 31 between said members.

A valve 33 is associated with each bore 23. As best seen in FIG. 8, each valve 33 includes an elongated stem 34 which extends through the bore 23 thereof and which has an annular groove 35 near its lower end to receive an annular sealing ring 36, and a second annular groove 37, which is disposed above and spaced from the groove 35, to receive a second annular sealing ring 38. The valve stem 34 has a third annular groove 39 disposed between the grooves 35 and 37 and nearer the groove 35, to receive a flat split ring 40. When the valve 33 is in a closed position, as seen in FIG. 8, the ring 40 abuts the top surface 41 of the plate 15 around the bore 24 thereof, which is in alignment with said valve, and the lower sealing ring 36 is disposed in and seals said bore, and the upper sealing ring 38 is disposed in the lower portion of the bore 23 for sealing the bore 23. When the valve 33 is in an open position, as seen in FIG. 3, the ring 40 abuts the top wall of the passageway 19 around the bore 23 in which said valve is mounted, the sealing ring 38 engages the upper part of said bore 23 for sealing the bore, and the sealing ring 36 is disposed above the bore 24, with which the valve aligns, so that said bore 24 forms a communicating passageway between the passage 19 and the socket 26 which registers with said bore 24. It will also be noted that the passageways 19 are of a width substantially greater than the diameter of the valves 33 so that said valves, when in a closed position, will not obstruct fluid flow through the passageways. The upper portions 42 of the valve stems 34 form handles by which the valves can be grasped and moved between their open and closed positions.

A ball valve 43 is disposed in each socket 26 and is supported by a weak compression spring 44 in the upper end of which a part of the ball seats. The springs 44 are contained in the sockets 26 beneath the balls 43 and have their lower ends resting on and supported by externally threaded tubes 45 which are detachably mounted in the threaded bores 27.

An outlet nipple 46 has a restricted threaded upper end 47 which engages the bore 30 so that a nipple 46 is provided for each channel 29. A flexible conduit or hose 48 leads from

each nipple 46 to a machine, not shown, to be controlled by the programmer 12. A flexible conduit or hose 49 connects with each nipple 20 and said hoses 49 lead from any suitable source of fluid supply. Posts or supports 50 may extend through the housing 13, adjacent its corners, and may be secured to any suitable supporting member, not shown, for supporting the programmer 12 so as to afford adequate clearance for the conduits 48.

From the foregoing, it will be readily apparent that fluid may be supplied to all or selected ones of the passageways 19 through the conduits 49 and fittings 20 for pressurizing said passages. Selected ones of the valves 33 of one or more of the passageways 19 may be lifted upwardly to open positions. The fluid under pressure will then pass from the passageways 19 through the open bores 24 to unseat the ball valves 43 which are disposed therebeneath, as seen in FIGS. 2 and 3, so that the fluid can flow around the open balls and escape from the sockets 26 thereof through the tubes 45, into the channels 29 with which said tubes communicate. The associated bores 24, sockets 26, and tubes 45 thus form passages for supplying fluids to the channels 29 or to selected ones of said channels, which fluids will escape through the outlet nozzles 46 and conduits 48 thereof to the machine being controlled.

The housing 13 is shown provided with five longitudinal rows of valves 33, each row containing twelve valves making a total of sixty valves. Each longitudinal row of twelve valves controls the passage of fluid from one passageway 19 to the twelve channels 29, and each transverse row of five valves 33 controls the passage of fluid from the five passageways 19 to a single channel 29, so that a multiplicity of different patterns or combinations may be programmed by the device 12 to the machine being controlled.

The springs 44 are only of sufficient strength to support the ball valves 43 in closed positions seated against the lower ends of the bores 24. Said ball valves and springs are provided to prevent back feed into a passageway 19, which is not pressurized, due to a back pressure in one of the channels 29, and which would result in the fluid possibly escaping from the passageway 19 through the port 24 of another open valve of said passageway to incorrectly alter the programming of the machine.

FIGS. 9 and 10 illustrate a slight modification whereby a greater selectivity of the programming is accomplished by omitting the bottom member 17 and the gasket 31, and by removing the tubes 45 and engaging the threaded end 47 of an outlet nipple 46 in each of the threaded bores 30, so that a total of sixty outlets 46 and conduits 48 is provided, one for each valve 42 to provide a much greater selectivity in the program arrangements.

Various modifications and changes are contemplated and may be resorted to without departing from the function or scope of the invention.

I claim:

1. A fluid programmer comprising a housing having a plurality of passageways, means sealing off said passageways from one another, a fluid pressure supply means for each

passageway, a plurality of passages contained in said housing having inlet ends communicating with each of said passageways and constituting the only outlets thereof, outlet conduits leading from the housing and communicating with said passages, and manually actuated valves mounted in the housing and movable to selectively open and close the inlet ends of said passages.

2. A fluid programmer as in claim 1, each of said passages including an enlarged portion containing a normally closed check valve which is opened by the pressure in the inlet end of said passage when the manually actuated valve thereof is in an open position and which closes to prevent a back feed through said passage.

3. A fluid programmer as in claim 1, said housing having a plurality of channels disposed crosswise of said passageways each of which communicates with and forms a part of a plurality of said passages and to each of which one of said outlet conduits is connected.

4. A fluid programmer as in claim 3, said housing being of laminated construction including a top member provided with said passageways and in which said valves are slidably mounted, a bottom member provided with said channels, and at least one intermediate member provided with said passages connecting the passageways and channels.

5. A fluid programmer as in claim 1, each of said passages having a separate outlet conduit leading from an outlet end thereof.

6. A fluid programmer as in claim 1, said housing being elongated, said passageways being disposed longitudinally of the housing, and a longitudinal row of said valves extending into each passageway for controlling the passages leading therefrom.

7. A fluid programmer as in claim 6, said housing including a plurality of transverse channels each communicating with the passages of a transverse row of said passages and each controlled by one of said valves of each of the passageways, and one of said outlet conduits communicating with and leading from each of said transverse channels whereby fluid may be selectively supplied through the programmer to each of said outlet conduits from each of said passageways.

8. A fluid programmer as in claim 7, said fluid supply means discharging into corresponding ends of the passageways and said outlet conduits leading from the bottom of the housing.

9. A fluid programmer as in claim 1, said housing having bores opening outwardly of its upper surface and downwardly into said passageways, each of said valves having a stem extending through one of said bores and provided, adjacent its lower end, with a sealing ring for sealing the inlet end of one of said passages in a closed position of the valve said valve stem having a second annular sealing ring engaging said bore in either the lowered, closed position, or the raised, open position of the valve for sealing said bore in both said positions.

10. A fluid programmer as in claim 9, and a stop member carried by said valve stem between said seals for engaging portions of the housing to limit movement of the valve toward either an open or closed position.