This invention pertains to the art of connectors for fluid lines, or for electrical lines, or for both. The invention is embodied in a connector for terminal ends of conduits or tubes to connect a fluid line. The invention is also embodied in a connector for electrical terminals to close one or more electric circuits by means of the device. The invention is a multiple connector for one or more tubes and one or more wires, enabling the tubes of the several fluid lines and the wires of the several electrical lines to be rapidly, easily and securely connected and disconnected.

In the operation of aircraft, and particularly in the operation of military aircraft, wherein the members of the crew are commonly positioned at various parts of the craft, it is desirable that the operating personnel be in telephone communication with each other so as to give and receive orders, and they should also be in radio communication with other planes, ships or land stations. For high altitude flying they may also require oxygen, "G" suit anti-blackout air pressure and electric heating of composite flight clothing. In an emergency, such as a bailout, there could be dangerous delay in disconnecting the lines of these various services. A connector embodying the present invention enables the lines of all these services to be instantly and simultaneously connected or disconnected by means of a simple operation. By disengagement of a simple attachment all connections are automatically, leaving the wearer free to set away.

For example, the disclosed embodiment comprises a connector with two tubular connections for as many fluid lines, and six electrical contacts. Obviously, the number, size and arrangement of these connections can be varied without departing from the principles of the invention. Essentially the present device consists of a pair of blocks held together by suitable spring clips and kept in alignment by suitable locating members. A conduit for each fluid or electrical line is embodied in each block, and when the blocks are attached together means of the clips, the locating members position the conduit in the several blocks to complete or close each line.

The principles and operation of the invention will be clearly understood from the accompanying drawing, to which attention is now directed.

In the drawing:
Fig. 1 is a perspective of one block, parts being cut away for clearness of illustration.
Fig. 2 is a perspective of the companion block, positioned adjacent the block of Fig. 1.
Fig. 3 is perspective of the block in Fig. 2, viewed from the other side thereof.
Fig. 4 is a perspective of fluid and electrical line connections that are connected with the device of the invention, and are adapted to be used therewith.

The embodiment of the invention disclosed in the drawing comprises the block 1, Fig. 1, and the companion block 6, Fig. 2. The block 1 comprises the open face 3 adapted to be positioned opposite the open face 35 of block 6, and in surface to surface contacting engagement therewith. The open face 35 embodies a male terminal 4 of each of the fluid lines 41 that is connected by the device, each male fluid terminal 4 of block 1 being companion to a female fluid terminal 5 in the open face 30 of block 6. The open face 35 of block 1 also embodies a male terminal 9 of each electrical lead that is connected by the device, each male electrical terminal 9 of block 1 being companion to a female electrical terminal 32 in the open face 30 of block 6. All the terminals in block 6, either fluid or electrical, are of the female variety, and for this reason block 6 is herein characterized the female block. Each terminal, either fluid or electrical, in block 1 is companion to a corresponding terminal in block 6, and all terminal in block 1 are of the male variety. For this reason block 1 is herein characterized the male block.

To comprise a connection of any fluid line, the device of the invention comprises a conduit 3 that extends through the block 6 towards the open face 35 thereof, where it comprises the female terminal 5. A counterbore or recess 19 is sunk into the open face 35 to meet the end of each conduit 3, and the conduit 3 is securely fastened in the block 6 in any suitable manner with its end at the base of the recess 19. The gasket 5 is seated in the recess 19 to be embedded in the face 35, and to provide a terminal ring with an open face that lies beneath the open face 30 of block 6. Recess 19 constitutes a locating member for the male terminal 9 to guide it into engagement with the open face of the gasket 5, the gasket being constructed of suitable resilient material such as rubber to provide a yielding seat for fluid-tight juncture with the male terminal 9.

Each fluid line comprises a conduit 2 fastened to the block 1 in any suitable manner, and extending therethrough towards the open face 35 thereof. A resilient bellows 3 is attached at its one end to the conduit 2, by welding, soldering, brazing or other suitable means, to form a continuation of the fluid passage of the conduit 2. The male terminal 9, constituting a ferrule, is attached to the other end of the bellows 3 in a similar manner, and provides a projecting terminal rim of the fluid line terminal of block 1.

Bellows 3 is a Syphon or other suitable metallic bellows with the desired degree of resiliency. A recess or counterbore 35 is sunk into the open face 35 of the block 1, and provides the bottom shoulder 27 against which the bellows 3 is seated, there being a recess 23 for each fluid line.
served by the device. With the bellows housed in the recess 23, the terminus 4 projects above the surface 35 by an amount suitable for the bellows to be compressed and to resistively hold the surface 35 in position to be guided by the recess 19 into seating engagement with the exposed surface of the female terminus 5. The male terminus 6 projects above the surface 35 by an amount suitable for the bellows to be compressed and to resistively hold the surface 35 in position to be guided by the recess 19 into seating engagement with the yielding material of the gasket 5.

The open surfaces 33 and 36 of the respective blocks 1 and 6 are flat and that enables them to be positioned in surface to surface contacting engagement. Locating members are provided to guide the male and female fluid termini 4 and 6 towards each other, and also to guide the male and female electrical termini 9 and 32 in a similar manner towards each other. The locating members comprise the dowel pins 16 projecting out of the open faces 36 and the companion sockets 17 in the face 25, the dowel pins 16 being long enough to locate the male termini 4 and 9 for direct line approach to the female termini 5 and 32 without becoming fowled against the surface 36.

Suitable clamps are provided to attach the blocks 1 and 6 together, and these, in the disclosed embodiment, comprise the spring clamps 7 of the block 6 that engage the companion recesses 16 of the block 1. Each clamp 7 is attached to the block 6 in a recess 23 thereof, to pivot on a pin 21, and the clamp 7 projects out of its recess to include a terminal latch 20 at its end that fits the recess 16. A finger grip or handle 33 is provided at the end of each clamp 7 to enable quick and easy manual release thereof.

The invention can also be employed as a connector for electrical lines, and the disclosed embodiment is adapted to connect both types of lines, fluid and electrical. In the construction shown there are six electrical leads, and these serve three-two-lead circuits 62. Under preferred practice, and as shown, the female electrical termini 32 are embodied in the female block 6 together with the female fluid terminus 5, and the respective companion male terminal are accordingly embodied in the male block 1.

Each female electrical terminal comprises a fixed terminal 22, Fig. 3, that projects through the block 6 towards the open face 36 thereof. For each such terminal 22, a recess 23 in the open face 36 to provide a shoulder against which the head of the terminal 22 is seated, the latter comprising an open faced terminal contact 32 that lies embedded in the recess 16, and sunken below the open face 36 of the block 6. A nut 11 is provided for each terminal 22 to hold it firmly in the block 6, the structure serving to provide a binding post for any suitable electrical lead.

Each male terminal comprises a terminal pin 9 that projects out of the open face 35 of the block 1, and is located to register with its companion recess 16 in the open face 36 of block 6 that houses its companion terminal contact 32 when the blocks are attached to each other by means of the spring clamps 7. Each terminal pin 9 is positioned in a cavity 28 in the face 35 of block 1. The cavity 28 is counterbored from the opposite side of the block 1 to provide a shoulder against which the head 29 of the pin 9 is adapted to seat. A compression spring 12 is housed in each cavity 28 in backing relationship with the pin 9 therein. The pin 9 is thus pressed into electrical contacting engagement with its companion contact terminal 32 of the block 6 by means 41 in position to be guided by the recess 19 in position to be guided by the recess 19 into seating engagement with a two-terminal plug 4, Fig. 4, contact being made through the terminal contacts 14 thereof. The socket structure employed for connecting the plugs 14 in block 1 serves also to confine the springs 12 in the cavities 28.

An inlet 13 is embodied in the block 1 for each terminal 9, the inserts 13 being screw-threaded into the block 1. Each insert 13 is perforated as shown to provide a sleeve for its companion terminal 14 of its plug 40. An abutment disc 30 is positioned in each cavity 28 to provide a press seat in backing engagement with the spring 12. The spring 12 is thus positioned between the seat 30 and head 29 of terminal 9. The spring 12 thus operates to project the terminus 9 above the surface 35, and into resilient engagement with its terminal contact 32, and also to press the spring seat 28 and its terminals 14 into electrical contacting engagement with the end of its companion terminal 14 of its plug 30. The spring 12 serves as an electrical conductor between the terminus 9 and terminal 14, through the disc 30.

The blocks 1 and 6 are preferably constructed of suitable dielectric material, molded plastic having been used and found suitable for the purpose.

The device illustrated in the drawing is adapted, for example, to provide a fluid connection for a crew member of a military airplane to his "G" black out suit, and another fluid connection to his oxygen mask. The device also serves for him to connect various electrical lines that serve his personal equipment.

Pursuant to this purpose, the preferred practice is to attach the block 6 to a bulkhead, panel or other suitable fixed portion of the airplane, the several fluid lines being connected each through a conduit 8. Electrical lines are connected by their leads being attached to the several binding posts provided by the terminals 22 as illustrated in Fig. 3.

Each fluid line is connected to the block 1 by a suitable hose line 41, Fig. 4, that emanates from the crew member's garment, the connection being made to the conduit 2 by means of the coupling 15, for example. The connection of any electrical line that emanates from the crew member's person is preferably made by means of a plug such as 40, the corresponding set of inserts 13 in block 1 constituting a jack.

In operation supply tubes 8 carrying block 6 would be mounted on a convenient wall or panel in an airplane. Block 1 is mated with block 6 so that ferrules 4 are received by recesses 10, alignment dowels 18 are received by holes 17, and plug contacts 9 are received by sockets 10. Ferrule 7 affects an assembled unit of blocks 1 and 6 when engaged with notches 16. The final clamping effects a compression of Syphons 25 and a resulting reacting pressure is exerted on ferrules 4 in its engagement with the gaskets in recesses 19 resulting in a tight juncture therewith and a potential disengaging force when needed. Spring loaded plug contacts 9 are likewise held in tight contacting engagement with contact terminal heads 32.
by springs 12 and result in a potential disengaging force when needed. The pilot couples his "G" anti-blackout suit and oxygen mask to tubes 2 through means of couplings 15. His communication head pieces are connected with the plug-in terminal sockets 13 through means of plugs 45. In an emergency such as calling for a bailout, the pilot need only to jerk on his hose connections 41 thereby disengaging the latches 38 of spring clips 7 from notches 16, and blocks 1 and 6 are quickly disconnected and fall apart, leaving the wearer free to get away. The spring loaded contacts 8 and compressively stressed sylphons 25 aid in forcibly ejecting block 1 from block 6 upon the release of the clamps 7 without further effort on the part of the pilot.

While a particular embodiment of this invention has been illustrated and described herein, it is not intended that this invention be limited to such disclosure, and changes and modifications may be made within the scope of the claims. This latitude applies particularly to the spring clamp 7 only one type of which is shown, whereas there is a wide variety of suitable clamps, latches and attachment clips available.

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

What is claimed is:

1. A connector for a fluid line conduit comprising a pair of companion blocks relatively positionable with open faces opposite each other, each block comprising a terminal of the conduit, the terminal in one block comprising a terminal ring with an exposed face sunken into the open face of the block, the other block comprising a cavity disposed in its open face, a resilient bellows comprising the conduit terminus of the cavity containing block, the bellows being embedded in the cavity thereof and comprising a terminal rim companion to the ring, clamps operable to attach the blocks to each other with their open faces in opposed relationship, and locating members operating between the open faces of the blocks to position the rim in alignment with the ring when the blocks are relatively moved to approach each other.

2. A connector for a fluid line conduit comprising a pair of companion blocks relatively positionable with open faces opposite each other, each block comprising a terminal of the conduit, the terminal in one block comprising a terminal ring with an exposed face sunken into the open surface of the block, the other block comprising a cavity sunken into the open face of the block, a resilient bellows comprising the conduit terminus of the cavity containing block, the bellows being embedded in the cavity and comprising a terminal rim companion to the ring projecting above the open face of the block, clamps operable to attach the blocks to each other with their open faces in surface to surface contacting engagement, and locating members operating between the open faces of the blocks to position the rim in alignment with the ring when the blocks are relatively moved to approach each other.

3. In a connector as defined in claim 4, locating members operating between the open faces of the blocks to position the terminal contact of each movable terminal in alignment with the terminal contact of its companion fixed terminal, and the rim of each bellows into alignment with its companion ring when the blocks are moved relatively to approach each other.

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