June 26, 1945. C. J. FREY 2,379,226

MASTER CONNECTING PLATES FOR ENGINE INSTALLATION

Filed Dec. 17, 1942

Fig. 1.

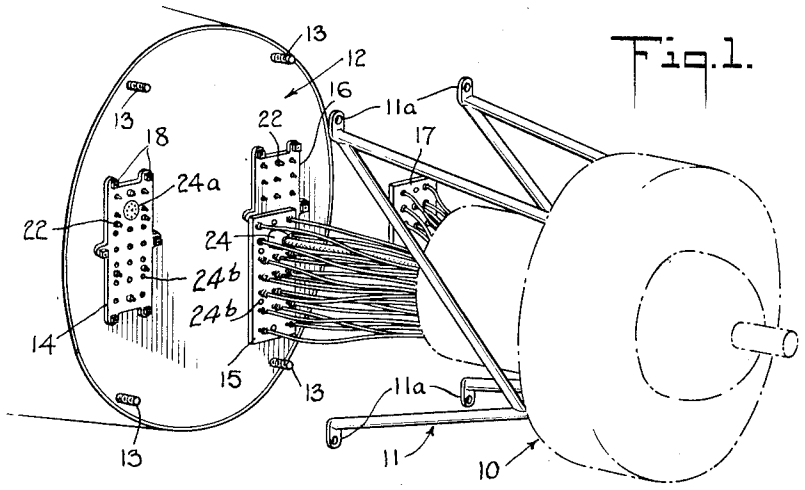


Fig. 2.

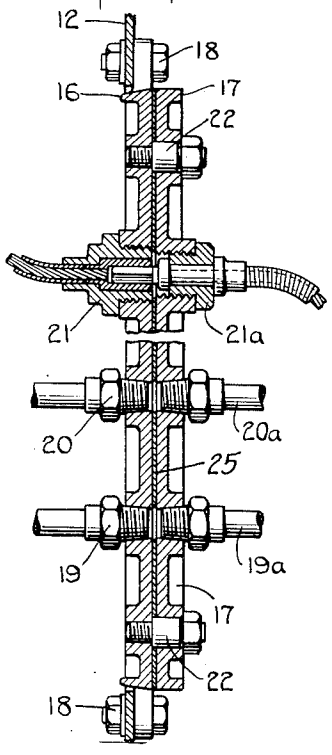


Fig. 3.

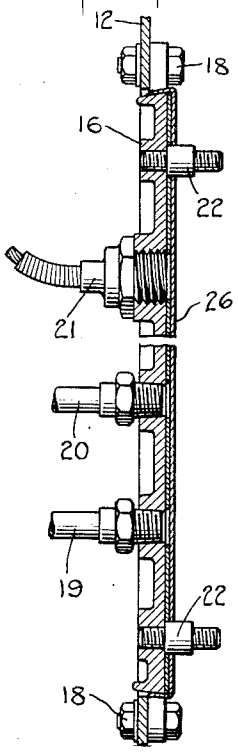
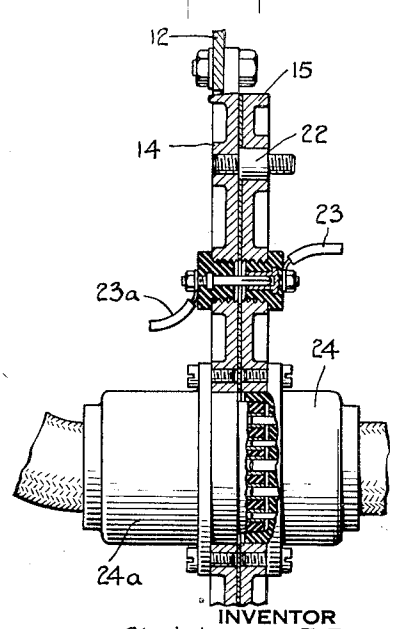


Fig. 4.



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MASTER CONNECTING PLATES FOR ENGINE INSTALLATION

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2 Claims. (Cl. 173—328)

My present invention relates to master connecting plates for engine and like installations.

More particularly, the instant invention is directed to master connecting plates for airplane engines. Under present practice, the starting, operation and control of the engine installation of a modern bomber, or air transport or other types of airplanes presently employed in warfare as well as peacetime operations, require a very large number of electrical wires, electrical cables, multiple fuel, oil and other lubricating pipes or lines, pipes housing flexible control wiring or like control elements, cooling and other liquids, fluids, etc.

Under present day practice, even at the height of our war effort at the stage of installing an engine in such airplane, the operation of connecting the terminals of such maze of electrical, control and like wiring and pipes for oil, fuel and control elements, etc., running from the engine or engines with the corresponding terminals of the respective electrical, control and like wiring, and the respective pipes for oil, fuel and control elements, etc., requires expert mechanics in order to assure proper mating of the concerned terminals. For modern bomber and air transport installations, a minimum time period required for two expert mechanics per each assembly averages four hours. Similar expertness and corresponding delay is experienced in the operation of disassembling a damaged or defective engine and in assembling a substitute engine.

Pursuant to my present invention, the fuel, oil, control pipes and like lines and the electrical and other wiring running from the engine or group of engines of any engine installation of an airplane are permanently connected at their terminals to a master connecting plate, which mates with a matching master connecting plate mounted, say, on the firewall of the airplane, in which latter are mounted and in matching register the terminals of the fuel, oil, control pipes and like lines, and of the electrical and other wiring to be respectively connected with the aforesaid terminals of the first-named master connecting plate.

Under the stress of our war effort, expert mechanics are becoming relatively scarce. Pursuant to the present invention, the assembling and disassembling of an engine does not require any expertness, and may be accomplished in the matter of but a few minutes and with certainty and precision of connection of the proper terminals. These features of the invention are of paramount advantage in the assembly and substitution of airplane engines in distant lands, including fields of battle, as well as in the stages of original assembly of the engine and its appurtenant parts, of transfer to and operation on the testing stand and when ultimately installed in the airplane.

Further features and objects of the invention will be more fully understood from the following detail description and the accompanying drawing, in which

Fig. 1 is a perspective view diagrammatically illustrating a preferred embodiment of the invention applied to an airplane engine.

Fig. 2 is a sectional elevation through the assembly of two typical matching master connecting plates;

Fig. 3 is a sectional elevation of the left-hand master connecting plate of Fig. 2.

Fig. 4 is a sectional elevation of another typical set of matching master connecting plates.

Referring to the diagrammatic perspective view illustrated in Fig. 1, 10 indicates generally an airplane motor or motor assembly mounted, say, on a conventional tubular mount 11, which usually includes as shown, four struts 11*a*, 11*a*, 11*a* and 11*a*, which are provided with suitable means for attachment to the firewall 12 or other support, such attachment means being illustrated in the form of perforated or recessed ears carried at the ends of the struts 11*a* for receiving the threaded bolts 13, suitable nuts (not shown) completing the mounting of the engine assembly 10.

My invention is applicable in many forms, two forms being shown in Fig. 1, one form comprising the master plate 14 attached, say, to the firewall 12 and the master plate 15 carrying the terminals of the electrical and other control wiring, oil and other fluid lines, etc., connecting with the respective parts of the engine assembly. The master plate 14 and its matching master plate 15 are respectively constructed to receive suitable mounting means for the individual terminals of the electrical and other control wiring, of the oil and other fluid lines, etc., arranged in precise register and constructed to respectively and accurately interengage when the master plate 15 is connected to and upon its co-matching master plate 14. Such arrangement may be employed when it is desired to sub-divide the concerned connections, advantageous in the instance of a large number of connections as in the instances of large or multi-engine bombers, troop and civilian transports, and the like.

Fig. 2 is a transverse section of typical matching master control plates, say, the plate 16, shown attached to the firewall 12, and its matching control plate 17. The terminals for electric wires,

feed lines, controls, etc., consist of two piece twin terminal unions and in order to accommodate these unions the mating master connecting plates are each provided with a plurality of openings 24b spaced identically with and complementary to the openings in the other plate to form coinciding apertures, each two piece twin terminal union having one piece removably mounted in an aperture 24b of one of the master connecting plates and the other piece removably mounted in a coinciding aperture 24b of the other plate. The two pieces of the twin terminal unions are accessible and separable from the exterior of either of the master connecting plates and they may be separated collectively by removing the plates and by being removably mounted in the apertures of said plates, they are separable individually exteriorly of either master connecting plate. Fig. 3 shows, similarly in transverse section, the matching plate 16. The master plate 16 may be attached to the firewall 12, as shown, by cutting the proper opening within the firewall, usually of stainless steel or like fire retarding wall material, and securing the plate thereto by bolts as indicated at 18, 18. As shown in Figs. 2 and 3, 19 indicates, say, a fuel pipe, 20 indicates, say, an oil pipe and 21 indicates, say, a piping or tubing enclosing flexible control wiring, and such other connections as electrical wiring, cables, etc., as may be desired. Correspondingly, the matching plate 17 embodies the terminals suitably mounted therein of the pipe 19a, say for connection with the fuel pipe 19, the pipe 20a, say for connection with the oil pipe 20 and the piping or tubing 21a, say, for connection with the terminal of the piping or tubing 21 enclosing flexible control wiring, and similarly for electrical wiring, cables, etc.

The matching master control plates may be connected with one another as may be desired. As shown in Figs. 2 and 3, double threaded bolts may be employed as is indicated at 22, 22. A packing plate or gasket 25 is preferably interposed between the matching master control plates, as clearly illustrated in Fig. 2 of the drawing.

Fig. 4 is illustrative in particular detail with respect to connections for electrical wiring, cables and the like, say for the two matching master connecting plates typified by the plates 14, 15. Thus the plate 15 carrying the terminals of the electrical wiring, typified by the indicated wiring 23, cables typified by the indicated cable 24, the aforesaid running from the engine assembly, matches in its respective mounted terminals the co-related terminals mounted in the master plate 14, in turn mounted on the firewall 12, similarly as above described with respect to the matching master control plates 16, 16. Thus the terminal wiring 23a mounted in the master plate 14 is arranged to connect with the terminal of the wiring mounted in the master plate 15, the terminal of the electrical cable 24a mounted in the master plate 14 arranged to connect with the terminal of the electrical cable 24 mounted in the master plate 15, and so forth.

In the arrangement of the various connecting terminals, it is advantageous to locate the electrical wiring, cables and the like above the terminals of the oil and fuel and similar lines employing fluids, to ensure non-fouling of the electrical wiring, cables and the like. Closing plates 26 are preferably arranged to be placed upon the respective master plates, to seal the terminals of such fluid carrying lines.

The master plates may be made of metal, plastic, treated wood or other cellulosic material or the like, and may be cast, machined, molded or otherwise suitably formed. Metal or like rigid, fire-retarding material is preferable, and its effective weight reduced, employing minimum thickness of body reinforced by ribs or like at the backs of the master plates. In the use of metal or other electrically conducting material for the master plates, the terminals of the electrical wiring, cables and the like, are mounted in insulating bushings or the like. To preserve the weight factor, an essential in many airplane designs, the firewall may be cut away or otherwise provided with openings behind the location or locations of the thereon mounted master plates, which serve to effectively close such openings. Such openings in the firewall also facilitate access to the various connector terminals carried by and extending through the master plate or plates mounted forwardly upon the firewall.

The master plates may bear designations associated with the respective terminals, to identify the particular connections to be connected with the respective terminals.

From the above, it appears that my invention affords convenience as well as speed and accuracy in the original assembly of the various connections leading from the engine or motor assembly to its master connecting plate. When once so properly assembled, the master plate assembly is final for the life of the engine or motor assembly. Correspondingly, after all connections leading from the instrumentalities carried by the airplane or from the instrument board or boards are connected with their proper terminals carried by the master connecting plate secured to the firewall or equivalent, such connections are final and assured of accuracy.

Accordingly, upon installation of an engine or substitution of an engine, the completion of the connections of the respective terminals carried by the master connecting plates is readily effected by bringing the two plates into mutual engagement and clamping of the same relative to one another to insure good electrical and other concerned connections.

Whereas I have described my invention by reference to specific forms thereof, it will be understood that many changes and modifications may be made provided they do not depart from the scope of the claims.

In the claims annexed hereto, the term "conductor" is used generically to cover electric wiring and conduits for air, heat, liquids, etc.

I claim:

1. The combination of a support having an opening, a pair of mating master connecting plates covering the opening in said support and each provided with a plurality of openings spaced identically with and complementary to the openings in the other plate to form coinciding apertures, two piece twin terminal unions for electric wires, feed lines, and controls, each of said two piece terminal unions having one piece removably mounted in an aperture of one of said plates and the other piece removably mounted in a coinciding aperture of the other plate, and means for removably mounting the plates on the support, said terminal unions being separable collectively and also separable individually exteriorly of either master connecting plate.

2. The combination of a support having an opening, a pair of mating master connecting plates covering the opening in said support and each provided with a plurality of openings spaced

identically with and complementary to the openings in the other plate to form coinciding apertures, one of the plates fitting within the opening of the support, means for detachably securing said plate to the support, means for detachably locking the plates together, and two piece twin terminal unions for electric wires, feed lines, and controls, each of said two piece terminal unions having one piece removably mounted in an aperture of one of said plates and the other piece removably mounted in a coinciding aperture of the other plate and said terminal unions being separable collectively and also separable individually exteriorly of either master connecting plate.

CHRISTOPHER J. FREY.