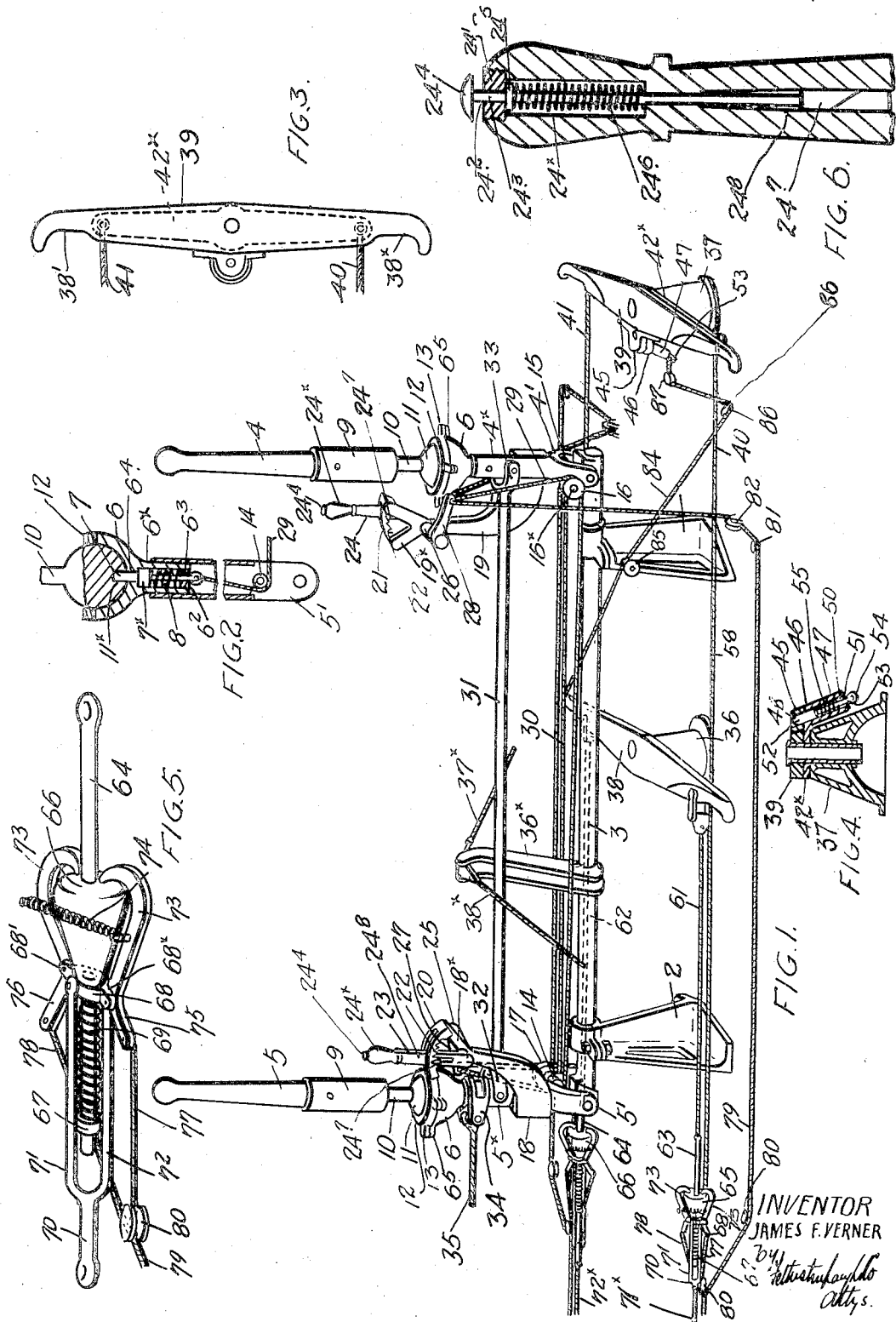


J. F. VERNER.
AEROPLANE CONTROL.
APPLICATION FILED MAR. 7, 1918.

1,330,664.

Patented Feb. 10, 1920.



UNITED STATES PATENT OFFICE.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, JAMES FRED. VERNER, of the city of Toronto, in the county of York, in the Province of Ontario, Canada, have invented certain new and useful Improvements in Aeroplane Controls, of which the following is the specification.

My invention relates to improvements in aeroplane controls and the object of the invention is to devise means whereby the front or rear control levers may be rendered independently operative by the operator of the other of the controls whereby such control will remain operative and the other control rendered inoperative to obviate the danger of accidents caused by the occupant of the aeroplane losing control thereof so that in the case of a fighting machine when one of the occupants is disabled and interferes with the control of the machine his control mechanism may be disconnected so that the other occupant may entirely control the machine and in the case of a training machine should the cadet lose his head and not be capable of operating his control mechanism properly the instructor may disconnect the control mechanism of the cadet so as to render it inoperative and allow of the instructor operating the machine independently and it consists essentially of the following arrangement and construction of parts as hereinafter more particularly explained.

Figure 1, is a general perspective view of my device.

Fig. 2, is a sectional detail of the mechanism for breaking the connection of either the front or rear manually operated lever with the control mechanism.

Fig. 3, is a plan view of the mechanism for breaking the connection of the front rudder control lever with the rear rudder control lever.

Fig. 4, is an enlarged sectional view through Fig. 3.

Fig. 5, is a perspective detail of the mechanism for breaking the connection of the rear rudder control lever with the front rudder control lever.

Fig. 6, is a sectional view of the breaking lever locking device.

In the drawings like numerals of reference indicate corresponding parts in the various figures.

1 and 2 indicate the front and rear bear-

ing brackets suitably secured to the bottom of the fuselage. 3 indicates a rocking shaft journaled in the bearing brackets 1 and 2. 4 indicates the front manually operated control lever, which is swung at its lower end upon the forward end of the rocking shaft 3. 5 indicates the rear manually operated control lever, which is swung at its lower end upon the rear end of the rocking shaft 3. Each of the levers 4 and 5 is broken immediately of its length, the lower portions being provided with tubular portions 4^x and 5^x formed integral with the forks 4' and 5'. 6 indicates a socket member provided with a depending tubular portion 6^x, a socket portion 6 and tubular portion 6^x being provided for each front and rear lever, a tubular portion 6^x fitting into each of the tubular portions 4^x and 5^x and being suitably secured therein. Each tubular portion 6^x is provided at its lower end with a closure nut 6² (see Fig. 2) provided with a central orifice 6³. 6⁴ indicates an orifice extending through the bottom of the socket 6 in vertical alinement with the orifice 6³.

7 indicates a plunger, which extends through the orifice 6⁴ and is provided with a shoulder 7^x. 8 indicates a compression spring extending between the shoulder 7^x and the nut 6².

Each control lever 4 and 5 fits into a sleeve member 9 and is suitably secured therein. Each sleeve member 9 is provided with a depending stem 10 terminating in a ball 11, which fits into the socket 6. 12 indicates a ring cap which fits over the upper portion of the ball 11 and is provided with lugs 13, which are bolted to the lugs 6⁵ extending from the socket 6. 11^x indicates a recess formed in each ball 11 diametrically opposite the stem 10 and into which the plunger 7 fits when either lever 4 or 5 is in its neutral position.

14 indicates a grooved roller which is journaled in a suitable cross pin carried in the fork 5' of the lever 5. 15 indicates a similar roller journaled on a similar cross pin carried in the fork 4' of the lever 4. 16 indicates a grooved pulley journaled on a pin 16^x extending from the side of the fork 4' and 17 indicates a similar pulley similarly mounted on a pin extending from the fork 5' at the opposite side of the mechanism to the pulley 16. 18 indicates a

bracket carried by the lower portion of the lever 5 and 19 indicates a similar bracket carried by the lower portion of the lever 4 on the opposite side to the bracket 18. The brackets 18 and 19 extend upwardly and are formed into V-shaped heads 18* and 19* carrying arc-shaped guides 20 and 21 provided with ratchet notches 22.

23 and 24 indicate levers which are journaled in the apexes of the bracket heads 18* and 19* and extend upwardly through the guides 20 and 21. The lower ends of the levers 23 and 24 are provided with stems 25 and 26 from which extend arms 27 and 28. 29 indicates a cable, which extends from the arm 28 around the pulley 16 and around the pulley 14, the free end of such cable being connected to an eye formed at the lower end of the spring held plunger 7 (see Fig. 2). 30 indicates a cable, which extends from the arm 27 around the pulley 17 and around the pulley 15 to the eye of a plunger corresponding to the plunger 7 and located in the lower portion of the lever 4. Each lever 23 and 24 is provided with a hollow handle 24', the upper portion of which is provided with a closing plug 24' having a center orifice 24². 24³ indicates a plunger provided with a press button 24⁴ at its upper end and a shoulder 24⁵ located, when the plunger is in its normal position, immediately beneath the closure 24'. 24⁶ indicates a compression spring extending between the base of the hollow portion of the handle 24* and the shoulder 24⁵. By this means the plunger is always held in its upper position. 24⁷ indicates a ratchet formed integral with the plunger 24³ and held in a guide 24⁸ formed in the handle 24. The ratchet head 24⁷ normally engages the teeth 22 of the guide 20 or 21.

31 indicates a link rod provided with forked ends 32 and 33 pivotally connected to the lower portions 4* and 5* of the levers 4 and 5. The lower portion 5* of the lever 5 is provided with rearwardly extending lugs 34 to which is connected a cable 35 which is connected to control the elevators. 36* indicates an arm carried by the rocking shaft 3 and to which are connected cables 37* and 38* connected to the ailerons.

36 and 37 indicate the usual conical supporting standards secured to the bottom of the fuselage and which carry the rear rudder control lever 38 and forward rudder control lever 39, such rear and forward rudder control levers 38 and 39 being swingably mounted on standards 36 and 37.

40 and 41 indicate cables connected to the supplemental lever 42* located beneath the forward rudder control lever 39 and which extend rearwardly to the rudder. 45 indicates a semi-circular bracket which is secured to the rearward edge of the lever 39. 46 indicates a similar bracket extending

from the supplemental lever 42*. 47 indicates a hollow boss extending from the portion 46, the orifice of such boss extending through the portion 46 and being in a line with a similar orifice 48 formed in the semi-circular portion 45. The lower end of the hollow boss is provided with a closure 50 having a central orifice 51. 52 indicates a plunger provided with a stem 53 extending through the orifice 51 and provided at its lower end with an eye 54. 55 indicates a compression spring extending between the lower end of the plunger and the closure 53.

84 indicates a cable connected at one end to the cable 30 and passing around pulleys 85, 86 and 87 to the stem 53 of the locking plunger connecting the levers 42* and 39.

It will be seen that when the plunger 52 is withdrawn the connection between the foot lever 39 and supplemental lever 42* is broken thereby allowing of the free movement of the foot lever 39 independently of the supplemental lever 42*. The supplemental lever 42*, it will be noticed on referring to Fig. 3, is sufficiently short so as to escape the foot of the operator which engages the notches 38* and 38' of the lever 39.

61 and 62 indicate cables leading rearwardly from each end of the foot lever 38. 63 and 64 indicate bars connecting the free ends of the cables 61 and 62. The bars 63 and 64 are provided with conical enlargements 65 and 66, the base of each of such enlargements being presented inwardly.

It will be noted upon particularly referring to Fig. 5 that these enlargements 65 and 66 are located intermediately of the length of each bar 63 and 64. Each bar 63 and 64 is provided with a collar 67 secured in a stationary position upon the bar. 68 indicate collars movably mounted upon the bars 63 and 64 and held against the small end of each conical enlargement 65 and 66 by compression springs 69.

70 indicates a bar member provided with arms 71 and 72 pivotally secured to each of the collars 68 at diametrically opposite points. 71* and 72* indicate cables extending from the bar 70 to the rudder. Each collar 68 is provided with outwardly extending lugs 68* and 68'. 73 indicate gripping jaw members. A gripping jaw member 73 is pivotally mounted upon each of the lugs 68* and 68' and they are held together by a tension spring 74 so that the free ends of the jaw members extend over the broad end or face of the conical member 65 in proximity to the rod 64. The opposite ends of the jaw members are provided with tail pieces 75 and 76. 77 and 78 indicate cables, which are connected to a single cable 79 and extend around a pulley 80. The cables 79 extend from the pulley 80 longitudinally of the fuselage and pass around pulleys 81 and 82, each cable 79 passing upwardly from the

pulley 82 to the arm 28 to which it is secured.

Having described the principal parts involved in my invention I will briefly describe the operation of the same.

If it is desirable that the operator of the rear control lever 5 should operate the machine independently all that the operator has to do is to strike the lever 23 so as to force it forward, the ratchet head 24 slipping over the ratchet teeth 22 and automatically locking the lever 23 at the place to which it is moved. In order to again release the lever 23 all that it is necessary to do is to press upon the button 24^a thereby carrying the ratchet head 24 out of engagement with the teeth 22. By the forward movement of the lever 23 a pull is exerted upon the cable 30. The pull on the cable 30 withdraws the plunger 7 located in the lower portion 4^x of the control lever 4 so as to carry it out of engagement with the recess 11^x of the ball 11. By this means the connection between the upper portion of the lever 4 and the lower portion of the lever is broken so that such upper portion can be swung around in any direction by reason of the freed ball and socket connection 11 and 6 without having any influence upon the control mechanism of the machine.

It will also be seen that the rudder control lever 39 is disconnected by the pull on the cable 84 withdrawing the locking plunger 53. The foot lever 38 can then be operated independently, pulling upon the cables 61 and 62 to operate the rudder.

If, however, instead of the operator of the lever 4 being out of commission the operator of the lever 5 is thrown out of commission then the operator of the lever 4 forces the supplemental lever 24 rearward, such lever operating similarly to the operator 23 hereinbefore described thereby carrying the arm 28 upward to pull upon the cables 29 and 79. The cable 29 draws upon the plunger 7 located in the lower portion 5^x of the lever 5 carrying such plunger out of the recess 11^x of the ball 11 of the lever 5 and thereby breaking the connection between the upper end of the lever 5 and the lower portion so that the upper portion can be swung in any direction or held in any position without having any influence upon the control mechanism. Simultaneously the pull upon the cable 79 draws upon the cables 77 and 78 pulling such cable portions around the pulley 80 and drawing the tail pieces 75 and 76 of the jaw members 73 together against the tension of the spring 74. By this means the engaging ends of the jaw members 73 are carried outward clear of the conical enlargement 65.

It will, therefore, be seen that should the operator of the lever 38 lose control the rudder controls may be operated directly

from the lever 39 through the cable 40, any pull exerted by the operator of the lever 38 upon the cables 61 and 62 being taken up by the compression of the springs 69 and, therefore, not influencing the cables 71 and 72 extending to the rudder.

From this description it will be seen that I have devised a very simple device whereby operating levers either at the front or rear may be thrown out of connection with the controlling mechanism so as to render either inoperative and allow the independent operation of the machine by those levers left in engagement, that is to say, by either the front or rear engaged levers.

In operating my device it may be said that it takes less than 5 seconds of time to restore control to the control mechanism after the breaking of such control mechanism and such restoration of control can be effected during flying of the machine without the necessity of landing.

It will be observed that the supplemental hand operated lever 27 (or 28) is carried by the hand operated control lever and therefore is readily accessible to the hand of the operator under all conditions of flying, that is, in all the different angular positions that the hand operated control lever may assume.

In other words, the supplemental lever follows the movement of the hand operated control lever and is thus ready at hand to be operated at all times. Furthermore, as the connections extending from these supplemental levers (the cable 29 or 30 in the form shown) extend down along the hand operated control levers to near the rock shaft 3 and thence along the rock shaft to control the connection between the sections of the other hand operated control lever these connections will not be affected by the swinging of the hand operated control levers to different angular positions.

What I claim as my invention is:

1. In an aeroplane control mechanism, a control lever divided intermediate of its length, a ball and socket connection between the portions of the lever, a spring plunger carried by one member of the ball and socket connection and engaging the other member, said spring plunger being within the lower portion of the divided lever and operating longitudinally thereof, a complementary control lever, a supplemental lever carried adjacent thereto and means operated thereby and extending into the lower part of the divided lever for withdrawing the spring plunger to disconnect the ball and socket, substantially as described.

2. In an aeroplane control mechanism, the combination with the front manually controlled lever and front and rear rudder control levers, a divided cable connection extending from a rudder controlled lever to

the rudder, a resilient compressible coupling member connecting the divided portions of the cable together and comprising two portions, one member being connected to one portion of the cable and the other member to the other portion of the cable, engaging releasable means for rigidly connecting the portions of the coupling member together, a supplemental manually controlled lever located adjacent to the front manually controlled lever, and means operated thereby for releasing the engaging members of such coupling member.

3. In an aeroplane control mechanism, the combination with the front control lever, rear foot controlled lever and divided cable connection extending therefrom, of a coupling member for connecting the divided portions of the cable together and comprising a bar member provided with a conical enlargement intermediately of its length connected to one portion of the cable, an abutment located to the rear end of the rod, a collar freely carried by the rod between the abutment and the conical enlargement, a spring extending between the abutment and collar, a bar member connecting the collar to the other portion of the cable, jaw members carried by the collar extending over and engaging with the enlarged end of the conical member, a supplemental lever located adjacent to the front manually controlled lever, and a cable and pulley con-

nection between the supplemental manually controlled lever and the jaw members withdrawing the jaw members out of engagement with the conical member.

4. In combination, a pair of hand operated control levers, one for each operator, one of said hand operated levers being formed in sections, means for locking the sections together, a rock shaft upon which the said levers are pivotally mounted, a supplemental hand lever adjacent one of the hand operated control levers, and carried thereby and a connection extending from said supplemental lever down along the main hand lever thence along the rock shaft and thence upwardly along the other hand operated control lever to the locking means thereof whereby the said connection may be operated in all positions of the hand operated control lever, rudder control foot levers, a supplemental foot lever interposed between one of the main foot levers and the rudder connection, a detachable lock between the supplemental foot lever and its main foot lever, said detachable lock being operable from the connection extending along the rock shaft, substantially as described.

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Witnesses:

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B. BOYD.