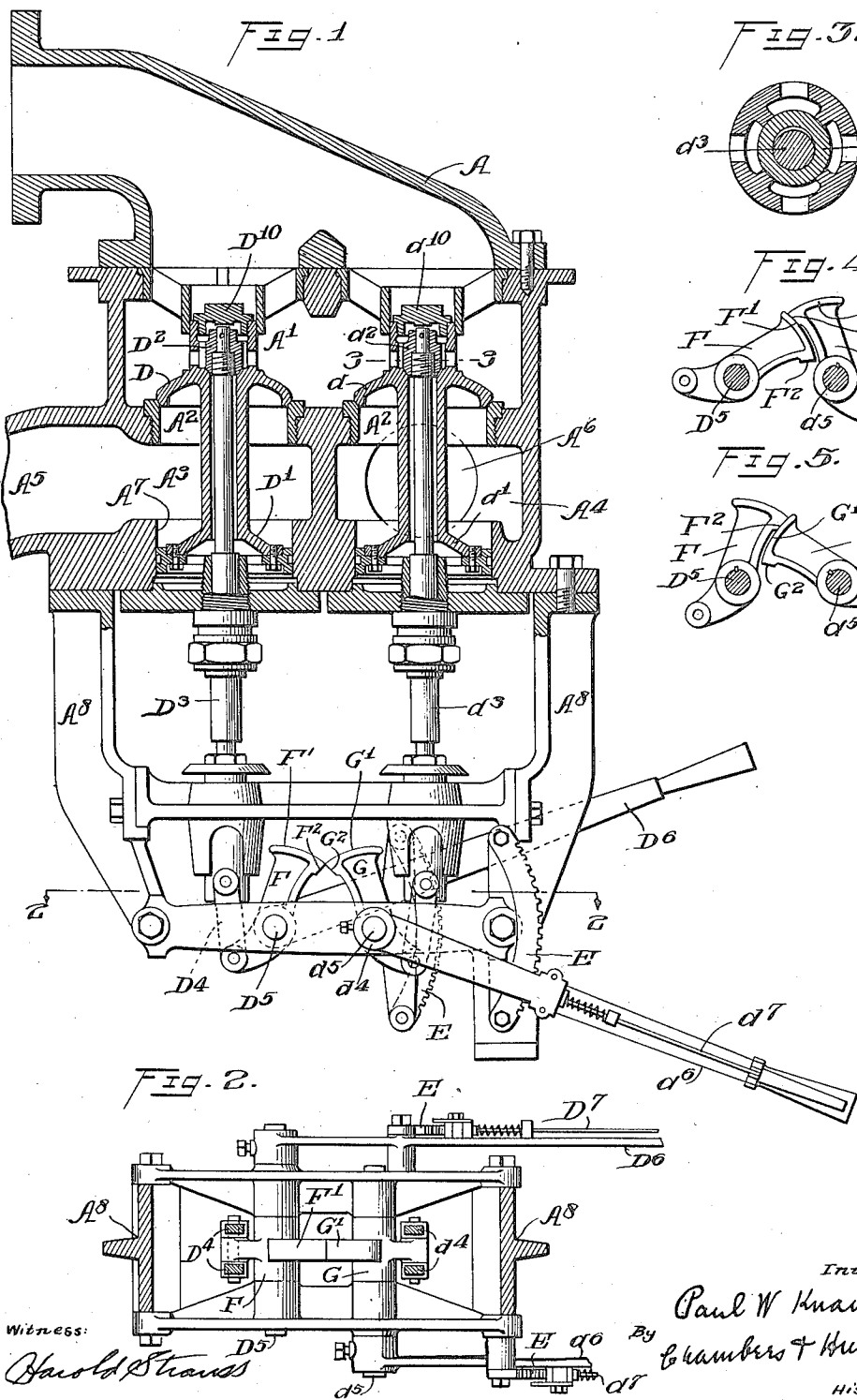


1,277,427.

P. W. KNAUF.
 DUPLEX VALVE.
 APPLICATION FILED MAR. 28, 1918.

Patented Sept. 3, 1918.
 2 SHEETS—SHEET 1.



Witness:

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Inventor

Paul W. Knauft
 By Chambers & Hubbell
 His Att'ys

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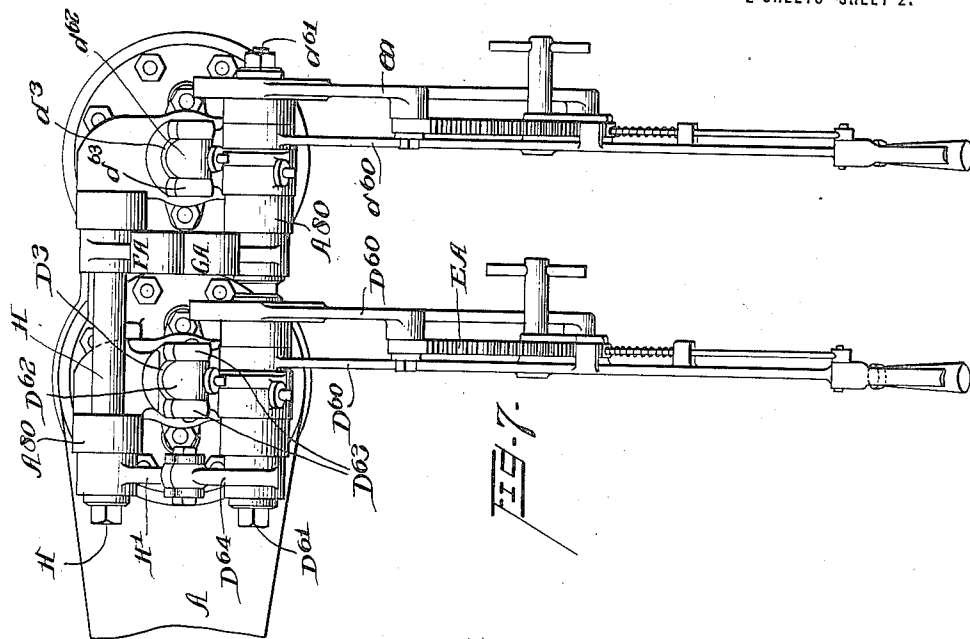


FIG. 7.

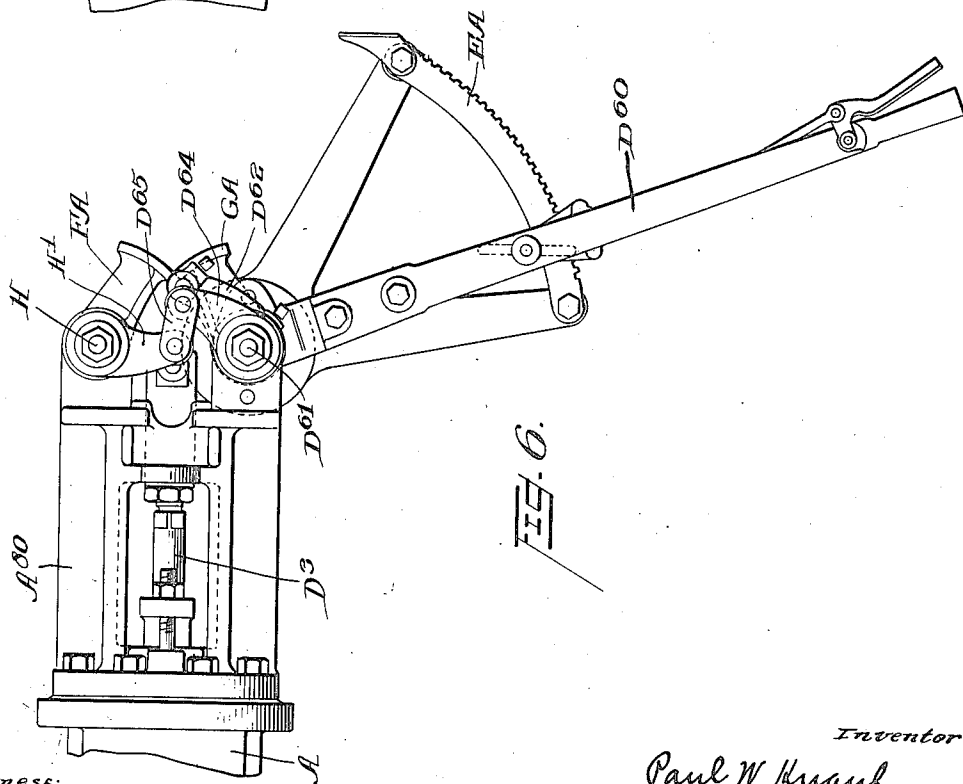


FIG. 6.

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UNITED STATES PATENT OFFICE.

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DUPLEX VALVE.

1,277,427.

Specification of Letters Patent.

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Application filed March 28, 1918. Serial No. 225,174.

To all whom it may concern:

Be it known that I, PAUL W. KNAUF, a citizen of the United States of America, residing in Cynwyd, in the county of Montgomery, in the State of Pennsylvania, have invented certain new and useful Improvements in Duplex Valves, of which the following is a true and exact description, reference being had to the accompanying drawings, which form a part thereof.

My present invention relates to duplex valves of the kind comprising one chamber or space connected to a pair of other chambers by ports and comprising separate valve means controlling communication between the first mentioned chamber and each of the other chambers.

A valve mechanism of this kind is employed, for instance, on turbine driven ships to control the steam admission to the main and reversing turbines. In such a valve there is a single steam inlet chamber and two outlet chambers connected, one to the steam inlet of the main turbine and the other to the steam inlet of the reversing turbine. In a duplex valve mechanism for such use it is of the highest importance that both outlet chambers should not be in communication with the inlet chamber of the valve at one time.

The general object of my invention is to provide a unitary duplex valve structure of a type well adapted for the special use referred to, and comprising simple and effective provisions for positively preventing communication between more than one pair of inlet and outlet chambers at the same time.

The various features of novelty which characterize my invention are pointed out with particularity in the claims annexed to and forming a part of this specification. For a better understanding of the invention, however, and the advantages possessed by it, reference should be had to the accompanying drawings and descriptive matter in which I have illustrated and described preferred embodiments of my invention.

Of the drawings:

Figure 1 is a sectional elevation of a preferred valve mechanism.

Fig. 2 is a sectional plan taken on the line 2—2 of Fig. 1.

Fig. 3 is a partial sectional plan taken on the line 3—3 of Fig. 1.

Fig. 4 is an elevation of the interlocking parts in the position in which one valve is open and the other closed.

Fig. 5 is a view taken similarly to Fig. 4 but showing the parts in the position in which the valve open in Fig. 4 is closed and the other valve is open.

Fig. 6 is an elevation of a portion of a modified form of valve mechanism, and

Fig. 7 is a plan of the apparatus shown in Fig. 6.

In the drawings, and referring first to the construction shown in Figs. 1 to 5, inclusive, A represents the casing of a duplex valve adapted for use to control the supply of steam to the main and reversing turbines of a ship. The valve casing is formed with an inlet chamber A' connected by two ports A² to separate outlet chambers A³ and A⁴. A⁵ represents the outlet passage leading from the chamber A³ and intended for connection to one of the turbines, say, the main turbine. A⁶ represents the outlet port from the outlet chamber A⁴ intended to be connected to the inlet of the reversing turbine.

Communication through the port A² connecting chambers A' and A³ is controlled by a valve member D, which, in the form shown, comprises a valve seat engaging portion and a balancing piston D' connected thereto by a sleeve or stem portion, and working in the piston chamber A⁷ formed in the valve casing at the opposite side of the chamber A³ from the port A². The valve stem D³ passes through, but does not fill the sleeve connecting the balancing piston D' to the valve disk portion proper of the valve member D. At its upper end the stem D³ carries a pilot valve D² which controls communication through the hollow stem portion of the valve between the inlet chamber A' and the remote end of the cylinder space A⁷. The pilot valve D² also forms a piston or crosshead permitted a restricted axial movement between the body of the valve member D and the retaining cage portion. In operation the initial opening movement of the valve stem D³ unseats the pilot valve D² and thus places the remote end of the chamber A⁷ in communication with the chamber A', and thereby balances,

or substantially balances, the steam pressures acting on the valve member D. The valve balancing and operating provisions so far described are not in themselves novel with me.

The means for controlling communication between the inlet chamber A' and the second outlet chamber A⁴, as shown, are identical with those controlling communication between the chambers A' and A³, and corresponding ports in the two port controlling mechanisms are designated by similar upper and lower case symbols and exponents.

The valve stem D³ is connected by a link D⁴ and one arm of an interlocking member F to a rock shaft D⁵ on which the element F is secured. Similarly the valve stem d³ is connected by a link d⁴ and one arm of an interlocking element G to the rock shaft d⁵ on which the element G is secured. To one end of the rock shaft D⁵ is secured an operating lever D⁶ which is shown as provided with a locking bolt D⁷ working over a toothed segment E. Similarly, the rock shaft d⁵ has secured to it at one end an operating lever d⁶ provided with a locking bolt d⁷ adapted to engage with the teeth of a second locking segment E. The rock shafts D⁵ d⁵ are journaled in, and the two segments E are carried by, a bracket A⁸ secured to the valve body and shown as provided with sliding bearings for the adjacent ends of the valve spindles D³ and d³.

The interlocking element F comprises an interlocking surface F' in the form of a segment of a cylinder coaxial with the rock shaft D⁵, and an intersecting interlocking surface F² coincident with a segment of a cylinder which is coaxial with the shaft d⁵ when the valve D is in the closed position shown in Fig. 1. Similarly, the interlocking element G comprises an interlocking surface G' in the form of a segment of a cylinder coaxial with the shaft d⁵, and an intersecting interlocking surface G² which coincides with a segment of a cylinder coaxial with the shaft D⁵ when the valve member d is in the closed position as shown in Fig. 1.

With both valve members closed, as shown in Fig. 1, either valve members D or d may be opened by turning the corresponding operating lever D⁶ and d⁶, but with the two valves cannot be simultaneously opened and as soon as either valve is opened the other is positively locked in the closed position by the interengagement of the interlocking elements F and G until the open valve is returned to its closed position. The interaction between the interlocking elements is readily apparent from Figs. 1, 4 and 5. In Fig. 4 the interlocking elements are in the position occupied by them when the valve D is open and the valve d is closed. In this condition of the apparatus the surface F' of the element F engages

the surface D² of the element G. The element G does not interfere with the turning movement of the element F and in consequence the valve D can be opened wide or closed tight, or set in any intermediate position as is desired. So long, however, as the valve D is out of the closed position the engagement existing between the surfaces F' and G² prevent the valve member d from being moved out of its closed position. Fig. 5 corresponds to the open position of the valve member d and in this condition of the apparatus the adjustment of the valve member d is not interfered with, but the engagement between the surface F² of the member F and the surface G' of the member G prevents the valve member D from being moved out of its closed position.

In the modification illustrated in Figs. 6 and 7, the valve body A, and interior parts, may be identical with those of the valve construction illustrated in Fig. 1. In Figs. 6 and 7 the bracket A⁸⁰ secured to the valve body A, and on which the valve operating levers are mounted, has journaled in its two valve operating rock shafts D⁶¹ and d⁶¹, which are in alinement with each other. The valve lever D⁶⁰ for operating the valve spindle D³ is secured to the rock shaft D⁶¹, and the latter is provided with an arm D⁶² connected to the valve spindle D³ by links D⁶³. The rock shaft D⁶¹ is also provided with an arm D⁶⁴ by a link D⁶⁵ to an arm H' carried by a rock shaft H parallel to the shafts D⁶¹ and d⁶¹ and journaled in the bracket A⁸⁰. The rock shaft H carries a cam interlocking element FA, which may be substantially identical with the interlocking element F of the construction shown in Fig. 1.

The interlocking element FA coöperates with an interlocking element GA substantially similar to the interlocking element G of the construction first described. The interlocking element GA is secured to the rock shaft d⁶¹, to which is also secured the operating lever d⁶⁰ for operating the valve spindle d³. The rock shaft d⁶¹ has an arm d⁶² connected to the valve spindle d³ by links d⁶³. Associated with the valve levers D⁶⁰ and d⁶⁰ are toothed locking segments EA and ea respectively.

The general operation of the modified form of valve mechanism, shown in Figs. 6 and 7, is essentially the same as that of the construction shown in Fig. 1, as will be apparent without further explanation. The valve mechanism shown in Figs. 6 and 7 possess an advantage over that shown in Fig. 1, however, in that the valve levers D⁶⁰ and d⁶⁰ are arranged side by side to turn about the same axis, and are moved in the same directions to produce corresponding opening and closing movements

of the two valves. These advantages are of considerable practical importance. The practical use of the form of my invention, shown in Fig. 1, has shown that undesirable
 5 confusion may result from an arrangement in which one valve lever is moved in one direction to open the valve connected thereto, while the valve lever alongside of it is moved in the opposite direction to open
 10 the valve connected thereto.

While in accordance with the provisions of the statutes I have illustrated and described the best form of my invention now known to me those skilled in the art will
 15 understand that changes may be made in the form of the apparatus disclosed without departing from the spirit of my invention as set forth in the annexed claims.

Having now described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. A unitary duplex valve mechanism comprising a valve body formed with two outlets, a separate balanced valve mechanism controlling each outlet and each comprising a valve proper, a valve spindle
 25 extending through the wall of the valve body and parallel to the other valve spindle, connected to said valve for positive actuation of the latter in each direction, hand levers
 30 for actuating each valve spindle independently of the other and interlocking provisions actuated by the turning of said levers whereby each valve spindle is held in the
 35 closed position while the other is in an open position.

2. A duplex valve mechanism comprising a valve body formed with two ports, separate valve mechanisms controlling said
 40 ports and each comprising a valve proper, a valve spindle extending through the wall of the valve body connected to said valve for positive actuation of the latter in each
 45 direction, a separate actuating hand lever for and connected to each valve spindle, and cam means cooperating with said levers to prevent either from being turned out of the position in which the corresponding
 50 valve is closed when the other lever is in the position in which the valve connected to it is open.

3. A duplex valve mechanism comprising a valve body formed with two ports, separate valve mechanism controlling said
 55 ports and each comprising a valve proper, a valve spindle extending through the wall of the valve body connected to said valve for positive actuation of the latter in each
 60 direction, a separate actuating hand lever for and connected to each valve spindle,

said hand levers being arranged side by side and being adapted to open the valves connected thereto when turned in one direction and to close the valves when turned in the opposite direction, a cam interlocking
 65 element connected to and oscillating with one of said levers, and a second cam interlocking element connected to the second of said levers to oscillate simultaneously therewith but in an opposite direction, said cam
 70 means cooperating to prevent either lever from being turned out of position in which the corresponding valve is closed when the other lever is in the position in which the valve connected to it is open.

4. A duplex valve mechanism comprising a valve body formed with two ports, separate valve mechanisms controlling said
 75 ports and each comprising a valve proper, a valve spindle extending through the wall of the valve body connected to said valve for positive actuation of the latter in each
 80 direction, a separate actuating hand lever for and connected to each valve spindle, a cam interlocking element rigidly connected to and oscillating with one of said levers, a
 85 second cam interlocking element geared to the second of said levers to oscillate simultaneously therewith but in an opposite direction, said cam means cooperating to
 90 prevent either lever from being turned out of position in which the corresponding valve is closed when the other lever is in the position in which the valve connected to it is open.

5. A duplex valve mechanism comprising a valve body formed with two ports, separate valve mechanisms controlling said
 95 ports and each comprising a valve proper, a valve spindle extending through the wall of the valve body connected to said valve for positive actuation of the latter in each
 100 direction, and a rock shaft geared to said spindle and provided with an operating lever arm, the two valve spindles being arranged side by side and the two rock shafts
 105 being coaxial, a cam interlocking element rigidly connected to one of said rock shafts, a counter shaft parallel to said rock shafts and gear connected to the other of said
 110 levers, and a cam interlocking element secured to said counter shaft and cooperating with the first mentioned interlocking element to prevent either valve lever from
 115 being turned out of the position in which the corresponding valve is closed when the other lever is in the position in which the valve connected to it is open.

PAUL W. KNAUF.