

P. L. WORMELEY.
SAFETY INTERLOCKING MECHANISM.
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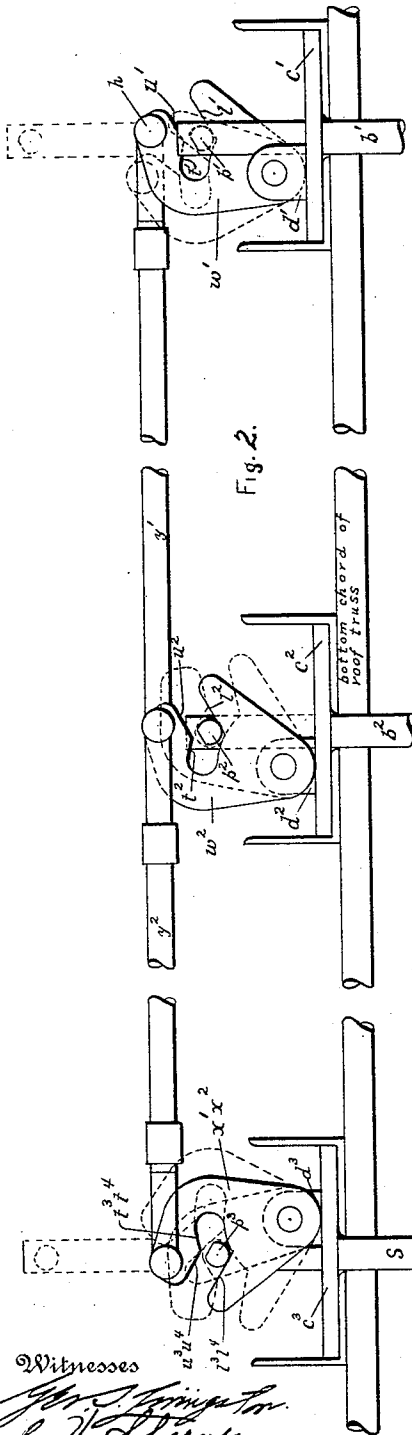


Fig. 2.

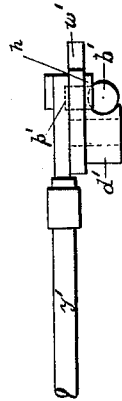


Fig. 1.

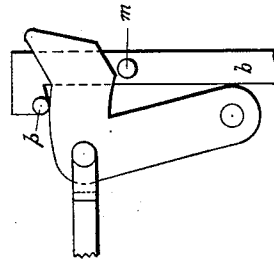


Fig. 4.

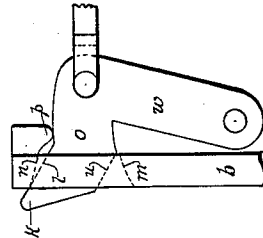


Fig. 3.

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SAFETY INTERLOCKING MECHANISM.

1,050,323.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, PHILIP LIGHTFOOT WORMELEY, a citizen of the United States, residing at Washington, District of Columbia, have invented certain new and useful Improvements in Safety Interlocking Mechanisms, of which the following is a specification.

The object of my invention is to provide means whereby two or more parts of a mechanism may be so interlocked that a definite movement of one part will lock the other part or parts against movement, and a definite movement of any one of the other said parts will lock the first said part against movement.

An important application of this invention is to be found in the case of water-gas generators wherein there is an alternate flow of gas and air. There is danger of an explosive mixture of gas and air being formed in the apparatus, and one of the objects of my invention is to avoid this danger by interlocking the stack valve with one or more of the blast valves in such a way that the opening of a blast valve locks the stack valve in open position so long as the said blast valve is open or partially open; and the closing of the stack valve locks any one or more of the blast valves in closed position so long as the stack valve remains closed or partially open.

In some cases it is desired to operate the generator blast valve independently of the stack valve, and one of the objects of this invention is to provide means whereby this may be done without danger of an explosion. I accomplish this by interlocking the said blast valve with one of the hot gas valves which control the direction of make in the generator, (or with the mechanism used to actuate the said gas valves) in such a way that the said blast valve and bottom gas valve cannot both be open at the same time.

With these objects in view, and such others as may hereinafter appear, my invention consists in the novel construction and combination of the various parts which will be described in the appended claims.

In the drawings forming a part of this specification:—Figure 1 is a plan and Fig. 2 an elevation, showing an interlocking de-

vice embodying my invention as applied to a common form of water-gas apparatus. Figs. 3 and 4 show modified forms of the locking mechanism illustrated in Figs. 1 and 2.

The device is shown bolted to the roof truss and connecting the stack valve with the carbureter and superheater blast valves. The same construction might evidently be extended to include the generator blast valve. The rods b' and b^2 are connected to the carbureter and superheater blast valves respectively, and the rod s is connected to the lever, (or any other mechanism) used to actuate the stack valve, the construction being such that the rod s moves down or up according as the stack valve is being opened or closed. These rods are kept in alinement by means of bearings in the castings c' , c^2 and c^3 , and they carry at their upper ends pins or projections p' , p^2 , and p^3 respectively which may be beveled as shown. To the casting c^3 are pivoted in the bearing d^3 , wings or locking members x' and x^2 , and to the castings c' and c^2 , are pivoted in bearings d' and d^2 , similar wings w' and w^2 respectively, these wings being pivotally connected to the ends of rods y' and y^2 respectively, which latter are each pivotally connected at their other ends to one of the wings x' and x^2 . The wings w' , w^2 , x' and x^2 are provided with slots having locking faces t' , t^2 , t^3 and t^4 , and inclined portions forming upper lips or deflecting faces u' , u^2 , u^3 and u^4 , and lower lips or faces l' , l^2 , l^3 and l^4 , by means of which the said wings are rotated or deflected by the pins or other projections p' , p^2 and p^3 . The locking portions as shown are substantially in the form of circular arcs described about the centers of the bearings d' , d^2 and d^3 . On account of the small angle of rotation however, the circular construction is not essential. In the position shown in Fig. 2, the pins p' and p^2 are in contact with the lower lips or faces l' and l^2 , and are clear of the locking portions of their respective wings. On the opening of either blast valve by the upward movement of its stem, the corresponding pin, say p' , engages the upper lip u' of the wing w' , and deflects the said wing to the left. If now the valve is again closed, the

pin p' engages the lower lip l' , and deflects the wing w' to the right, and finally into its original position, when further rotation to the right will cause the locking portion of the slot t' , to engage the pin p' . The wings w' and w^2 are similarly arranged with respect to the pin p^3 except that in this case the arrangement is such that whenever the pin p^3 is in engagement with the locking portion t^3 or t^4 of the wing w' or w^2 , the stack valve is locked in open position, and whenever the said locking portions are swung clear of the said pin, the upper lips u^3 and u^4 are in position for engagement with the said pin, and the stack valve is free to close by an upward movement of its actuating lever and the rod s . It will be noted further that the controlling mechanism for the stack valve is reversely arranged with respect to that for the blast valves, and that when the pin p^3 is in engagement with the curved portions t^3 and t^4 of the wings w' and w^2 , the wings w' and w^2 have been rotated to the left by an upward movement of the pins p' and p^2 cooperating with the upper lips u' and u^2 of the said wings. Similarly when the wings w' and w^2 have been rotated to the right by an upward movement of the pin p^3 , on the closing of the stack valve, the wings w' and w^2 are also rotated to the right, their connecting valves being thereby locked in closed position. Similarly when one of the wings w' or w^2 is rotated to the left on the opening of its valve, the respective wing w' or w^2 is also rotated to the left and the stack valve is locked in open position. As a result of this arrangement, if the stack valve is closed by raising its actuating lever, (the blast valves being already closed) the pin p^3 will immediately come in contact with the upper lips u^3 and u^4 of the wings w' and w^2 , thereby deflecting the said wings to the right and thus throwing the locking portions t' and t^2 into engagement with the pins p' and p^2 respectively. If now an attempt be made to open one of the blast valves, the corresponding pin say p^2 will come in contact with the locking portion t^2 of wing w^2 and make such movement impossible. If now the stack valve be opened, the wings w' and w^2 will be guided to their original positions by the downward movement of pin p^3 , and the wing w^2 will assume its former position as indicated in full lines (Fig. 2). It is now possible to open one or both of the blast valves, but by raising either one of them, the corresponding pin say p' will immediately deflect the wing w' to the left and thus throw the locking portion t^3 of wing w' into engagement with pin p^3 . If now an attempt be made to close the stack valve, the pin p^3 will come in contact with the locking portion t^3 and make such movement impossible. By ref-

erence to Figs. 1 and 2 it will be seen that in raising one of the blast valves, the corresponding pin, say p' , after deflecting the wing w' to the left, passes up through the inclined slot and out of contact with the upper lip u' . The construction is such however that in this position the wing w' is prevented from rotating to the right by the head of the pin or bolt h connecting y' and w' , which just clears the rod b' . In lieu of the bolt head as shown any suitable projection or lug may be used.

It is evident that this device could be operated as well if the castings c' , c^2 and c^3 were revolved 180 degrees about the rods b' , b^2 and s , and the connections y' and y^2 made as before.

The interlocking of a generator blast valve with one of the gas valves, may be effected in precisely the same way as described above, and may be illustrated by a portion of Fig. 2, in which b^2 might be taken to represent the stem of the generator blast valve, and s the stem of the bottom gas valve. By exactly the same reasoning as given above, it is evident that this interlocking mechanism makes it impossible for both of these valves to be open at the same time.

In the modified form shown in Fig. 3 the lower lip has been omitted and the rod b is slotted to receive the projection or lip o . An upward movement of the rod b causes the lower edge m of the slot to come in contact with the inclined surface or deflecting face u and deflect the wing w to the right. On a downward movement of the rod b to its original position, the projection p and upper surface n of the slot cooperate with the inclined surface or face l and deflect the wing w to its original position as shown. Rollers may be placed at the points p and l . In lieu of the slot Fig. 3, the rod b may carry pins or projections as shown at m and p (Fig. 4). The operation is precisely as described above.

While I have described my invention as applied to the manufacture of water-gas, I do not limit myself to such application, nor to the precise details of construction set forth herein. The device is capable of use in various relations for controlling valves and mechanisms of different kinds. It is applicable to valves and valve stems arranged in any relative positions, and is not limited to an arrangement where the directions of motion are in parallel lines as shown.

The exact form of the mechanism is evidently susceptible of wide variation within the scope of my invention, and the desired motion may be taken either directly from the valves or moving parts to be interlocked, or from parts of the apparatus actuating, or actuated by the said valves or

moving parts. Such variations are found necessary to meet the varying conditions of different installations.

What I claim is:—

5 1. The combination, with a movable valve rod or similar member of a locking member pivoted adjacent to said rod and having a locking face to engage and hold the rod against movement, means for moving said locking member into locking or releasing position, and said locking member
10 having a deflecting face arranged for engagement on a movement of said rod when released to swing said locking member farther from locking position.

15 2. The combination, with a movable valve rod or similar member, of a locking member pivoted adjacent to said rod and having a locking face to engage and hold the rod against
20 movement, means for moving said locking member into locking or releasing position, said locking member having a deflecting face arranged for engagement on a movement in one direction of said rod when released to swing said locking member farther
25 from locking position and a face arranged for engagement on a return movement of said rod to swing said locking member into such position that a further movement of said rod in the same direction may
30 lock said rod.

3. The combination, with two movable valve rods or similar members, of a locking member pivoted adjacent to each of said
35 rods, means connecting said locking members to move in unison, and means whereby a movement of either of said rods in one direction actuates said connected locking members to lock the other rod against movement.
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4. The combination with two movable valve rods or similar members, of a locking member pivoted adjacent to each of said rods, means connecting said locking members
45 to move in unison, means whereby a movement of either of said rods in one direction actuates said connected locking members to lock the other rod against movement, and means for preventing any return movement of said locking members until said rod
50 has partly returned to its first position.

5. The combination, with two movable valve rods or similar members, of a locking member pivoted adjacent to each of said
55 rods, means connecting said locking members to move in unison, and means whereby a movement of either of said rods in one direction actuates said connected locking members to lock the other rod against movement, and a return movement of said rod
60 actuates said locking members to release said other rod.

6. The combination, with two movable valve rods or similar members, of a locking
65 member pivoted adjacent to each of said

rods, means connecting said locking members in such relation that in one position of the same either rod is free to move, and means whereby a movement of either of said rods in one direction actuates said locking members to lock the other rod against movement. 70

7. The combination, with two movable valve rods or similar members, of a locking member pivoted adjacent to each of said
75 rods and having a locking face and a deflecting face, means connecting said locking members to move in unison, and means whereby either of said rods on movement in one direction, engages the deflecting face of the adjacent locking member to swing said locking members and lock the other rod against movement. 80

8. The combination, with two movable valve rods or similar members, of a locking member pivoted adjacent to each of said
85 rods and having a locking face, a deflecting face and a return face, means connecting said locking members in such relation that in one position of the same either rod is free to move, and means whereby either of said rods on movement in one direction, engages the deflecting face of the adjacent locking member to swing said connected locking members and locks the other rod against movement, and by movement in the reverse direction engages said return face to swing said locking members to their first position. 90

9. The combination, with two movable valve rods or similar members, of a locking member pivoted adjacent to each of said rods and having a locking face and a deflecting face, a projection on each of said rods arranged to engage said faces, and means connecting said locking members in such relation that a movement of either of said rods with its projection in engagement with the deflecting face of the adjacent locking member, serves to swing said members and locks the other rod against movement. 100

10. The combination, with two movable valve rods or similar members, of a locking member pivoted adjacent to each of said rods and having a locking face and a deflecting face at an angle to said locking face, a projection on each of said rods arranged to engage said faces, and means connecting said locking members in such relation that a movement of one of the rods with its projection in engagement with the deflecting face of its respective locking member, serves to lock the other rod against movement. 110

11. The combination, with two movable valve rods or similar members, of a locking member pivoted adjacent to each of said rods and having a locking face and a deflecting face, a projection on each of said rods arranged to engage said faces, means connecting said locking members in such relation 125

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tion that a movement of one of the rods with its projection in engagement with the deflecting face of its respective locking member, serves to lock the other rod against movement, each of said locking members having a face arranged for engagement by the respective projection on a return movement of the rod, whereby a return movement of the rod serves to return said locking members and release the other rod.

12. The combination, with two movable valve rods or similar members, of a locking member pivoted adjacent to each of said rods, each of said locking members having a slot therein providing a locking face, a deflecting face at an angle thereto, and a return face opposite said deflecting face, a projection on each of said rods engaging in said slot, said locking members being reversely disposed with respect to each other and connected for movement in unison, whereby a movement of either rod with its projection in engagement with the deflecting face serves to lock the other rod against movement, and a return movement of the first named rod effects engagement with the return face of the respective locking member and releases the other rod.

13. The combination, with a plurality of valve rods or similar members, of a plurality of locking members pivoted adjacent to one of said rods, a locking member pivoted adjacent to each of said other rods and connected respectively with one of said first named locking members, and means whereby a movement of any of said last named rods in one direction, actuates the respective connected locking members to lock said first named rod against movement.

14. The combination, with a plurality of movable valve rods or similar members, of a plurality of locking members pivoted adjacent to one of said rods, a locking member pivoted adjacent to each of said other rods,

and connected respectively with one of said first named locking members, and means whereby a movement of said first named rod in one direction actuates said locking members to lock said other rods against movement.

15. The combination, with a plurality of movable valve rods or similar members, of a plurality of locking members pivoted adjacent to one of said rods, a locking member pivoted adjacent to each of said other rods, and connected respectively with one of said first named locking members, and means whereby a movement of said first named rod in one direction actuates said locking members to lock said other rods against movement and a return movement of said rod actuates said locking members to release said other rods.

16. The combination, with two movable valve rods or similar members, of a locking member pivoted adjacent to each of said rods, and having a locking face and a deflecting face, a projection on each of said rods arranged to engage said faces, means connecting said locking members in such relation that a movement of one of the rods with its projection in engagement with the deflecting face of its respective locking member serves to lock the other rod against movement, each of said locking members having a face arranged for engagement by the respective projection on a return movement of the rod, whereby a return movement of the rod serves to return said locking members and release the other rod and means for preventing any return movement of said locking members until said face is engaged by said projection on the return movement of said rod.

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Witnesses:

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