

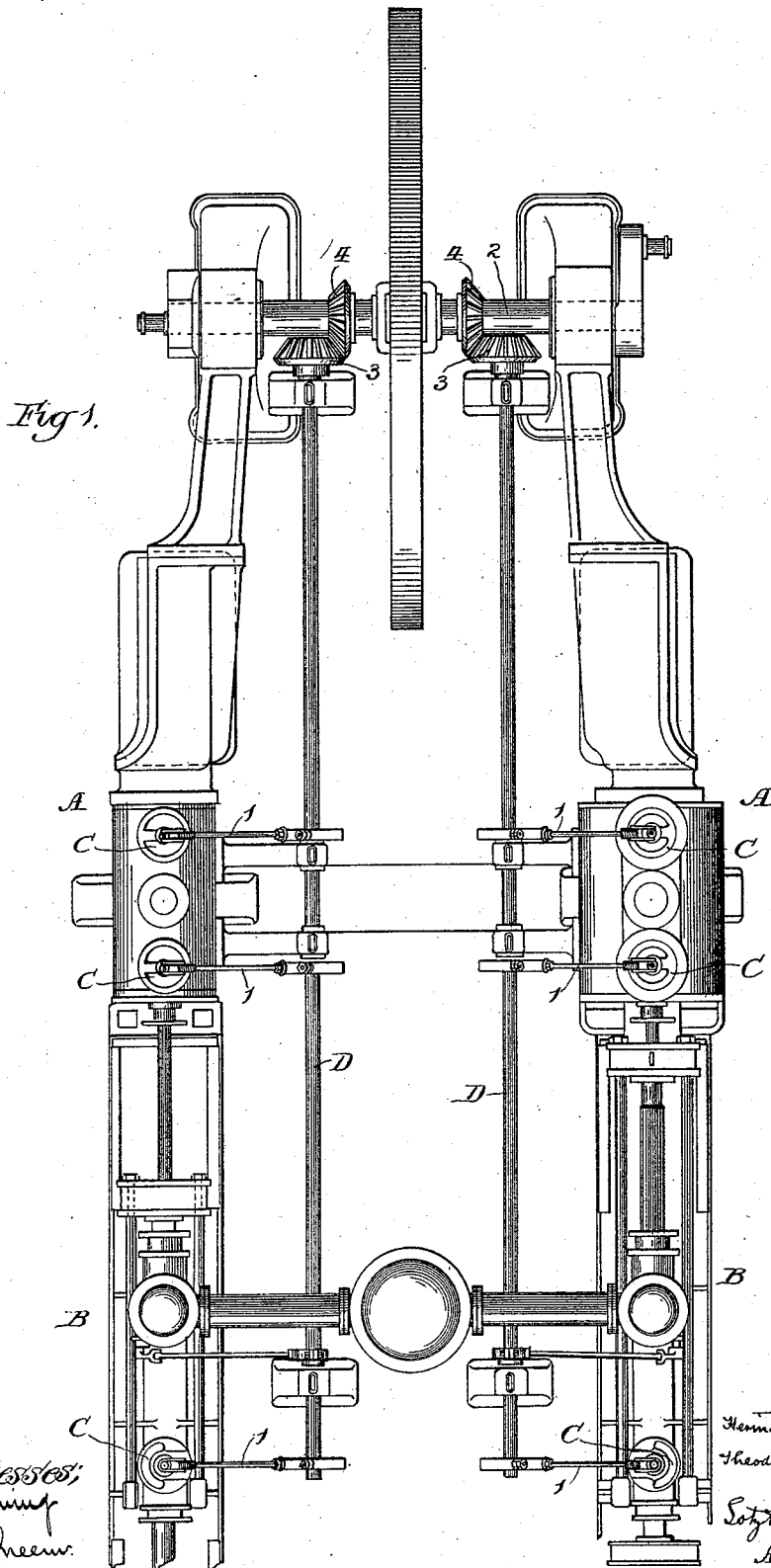
(No Model.)

2 Sheets—Sheet 1.

H. UNZICKER & T. MASEL.
VALVE GEAR.

No. 485,360.

Patented Nov. 1, 1892.



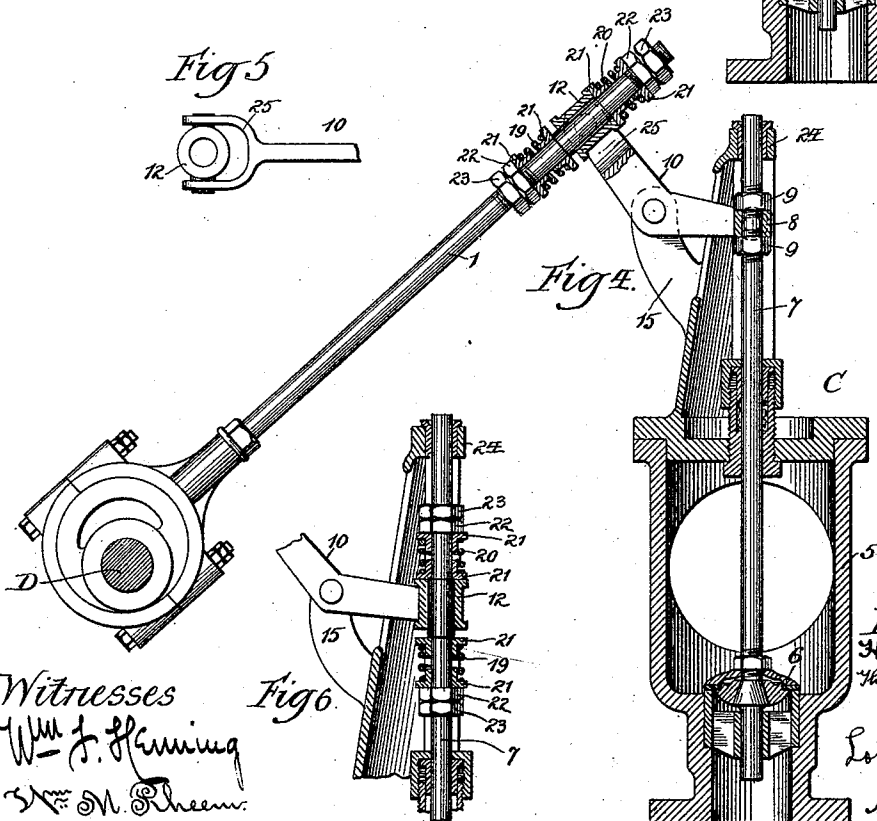
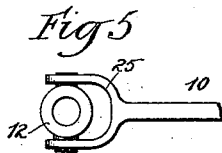
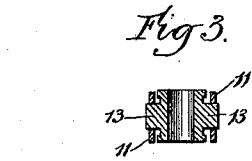
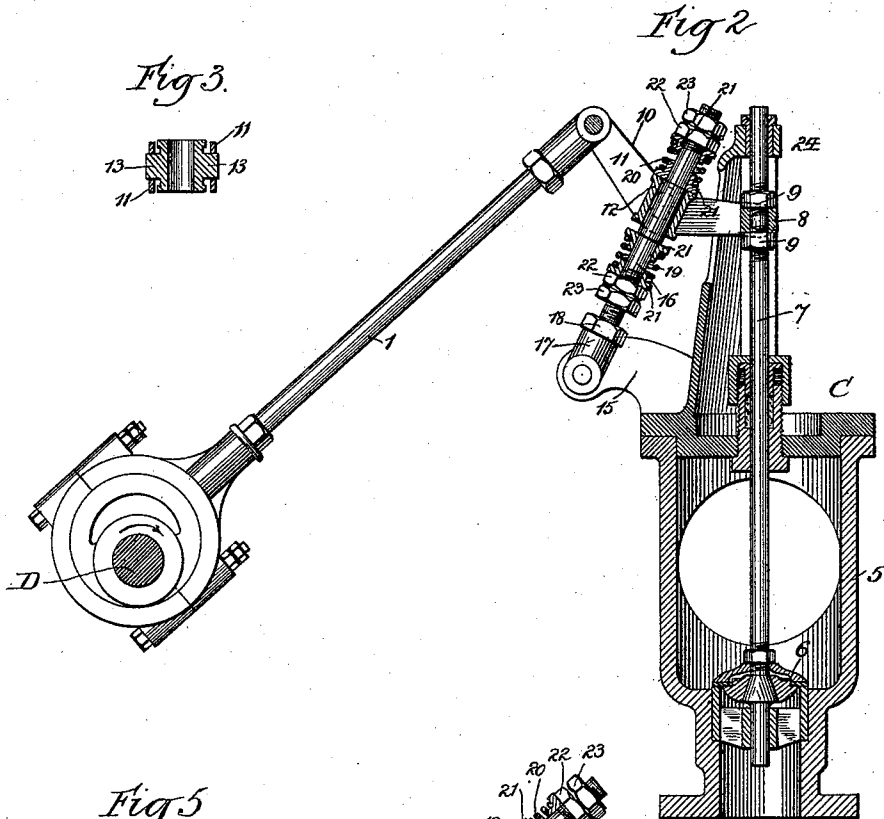
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2 Sheets—Sheet 2.

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VALVE GEAR.

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Witnesses
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UNITED STATES PATENT OFFICE.

HERMANN UNZICKER AND THEODORE MASEL, OF CHICAGO, ILLINOIS; SAID
MASEL ASSIGNOR TO THE CHICAGO IRON WORKS, OF SAME PLACE.

VALVE-GEAR.

SPECIFICATION forming part of Letters Patent No. 485,360, dated November 1, 1892.

Application filed August 2, 1892. Serial No. 441,978. (No model.)

To all whom it may concern:

Be it known that we, HERMANN UNZICKER and THEODORE MASEL, citizens of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Valve-Gears; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to mechanism for controlling the operation of valves, the object being to provide mechanism for this purpose that will serve to open and close a valve at certain intervals and hold the valve opened or closed for the requisite period.

The invention consists in the features of construction and combinations of parts hereinafter fully described and specifically claimed.

In the accompanying drawings, illustrating our invention, Figure 1 is a plan view of a steam-engine and pumps operated by the same and illustrating valves constructed in accordance with our invention applied to said engine and pump and operated from the driving-shaft of the steam-engine. Fig. 2 is a detail view, partly in side elevation and in vertical section, of a valve and the operating mechanism therefor. Fig. 3 is a detail section of the sliding collar that is located upon the guide-rod. Fig. 4 is a view similar to Fig. 3, but showing a modified form of construction embodying our invention. Fig. 5 is a detail view of the end portion of the vibrating lever. Fig. 6 is a fragmentary detail view of another modified form of construction embodying our invention.

This invention has reference more particularly to valves that are operated or set in motion from a regularly moving or rotating part—such as, for instance, eccentric or crank—and, further, to such valves that are to be opened and closed at certain predetermined intervals, and are to be held opened and closed for certain predetermined periods. Valves of this class are employed in steam-engines, pumps, compressors, &c., and in connection with these they are usually operated from a revolving part by a crank or eccentric, and we have se-

lected this form of device for illustrating the application of our invention.

Referring to Fig. 1 of the drawings, A indicates, as a whole, a steam-engine, and B a pump operated from said engine.

C indicates the valves of the engine and pump, constructed in accordance with our invention, and which are operated from shafts D, supported in suitable bearings and having eccentrics for operating the eccentric-rod of said valves. The shafts D are geared to and are driven by the main driving-shaft 2 of the engine conveniently by means of bevel-gears 3 upon said shaft 1, and bevel-gears 4 upon said shaft 2. In this way it will be seen that all the valves are controlled by the said shafts D, and we will now proceed to describe specifically said valve-controlling mechanism.

Referring to Fig. 2, 5 indicates a valve-casing, 6 the valve, and 7 the valve-stem, all of which are of familiar construction. Near its end said valve-stem is provided with a sleeve 8, that is adjustably held upon the stem by two nuts 9, that screw upon the screw-threaded portion of said stem 7. A vibrating lever 10, comprising two leaves or plates 11, is pivoted at one end to said collar 8 and at its other end to the end of the eccentric-rod 1. Between its ends said vibrating lever 10 carries a collar 12, that is preferably located between the plates 11 and is provided with pivot-studs 13, that bear in pivot-apertures in said plates. Mounted upon the valve-casing is an arm or bracket 15, with the outer end of which is pivotally connected a guide-rod 16, that passes through the collar 12. The said guide-rod 16 is adjustably connected with the arm 15 by having its end portion screw-threaded and engaging a screw-threaded socket 17, pivotally secured to said arm 15 and adapted to be held rigid with relation thereto by a jam-nut 18 upon said rod. The said collar 12 is located between two springs 19 and 20 upon said rod 16 and said springs 19 and 20 located between washers 21, that serve to cause the tension to be evenly distributed by said springs. The said springs are retained upon the guide-rod by nuts 22, that are controlled by jam-nuts 23, and it will be noted that by moving the nuts 22 the tension of the springs 19 and 20 can be regulated.

The parts being constructed and arranged as described, the operation is as follows: In said Fig. 2 the eccentric is in the position when the valve 6 has just been closed. As the shaft D turns the eccentric farther in the direction indicated by the arrow the eccentric-rod will move upwardly and lift the end of the vibrating lever 10, with which it is connected. The other end of said vibrating lever turns upon its connection with sleeve 8 as a pivot, while the collar 12 moves upwardly upon the guide-rod 16 against the tension of the spring 20, thereby compressing said spring. In this way it will be seen that the valve is held down upon its seat. After the eccentric has reached the highest point of its throw in this direction, the eccentric-rod 1 begins to descend, moves the collar downwardly upon the guide-rod 16, and permits the expansion of the spring 20; but at the same time the valve 6 is still held down upon its seat in an obvious manner. As the collar 12 moves down upon the guide-rod 16 under the influence of the eccentric and rod 1 it permits the full expansion of said spring 20 and then engages the washer 21 of the spring 19, whereupon the fulcrum-point of the vibrating lever 10 changes or shifts from the upper spring 20 to the lower spring 19, and the end of the lever connected with the valve-stem 7 is then elevated and lifts the valve from its seat. The eccentric and rod then continue to move the outer end of lever 10 downwardly and thereby to compress the lower spring 19 and throw the upper nut 9 on the valve-stem against the stop or abutment 24, formed by the guide of said valve-stem, and thus hold the valve open until the eccentric reaches the highest point of its throw in this direction, returns and throws the collar 12 up against the upper spring 20 to shift the fulcrum-point to the said upper spring 20 and close the valve in an obvious manner, whereupon the parts will be in the position shown in Fig. 2. In this way it will be seen that the movements of the valve are certain and positive and are under direct control of eccentric and devices for operating the same. It will be manifest that other devices or motors may be employed for operating the vibrating rod of the valve-controlling mechanism, and we therefore do not limit our invention to the devices shown and described, but contemplate employing any suitable motor for operating the said vibrating lever to impart to the same the necessary vibratory motion. By means of the adjusting devices upon the valve-stem the extent of movement of the valve can be regulated, and by the adjustment of the guide-rod 16 with relation to its pivotal support 17 and by the adjustment of the nuts 22 upon said guide-rod 16 the time of operation of the valve can be easily regulated, as found desirable.

In Figs. 4 and 5 we have shown a modified form of construction embodying our invention, which consists in locating the collar 12, springs 19 and 20, washers 21, and nuts 22

and 23 upon the end portion of the eccentric-rod 1. The vibrating lever in this instance is pivoted upon the arm or bracket 15 upon the valve-casing 5, and is forked at its ends, as shown at 25, and said forked ends 25 are pivotally connected with the sleeve 8 of the valve-stem and with the said collar 12 upon the eccentric-rod 1 in an obvious manner. The operation of this construction will be readily seen.

In Fig. 6 another modification is shown. In this construction the vibrating lever 10 is pivoted upon the bracket or arm 15 and is pivoted at one end to the end of the eccentric-rod, while the other end of the vibrating lever is pivotally connected with collar 12, which is located upon the valve-stem between the washers 21, springs 19 and 20, and nuts 22 and 23. The operation of this construction will also be plainly seen, in view of the description relating to Fig. 2.

We claim as our invention—

1. The combination, with a valve, valve-seat, and stop to limit the opening of said valve, of a vibrating member connected with said valve to close the same as said member moves in one direction and to open the same as said member moves in the opposite direction, the connection between said valve and member embracing a lost motion, substantially as described.

2. The combination, with a valve, valve-seat, and stop to limit the opening of said valve, of a vibrating member yieldingly connected with said valve to close the same as said member moves in one direction and to open the same as said member moves in the opposite direction, substantially as described.

3. The combination, with a valve, valve-seat, and stop to limit the opening of said valve, of a vibrating member yieldingly connected with said valve to open and close the same and having a greater extent of movement than is necessary to open and close said valve, substantially as described.

4. The combination, with a valve, valve-seat, and stop to limit the opening of said valve, of a vibrating member connected with said valve to open and close the same and having a greater extent of movement than is necessary to open and close said valve, the connection between said member and valve embracing a lost motion, substantially as described.

5. The combination, with a valve, valve-seat, and stop to limit the opening of said valve, of a vibrating member connected with said valve to open and close the same and having a greater extent of movement than is necessary to open and close the valve and two cushions interposed in the connection between said valve and member, substantially as described.

6. The combination, with a valve, valve-seat, and stop to limit the opening of said valve, of a vibrating member connected with said valve to open and close the same and having a greater extent of movement than is necessary to open and close the valve and two spring-

cushions interposed in the connection between said member and valve, substantially as described.

7. The combination, with a valve, valve-seat, and stop to limit the opening of said valve, of a vibrating member connected with said valve to open and close the same and having a greater extent of movement than is necessary to open and close the valve and two adjustable cushions interposed in the connection between said valve and member, substantially as described.

8. The combination, with a valve, valve-seat, and stop to limit the opening of said valve, of a vibrating member connected with said valve to open and close the same and having a greater extent of movement than is necessary to open and close the valve and two adjustable spring-cushions interposed in the connection between said member and valve, substantially as described.

9. The combination, with a valve, valve-seat, a stop to limit the opening of said valve, and valve-stem, of a vibrating member and a pivoted lever having its ends pivotally connected with said valve-stem and member, one of the pivots of said lever being located between two spring-cushions, substantially as described.

10. The combination, with a valve, valve-seat, a stop to limit the opening of said valve, and valve-stem, of a vibrating member and a pivoted lever having its ends pivotally connected with said valve-stem and member, one of the pivots of said lever being located between two adjustable spring-cushions, substantially as described.

11. The combination, with a valve, valve-seat, a stop to limit the opening of said valve, and valve-stem, of a vibrating member and a pivoted lever having its ends pivotally connected with said valve-stem and member, one of said pivots being located between two spring-cushions of adjustable tension, substantially as described.

12. The combination, with a valve, valve-seat, a stop to limit the opening of said valve, and valve-stem, of a vibrating member, a pivoted lever having its ends pivotally connected with said valve-stem and member, one of said pivots being located between two spring-cushions, and an adjustable connection between one end of said lever and one of said parts, substantially as described.

13. The combination, with a valve, valve-seat, a stop to limit the opening of said valve, and valve-stem, of a vibrating member and a lever pivotally connected at its ends with said valve-stem and member, said lever being supported between its ends by a yielding pivot, substantially as described.

14. The combination, with a valve, valve-seat, a stop to limit the opening of said valve, and valve stem, of a vibrating member and a lever pivotally connected at its ends with said valve-stem and member and having an adjustable connection with said valve-stem, said lever being pivotally supported between its

ends by a yielding pivot, substantially as described.

15. The combination, with a valve, valve-seat, a stop to limit the opening of said valve, and valve-stem, of a vibrating member, a lever pivotally connected at one end with said member, and a collar pivotally connected with the other end of said lever and located upon said valve-stem between two nuts 9, adjustably secured to said valve-stem, substantially as described.

16. The combination, with a valve, valve-seat, a stop to limit the opening of said valve, and valve stem, of a vibrating member and a lever pivotally connected at its ends with said valve-stem and member and supported between its ends upon a yielding pivot, substantially as described.

17. The combination, with a valve, valve-seat, a stop to limit the opening of said valve, and valve stem, of a vibrating member and a lever pivotally connected at its ends with said member and valve-stem and supported between its ends upon a yielding spring-supported pivot, substantially as described.

18. The combination, with a valve, valve-seat, a stop to limit the opening of said valve, and valve-stem, of a vibrating member and a lever pivotally connected at its ends with said valve-stem and member and supported between its ends upon an adjustable yielding pivot, substantially as described.

19. The combination, with a valve, valve-seat, a stop to limit the opening of said valve, and valve-stem, of a vibrating member and a lever pivotally connected at its ends with said valve-stem and member and supported between its ends upon a yielding pivot located between cushions, substantially as described.

20. The combination, with a valve, valve-seat, a stop to limit the opening of said valve, and valve-stem, of a vibrating member and a lever pivotally connected at its ends with said valve-stem and member and supported between its ends upon a yielding pivot located between spring-cushions, substantially as described.

21. The combination, with a valve, valve-seat, a stop to limit the opening of said valve, and valve-stem, of a vibrating member and a lever pivotally connected at its ends with said valve-stem and member and supported between its ends upon a yielding pivot located between spring-cushions of adjustable tension, substantially as described.

22. The combination, with a valve, valve-seat, a stop to limit the opening of said valve, and valve-stem, of a vibrating member, a lever pivotally connected at its ends with said valve-stem and member, and a block or collar pivoted to said lever between its ends and having a sliding connection with a laterally-movable guide-rod and located between cushions upon said guide-rod, substantially as described.

23. The combination, with a valve, valve-seat, a stop to limit the opening of said valve,

- and valve-stem, of a vibrating member, a lever pivotally connected at its ends with said valve-stem and member, and a block or collar pivoted to said lever between its ends and
- 5 having a sliding connection with a laterally-movable guide-rod and located between spring-cushions upon said guide-rod, substantially as described.
24. The combination, with a valve, valve-
10 seat, a stop to limit the opening of said valve, and valve-stem, of a vibrating member, a lever pivotally connected at its ends with said valve-stem and member, and a block or collar pivoted to said lever between its ends and
- 15 having a sliding connection with a laterally-movable guide-rod and located between spring-cushions of adjustable tension upon said guide-rod, substantially as described.
25. The combination, with a valve, valve-
20 seat, a stop to limit the opening of said valve, and valve-stem, of a vibrating member, a lever pivotally connected at its ends with said valve-stem and member, and a block or collar pivoted to said lever between its ends and
- 25 having a sliding connection with a pivoted guide-rod, and springs secured upon said guide-rod, located on opposite sides of said block or collar, substantially as described.
26. The combination, with a valve, valve-
30 seat, a stop to limit the opening of said valve, and valve-stem, of a vibrating member, a lever pivotally connected at its ends with said valve-stem and member, and a block or collar pivoted to said lever between its ends and

having a sliding connection with a pivoted 35
guide-rod, and springs secured upon said guide-rod and located between washers, substantially as described.

27. The combination, with a valve, valve-
seat, a stop to limit the opening of said valve, 40
and valve-stem, of a vibrating member, a lever pivotally connected at its ends with said valve-stem and member, and a block or collar pivoted to said lever between its ends and having a sliding connection with a longitudi- 45
nally-adjustable pivoted guide-rod, and springs secured to said guide-rods on opposite sides of said block or collar, substantially as described.

28. The combination, with a valve, valve- 50
seat, a stop to limit the opening of said valve, and valve-stem, of a vibrating member, a lever pivotally connected at its ends with said valve-stem and member, and a block or collar pivoted to said lever between its ends, having 55
a sliding connection with a pivoted guide-rod, and springs adjustably secured to said guide-rods on opposite sides of said block or collar and located between washers, substantially as described. 60

In testimony whereof we affix our signatures in presence of two witnesses.

HERMANN UNZICKER.
THEODORE MASEL.

Witnesses:

HARRY COBB KENNEDY,
WM. D. GORDON.