

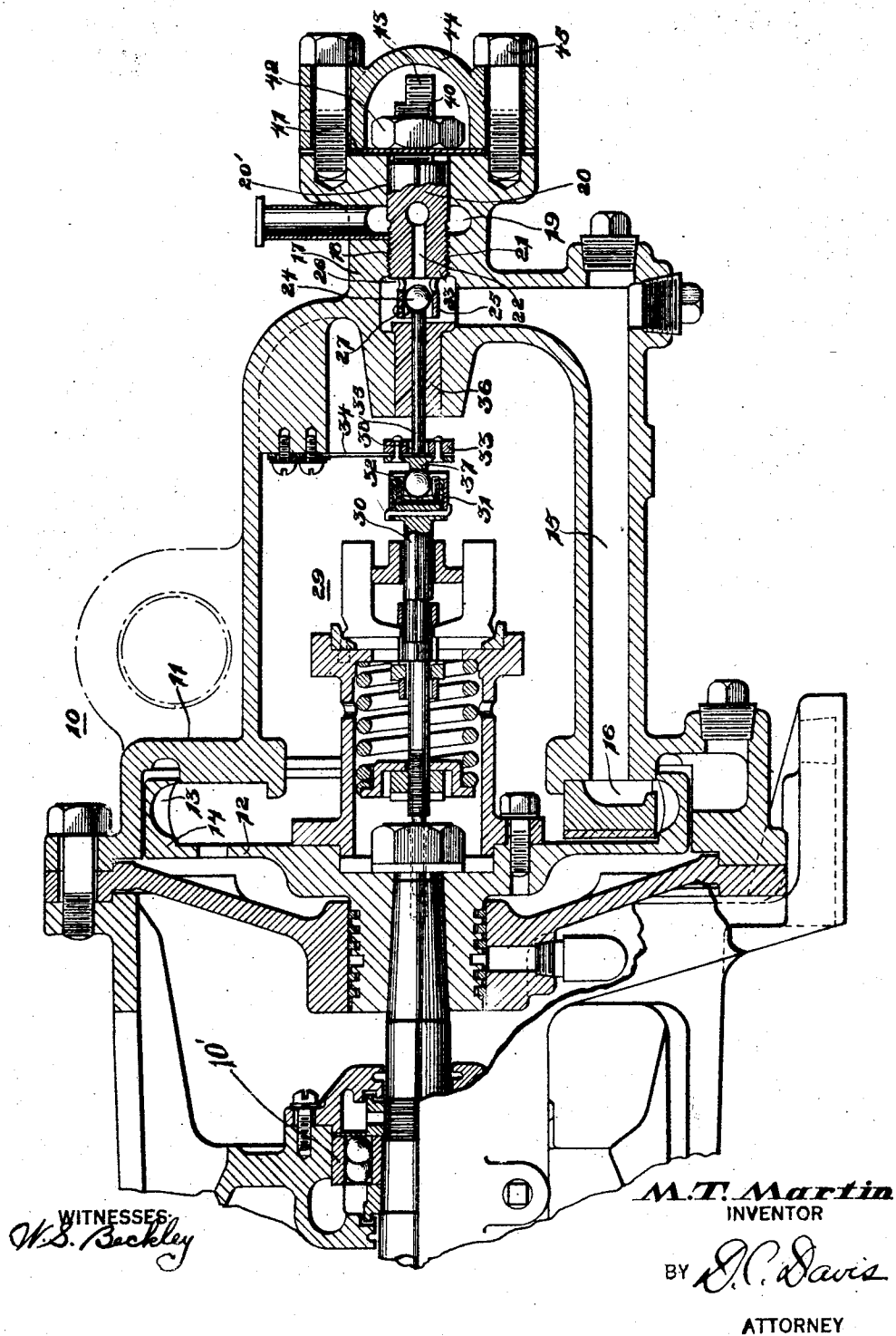
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M. T. MARTIN

TURBINE VALVE

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UNITED STATES PATENT OFFICE.

MATTHEW T. MARTIN, OF BROOKLYN, NEW YORK, ASSIGNOR TO WESTINGHOUSE ELECTRIC AND MANUFACTURING COMPANY, A CORPORATION OF PENNSYLVANIA.

TURBINE VALVE.

Application filed April 2, 1923. Serial No. 629,357.

To all whom it may concern:

Be it known that I, MATTHEW T. MARTIN, a citizen of the United States, and a resident of Brooklyn, in the county of Kings and State of New York, have invented a new and useful Improvement in Turbine Valves, of which the following is a specification.

My invention relates to prime movers, more particularly to those of the small type, such, for example, as are used with locomotive headlighter sets, and it is an object of my invention to provide apparatus of the character designated which shall incorporate governor-controlled admission valve mechanism which is capable of adjustment while the prime mover is in operation.

A further object of my invention is to provide a transmitting member in abutting relation with respect to reciprocatory governor-operated elements to render the governor apparatus durable and reliable in operation and economical from the standpoints of construction and assembly.

A further object of my invention is to provide a turbine which shall have a range of governor adjustment such that thrust, incident to movements of adjustment, cannot be imposed upon the governor or any of its associated parts.

A further object of my invention is to provide apparatus of the character designated which shall be durable and reliable from the standpoints of maintenance and operation and which shall be economical in the consumption of steam.

Apparatus made in accordance with my invention is illustrated on the accompanying drawing, forming a part of this application, in which the figure is a longitudinal sectional view of a turbine showing my improved valve mechanism applied thereto.

My present invention constitutes an improvement upon that type of prime mover described and claimed in the application of H. A. Newberg, Serial No. 496,569, filed August 29, 1921, and assigned to the Westinghouse Electric and Manufacturing Company, and the particular objects of my invention are to make the valve seat member of the governor controlled admission valve adjustable so that adjustments thereof may be made whenever desired, regardless of whether or not the turbine is in operation,

and to provide an intermediate abutment between the governor stem and the push rod, which shall prevent possible rotation of the push rod, prevent possible eccentric wear of one end of the push rod, and make it unnecessary to practice extreme accuracy in aligning the stem and rod.

Referring now to the drawing for a more detailed understanding of my invention, I show a headlighter set comprising a prime mover or turbine element, at 10, which is connected to a generator element, one of whose bearings is indicated at 10'. The turbine element, at 10, constitutes the basis of my improvement and the generator will not be further referred to.

The turbine or prime mover element, at 10, comprises a suitable casing 11, which surrounds a rotor 12 having internal buckets 13 on a peripheral flange 14. The casing 11 is provided with a nozzle passage 15, which communicates with nozzle openings 16 to supply motive fluid at high velocity to the buckets 13.

The casing 11 preferably terminates at one end in a hub portion 17, which contains a cylindrical opening 18, communicating with a motive fluid inlet passage or chamber 19 and with the nozzle supply passage 15. A cylindrical valve seat member 20 fits in the cylindrical opening 18 and it has a threaded connection 21 therewith, between the inlet passage 19 and the nozzle supply passage 15. The cylindrical valve seat member is provided with an interior passage 22, which communicates with the inlet supply chamber or passage 19 and which terminates preferably in a plane-faced valve seat portion 23 for the ball valve member 24. Beyond the seat portion 23, the cylindrical member 20 is provided with a cage construction 25 for the ball member, the cage construction preferably being provided with lateral openings 26 to allow motive fluid to enter the nozzle supply passage 15 and with any suitable means, such as a rivet 27, to limit opening movement of the ball valve member 24 by the entering motive fluid.

The governor mechanism, at 29, is carried by and arranged coaxially of the turbine rotor 12, and it includes a stem member 30, terminating in a socket 31, which contains a ball 32. The ball 32 is arranged to contact with an intermediate member 33

suspended by and held against rotation by a flexible member 34 secured to the turbine casing. The other side of the intermediate member 33 contacts with the valve or push
5 rod 35 having a close fit with respect to a bushing 36 carried by the turbine casing. The rod 35 is arranged to contact with the ball valve member 24. As shown, the governor stem 30, the push rod 35, and the valve
10 seat member 20 are in substantial alignment with the turbine axis.

The intermediate member 33 is preferably provided with a boss or projection 37, which contacts with the ball 32, and with a socket
15 38 to receive one end of the rod 35. The socket 38 is larger than the rod 35 in order that errors in misalignment may be taken care of. The intermediate member is prevented from rotating by means of the flexible
20 support 34. The socket 38 is sufficiently deep so that, in case of breakage of the flexible supporting member, the intermediate member 33 will be held in position in contact with the ball 32 and with the rod
25 35. The intermediate member 33 permits of satisfactory operation, should the stem 30 and the rod 35 not be in axial alignment, thereby facilitating assembly and manufacture. In a prior construction, the governor
30 stem ball contacted with the push rod, and it was found that there was a tendency for the ball to wear off the adjacent end of the push rod eccentrically. Accordingly, I devised this intermediate abutting member 33 which assures fixed positions of contact
35 with the ball 32 and with the push rod 35. Incidentally, the intermediate abutting member 33 prevents any rotary tendency being transmitted to the push rod.

40 The boss or projection 37 is preferably made of sufficient length so as to avoid contact of the intermediate member 33 with the wall of the socket 31 in case of wear of the latter or of the ball 32.

45 The cylindrical valve seat member 20 may be adjusted longitudinally and externally of the turbine merely by turning it. This is important for the reason that a proper positioning of the valve parts may
50 be obtained when the apparatus is originally assembled merely by turning the cylindrical valve seat member 20 until the the turbine is found to operate properly. In this way, minor variations in lengths of governor
55 stems and push rods, thicknesses of intermediate members, and sizes of balls are taken care of, permitting of quantity production of these parts without individual adjustment thereof. Also, after the turbine
60 has been in use, it may be desirable to make adjustments from time to time in order to take care of any looseness or wear which may occur in the governor mechanism or in the transmitting mechanism between
65 the governor and the ball valve 24. Under

the latter condition, the cylindrical valve seat may be turned to secure the proper adjustment of valve parts.

The cylindrical valve seat member 20 has a smooth cylindrical portion which has as
70 close a fit as is practicable with respect to the opening 20' in order to oppose leakage to the atmosphere from the inlet chamber. Leakage in this manner is furthermore
75 guarded against by a gasket 41, which surrounds the threaded stem 40 and which may be clamped against the hub member by the nut 42' and by the the cap 44, held tight against the hub member by means of the
80 screws 45.

The principal function of the nut 42 is to secure a tight fit in threaded connection 21 to minimize leakage from the chamber 19 to the supply passage 15.

The gasket 41 also serves as a means for
85 holding the valve seat member in an adjusted position should the nut 42 work loose or be left off. To this end, the gasket 41 is positively connected to the valve seat member in a circumferential direction so that the valve
90 seat member 20 may be adjusted and held in adjusted position by having the gasket 41 clamped by the cap 44.

The gasket 41 also serves to deflect steam
95 outwardly when making adjustments; thereby avoiding possible injury to the operator.

In order that the valve seat member 20 may be turned when making adjustments, the stem 40 is preferably provided with a
100 wrench-receiving portion 43.

The outer end of the cage 25 is sufficiently close to the bushing 36 so that, in adjusting the cylindrical valve seat member 20, the
105 cage 25 contacts with the bushing 36 without the valve seat portion 23 contacting with the valve ball 24 and transmitting thrust through the intermediate parts to the governor at 29. This arrangement avoids the possibility of imposing thrusts upon delicate
110 governor parts such as the stirrups.

From the structure described, it will be apparent that I have devised a valve seat member of a governor controlled turbine valve which may be adjusted externally of
115 the turbine and while the turbine is in operation. A fluid tight seal for the adjustable valve member is assured by means of the jam nut 42 which serves not only to hold the adjustable valve member in position but also
120 to clamp against the gasket 41 which contacts with the hub portion of the turbine casing. In addition, the cover 44 is firmly clamped against the bushing 41 thereby assuring a further sealing of the adjustable
125 valve member against possible escape of motive fluid.

In operation, if it is desired to adjust the valve seat portion 23, the cover 44 is removed, the jam nut 42 is loosened, and then
130 an appropriate wrench is applied to the

wrench portion 43, whereupon the cylindrical member 20 may be easily turned in one direction or the other, the screw-threaded connection 21 assuring either inward or outward movement of the valve seat member 20 to secure the desired adjustment. After the adjustment is made, the jam nut 42 is screwed up tightly against the gasket 41 in order to tighten the threads 21 and to clamp the gasket 41 and then the cover 44 is replaced, the screws 45 being tightened up so that the gasket 41 is firmly clamped by the cover. Due to the fact that the cage 25 will contact with the bushing 36 before the seat portion 23 contacts with the valve ball 24, it is impossible to impose thrusts on the governor incident to valve adjustment.

While I have shown my invention in but one form, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various other changes and modifications, without departing from the spirit thereof, and I desire, therefore, that only such limitations shall be placed thereupon as are imposed by the prior art or as are specifically set forth in the appended claims.

What I claim is:

1. The combination with a turbine having an admission valve of the governor-controlled type, of means extending externally of the turbine for adjusting the seat portion of the valve while the turbine is in operation, and a fluid-tight cover for said means carried by the turbine.

2. The combination with a turbine having an axially-aligned admission valve under the control of a governor, of means extending externally and axially of the turbine for adjusting the seat portion of the valve while the turbine is in operation.

3. The combination with a turbine having an admission valve of the governor-controlled ball type which is aligned with the turbine axis, of means extending externally and axially of the turbine for adjusting the seat portion of the valve while the turbine is in operation and a fluid-tight and detachable cover for said externally extending means.

4. In a turbine, the combination with a casing having a motive fluid inlet chamber and a nozzle supply passage; a valve seat member projecting beyond the casing, having a threaded connection with respect thereto, and having a passage for affording communication between the inlet chamber and the nozzle supply passage and which terminates in a valve seat portion; and a valve cooperating with the seat portion to control the flow of motive fluid from the inlet chamber to the nozzle passage.

5. In a turbine, the combination of a casing, a cylindrical opening in the casing, motive fluid inlet and nozzle supply passages communicating with the cylindrical open-

ing, a cylindrical member having a threaded connection with the casing between the inlet and nozzle supply passages, a passage in the cylindrical member for affording communication between the inlet and nozzle supply passages and terminating in a valve seat portion, and a valve member cooperating with said seat portion.

6. In a turbine, the combination of a casing, a cylindrical opening in the casing, motive fluid inlet and nozzle supply passages communicating with the cylindrical opening, a cylindrical valve seat member in the cylindrical opening and having a threaded connection with the casing between the inlet and nozzle supply passages, a passage in the valve seat member for affording communication between the inlet and nozzle supply passages and terminating in a substantially plane-faced seat portion, and a ball valve cooperating with said seat portion.

7. In a turbine, the combination of a casing, a cylindrical opening in the casing, motive fluid inlet and nozzle supply passages communicating with the cylindrical opening, a cylindrical valve seat member in the cylindrical opening and having a threaded connection with the casing between the inlet and nozzle supply passages, a passage in the valve seat member for affording communication between the inlet and nozzle supply passages and terminating in a valve seat portion, a ball valve cooperating with said seat portion, and governor-operated mechanism for limiting the freedom of movement of the ball valve member.

8. In a turbine, the combination of a casing, a rotor, a cylindrical opening in the casing in substantial alignment with the rotor axis, motive fluid inlet and nozzle supply passages communicating with the cylindrical opening, a cylindrical valve seat member having a threaded connection with the casing between the inlet and nozzle supply passages, a passage in the valve seat member for affording communication between the inlet and nozzle supply passages and terminating in a valve seat portion, and a governor-controlled valve cooperating with said seat portion.

9. In a turbine, the combination of a casing, a cylindrical opening in the casing, motive fluid inlet and nozzle supply passages communicating with the cylindrical opening, a cylindrical valve seat member in the cylindrical opening and having a threaded connection with the casing between the inlet and the nozzle supply passages, a passage in the valve seat member for affording communication between the inlet and the nozzle supply passages and terminating in a valve seat portion, a governor controlled valve member cooperating with said seat portion, and means carried by the cylindrical member and projecting beyond the turbine cas-

ing for turning the cylindrical member, whereby the valve seat portion may be adjusted toward or away from the valve member while the turbine is in operation.

10. In a turbine, the combination of a casing, a cylindrical opening in the casing, motive fluid inlet and nozzle supply passages communicating with the cylindrical opening, a cylindrical valve seat member in the cylindrical opening and having a threaded connection with the casing between the inlet and the nozzle supply passages, a passage in the valve seat member for affording communication between the inlet and the nozzle supply passages and terminating in a valve seat portion, a governor-controlled valve member cooperating with said seat portion, means carried by the cylindrical member and projecting beyond the turbine casing, whereby said cylindrical member may be turned while the turbine is in operation to move the valve seat portion toward or away from the valve member, and a fluid tight cover carried by the casing for said means.

11. In a turbine, the combination of a casing, a cylindrical opening in the casing, motive fluid inlet and nozzle supply passages communicating with the cylindrical opening, a cylindrical valve seat member in the cylindrical opening and having a threaded connection with the casing between the inlet and the nozzle supply passages, a passage in the valve seat member for affording communication between the inlet and the nozzle supply passages and terminating in a valve seat portion, a governor-controlled valve member cooperating with said seat portion, a threaded stud carried by the cylindrical member and which terminates in a wrench-receiving portion, and a lock nut carried by the stud for firmly holding the cylindrical member in a position of adjustment.

12. In a turbine, the combination of a casing, a cylindrical opening in the casing, motive fluid inlet and nozzle supply passages communicating with the cylindrical opening, a cylindrical valve seat member in the cylindrical opening and having a threaded connection with the casing between the inlet and the nozzle supply passages, a passage in the valve seat member for affording communication between the inlet and the nozzle supply passages and terminating in a valve seat portion, a governor-controlled valve member cooperating with said seat portion, a threaded stud carried by the cylindrical valve seat member and terminating in a wrench-receiving portion, a gasket surrounding the stud, and a lock-nut carried by the stud for holding the cylindrical valve seat member in any position of adjustment and serving to clamp the gasket with respect to the turbine casing to prevent leakage.

13. In a turbine, the combination of a cas-

ing, a cylindrical opening in the casing, motive fluid inlet and nozzle supply passages communicating with the cylindrical opening, a cylindrical valve seat member in the cylindrical opening and having a threaded connection with the casing between the inlet and the nozzle supply passages, a passage in the valve seat member for affording communication between the inlet and the nozzle supply passages and terminating in a valve seat portion, a governor-controlled valve member cooperating with said seat portion, a threaded stud carried by the cylindrical valve seat member and terminating in a wrench-receiving portion, a nut carried by the stud for cooperating with the turbine casing to hold the cylindrical valve seat member in adjusted position, and a detachable cover for the stud carried by the casing.

14. In a turbine, the combination of a casing, a cylindrical opening in the casing, motive fluid inlet and nozzle supply passages communicating with the cylindrical opening, a cylindrical valve seat member in the cylindrical opening and having a threaded connection with the casing between the inlet and the nozzle supply passages, a passage in the valve seat member for affording communication between the inlet and the nozzle supply passages and terminating in a valve seat portion, a governor-controlled valve member cooperating with said seat portion, a threaded stud carried by the cylindrical valve seat member, a gasket surrounding the stud and contacting with the turbine casing, a jam nut carried by the stud for holding the cylindrical valve seat member in adjusted position and cooperating with the gasket to prevent leakage, a detachable cover for the stud, and adjustable means for clamping the cover against the gasket to further prevent leakage.

15. In a turbine, the combination of a casing, a rotor, a hub portion carried by the casing substantially in axial alignment with the rotor, a cylindrical opening in the hub portion, motive fluid inlet and nozzle supply passages communicating with the cylindrical opening, a cylindrical valve seat member in the cylindrical opening and having a threaded connection with the hub portion between the inlet and nozzle supply passages, a passage in the valve seat member for affording communication between said passages and terminating in a valve seat portion, a ball valve member cooperating with the seat portion, axially disposed governor mechanism carried by the rotor, and axially arranged operating mechanism between the governor mechanism and the ball valve member.

16. In a turbine, the combination of a valve seat member adjustable externally of the turbine, a valve member cooperating with

the seat member and tending to be opened by the steam, a push-rod for moving the valve member toward its seat, and a governor for moving the push-rod.

17. In a turbine, the combination of a valve seat member adjustable externally of the turbine, a ball valve cooperating with the seat and tending to be opened by the steam, a push-rod for moving the ball valve toward its seat, and a governor for moving the push-rod.

18. In a turbine, the combination of a threaded member extending externally of the turbine and having a steam passage therein and terminating in a valve seat portion with a cage for the valve, a ball valve cooperating with the seat portion and tending to be moved away therefrom by the steam, and a governor for moving the ball valve toward its seat portion.

19. In a turbine, the combination of a threaded member extending externally of the turbine and having a steam passage therein and terminating in a valve seat portion and a valve-holding cage, a ball valve in the cage and tending to be moved away from the seat portion by steam, a push-rod for moving the ball valve toward the seat portion, and a governor for moving the push-rod.

20. In a turbine, the combination of an admission valve comprising a seat member which is adjustable externally of the turbine and a ball valve member movable away from the seat member by entering steam, a push-rod for moving the ball member toward the seat member, a governor-operated stem construction, and an abutment member between the stem construction and the push-rod and in abutting relation with respect thereto.

21. In a turbine having a casing, the combination of an admission valve, a governor-operated element, a push-rod between the governor-operated element and the valve, transmitting means in abutting relation between the governor-operated element and the push-rod, and flexible means for supporting the transmitting means from the turbine casing.

22. In a prime mover having a casing, the combination of an admission valve including a seat member adjustable externally of the casing and a valve member cooperating with the seat member and movable away therefrom by motive fluid, a push-rod cooperating with said movable valve member for moving it toward its seat, a governor-operated element, means interposed between the governor-operated element and the push-rod and in abutting relation with respect thereto, and means for supporting said means from the casing.

23. In a prime mover having a casing, the combination of an admission valve in-

cluding a seat member which is adjustable externally of the casing and a ball valve member cooperating with the seat member and movable away therefrom by motive fluid, a push-rod cooperating with said ball member for moving it toward its seat member, a governor stem having a ball member at one end thereof, a transmitting member interposed between the ball member of said stem and the push-rod and in abutting relation with respect thereto, and supporting means for the transmitting member carried by the casing.

24. In a turbine, the combination of an admission valve comprising a seat member which is adjustable externally of the turbine and a movable valve member cooperating with the seat member and movable away therefrom by entering steam, a push-rod for moving the movable valve member toward the seat member, a governor stem, and a transmitting member between the governor stem and the push-rod and in abutting relation with respect thereto.

25. In a turbine, the combination of an admission valve comprising a valve seat member which is adjustable externally of the turbine and a ball valve member which is movable away from the seat member by entering steam, a push-rod in substantial alignment with respect to said seat member and operative to move the ball toward the seat member, a governor-operated stem in substantial alignment with respect to said push-rod, and an intermediate transmitting member in abutting relation with respect to the governor stem and the push-rod.

26. In a turbine having a governor whose axis coincides with the turbine axis, the combination of an admission valve comprising a seat member in substantial alignment with the turbine axis and which is adjustable externally of the turbine and a ball valve cooperating with the seat member and movable away therefrom by entering steam, a push-rod in substantial alignment with the seat member for moving the ball valve toward the seat member, a governor-operated member in substantial alignment with the push-rod and with said seat member, and a transmitting member interposed between the governor-operated member and a push-rod and in abutting relation with respect thereto.

27. In a turbine having a casing and a governor whose axis coincides with the turbine axis, the combination of an admission valve comprising a seat member in substantial alignment with the turbine axis and threaded to the casing and extending externally thereof, and a ball valve member cooperating with the seat member, and which is movable away therefrom by entering steam, a push-rod in substantial alignment with the turbine axis for moving the ball valve

member toward its seat, a governor-operated element in substantial alignment with the turbine axis, a transmitting member between the governor-operated member and
5 the push-rod and in abutting relation with respect thereto, and means carried by the casing for supporting the transmitting member.

28. In a turbine, the combination of a
10 valve seat member adjustable externally of the turbine, a movable valve member co-operating with the seat member and movable away therefrom by entering fluid, a

governor, means for transmitting motion from the governor to the movable valve
15 member to move the latter in a closing direction, and abutment means for limiting movement of adjustment of the seat member in one direction to prevent thrusts being imposed on the governor and trans-
20 mitting means by the seat member.

In testimony whereof, I have hereunto subscribed my name this 5th day of March 1923.

MATTHEW T. MARTIN.