No. 723,894. PATENTED MAR. 31, 1903.

J. B. MICHAEL.

THROTTLE VALVE.

APPLICATION FILED JULY 14, 1902.

NO MODEL.

FIG. 1.

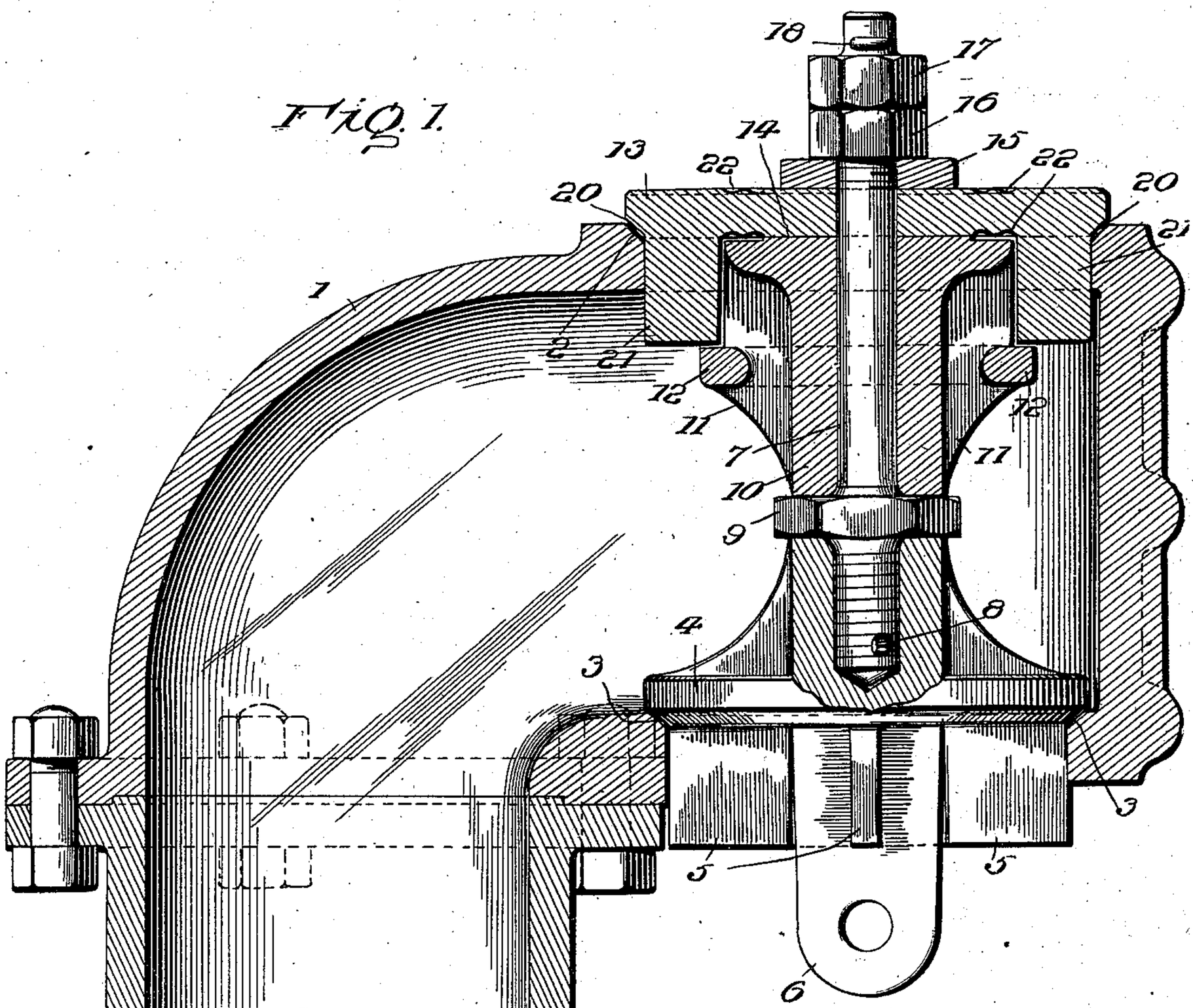


FIG. 2.

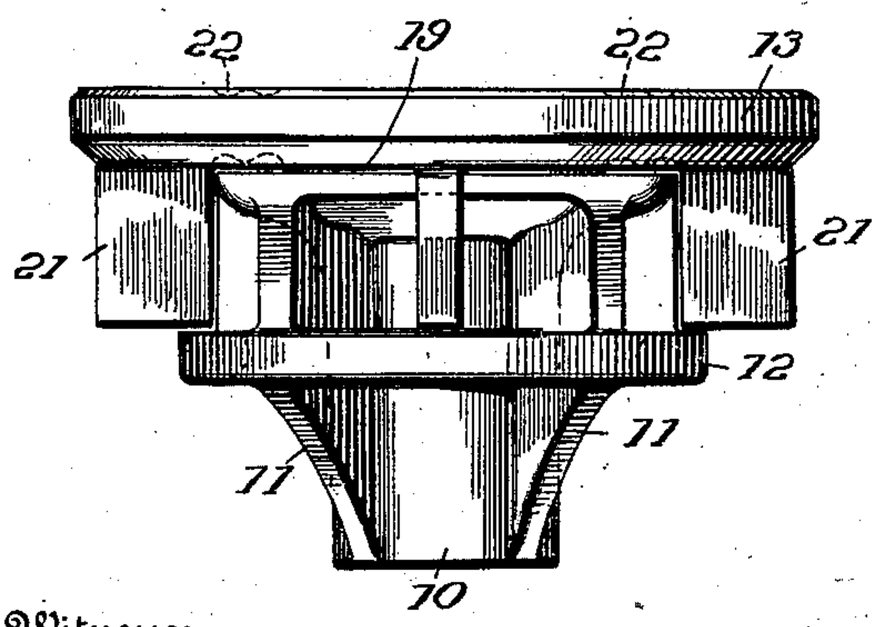
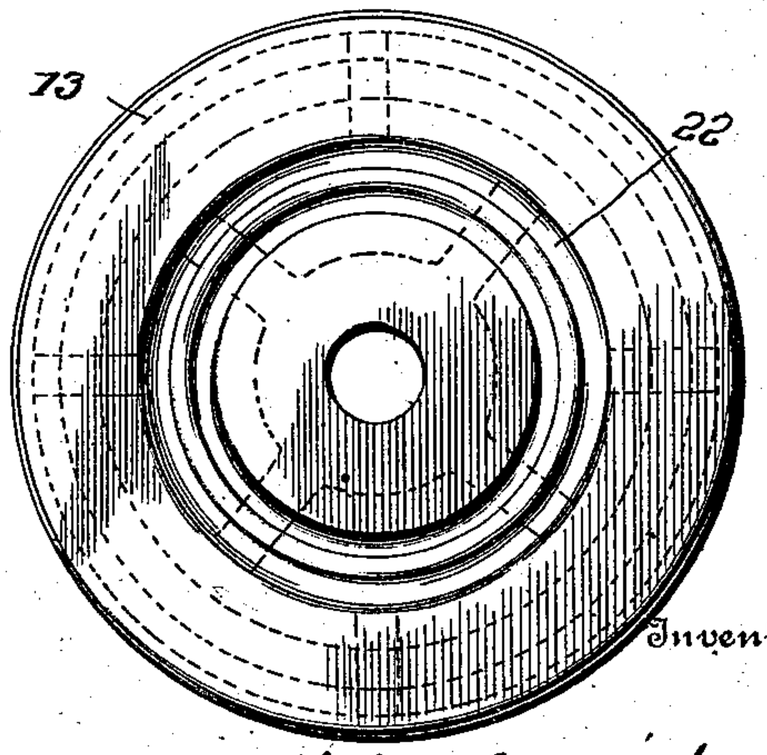


FIG. 3.



Witnesses

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UNITED STATES PATENT OFFICE.

JOHN BAKER MICHAEL, OF KNOXVILLE, TENNESSEE.

THROTTLE-VALVE.

SPECIFICATION forming part of Letters Patent No. 723,894, dated March 31, 1903.

Application filed July 14, 1902. Serial No. 115,556. (No model.)

To all whom it may concern:

Be it known that I, JOHN BAKER MICHAEL, a citizen of the United States, and a resident of Knoxville, Tennessee, have invented a new and useful Improvement in Throttle-Valves, which is fully set forth in the following specification.

My invention relates to throttle-valves for steam-engines. One of the great difficulties experienced in valves of this class is their liability to leakage, especially when used with compound and other high-pressure engines, with all the accompanying annoyance and injury due to condensed water and steam, which are thus caused to collect in the cylinders.

The object of the present invention is to obviate these objections and to construct a simple and efficient throttle-valve.

With this object in view the invention consists in the construction and combination of elements hereinafter illustrated and described and then pointed out in the claims.

Referring to the drawings, which are hereby made a part hereof, Figure 1 is a vertical transverse section through the throttle-box with my improved throttle-valve in position and some of the parts shown in elevation. Fig. 2 is an elevational view of the upper diaphragm disk valve with its supporting-sleeve, and Fig. 3 is a plan view of said valve.

Referring to the drawings, 1 indicates the throttle-box, of usual construction, having the two carefully-ground valve-seats 2 and 3 formed therein in the usual or any desired manner. Seated in the seat 3 is a disk valve 4, provided with the usual guide-wings 5 5 and the depending lug 6, by means of which it may be connected to the usual or any suitable valve-operating mechanism. (Not shown.) A rod or stem 7 is connected to the disk valve 4, as by screw-threads or a pin passing through the hole 8, or by both the screw-threads and pin, and is provided with a shoulder 9, upon which a sleeve 10 rests, the sleeve also fitting the stem closely. Brackets 11 on the sleeve 10 support an annular shoulder 12, and a diaphragm-like disk valve 13 rests with a ground joint 14 upon the top of the sleeve 10, the rod or stem 7 passing up through the valve 13, a washer 15, and lock-nuts 16 and 17 and being provided with a cotter-pin 18. While the valve 13 rests with a tight joint upon the upper end of the sleeve 10, there is a clearance of, say, one sixty-fourth of an inch provided between the lower surface of the valve 13 and the perimeter of the top of the sleeve, as indicated at 19, and the proportion of the parts is such that a like clearance normally exists between the valve and its seat, as indicated at 20. The proper adjustment of the parts for this latter purpose is secured by grinding the bottom of the sleeve 10 at the point where it rests upon the shoulder 9. The valve 13 has guide-wings 21, between which and the shoulder 12 and the brackets 11 a clearance of about one sixty-fourth of an inch normally exists, and the valve itself is provided with annular corrugations 22 on its upper and lower surfaces, these corrugations by their distribution permitting a slight yielding action of the diaphragm disk valve 13 without unduly weakening it.

In constructing and assembling the parts the lower valve 4 is ground to its seat 3, the stem 7 is attached thereto, the sleeve 10 is ground to its bearing on shoulder 9, the valve 13 is ground to its seat 2 and to its bearing on the sleeve 14, the washer 15 is ground to the valve-diaphragm 13, the nuts 16 and 17 are tightened, so as to secure the entire structure together, and the whole secured by inserting the cotter-pin 18, the grinding and tightening of the parts being such as to make steam-tight joints. When the parts are assembled and in position in the valve-box, the two valve-disks are so constructed that when the lower valve 4 is seated the upper valve 13 will not entirely close until forced to its seat by pressure, a slight opening being left between the valve and its seat; but with sufficient pressure the upper disk will be forced to its seat, the disk bending or yielding along the corrugations. This operation will be readily understood if we assume the upper disk 13 of the valve to have a diameter of eight inches, giving the upper face exposed to steam-pressure a surface area of 50.2656 square inches, and the contacting surface of the sleeve 10, which supports disk 13, to have a diameter of three and one-half inches or a superficial area of 21.9912 square inches and

the steam-pressure to be two hundred pounds. Now a portion of the pressure upon the upper face of the disk 13 will be transmitted to and sustained by the sleeve 10; but the remaining portion of the disk, which overhangs the sleeve and is unsupported, aggregating a surface area of 28.2744 square inches, will be burdened by the steam-pressure, and this, amounting to about two and one-half tons, will easily bend the disk along the line of corrugations and firmly press the valve to its seat and retain it there.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a throttle-valve, the combination of a throttle-box with ports therein, and a valve adapted to close said ports located in said box, said valve consisting of two relatively fixed disk valves, one of which is flexible, and a connection between said disk valves.

2. In a throttle-valve, the combination of a throttle-box with ports therein, and a valve adapted to close said ports located in said box, said valve consisting of two relatively fixed disk valves, one of which is flexible, and an adjustable connection between said disk valves.

3. In a throttle-valve, the combination of a throttle-box, with ports therein, and a valve adapted to close said ports located in said box, said valve consisting of two relatively fixed disk valves, one of which is provided with annular corrugations, and a connection between said disk valves.

4. In a throttle-valve, the combination of a throttle-box with ports therein, and a valve adapted to close said ports located in said box, said valve consisting of two relatively fixed disk valves, one of which is flexible, and a connection between said disk valves, said connection being of such length as to normally prevent one of said valves from entirely closing its port.

5. In a throttle-valve, the combination of a throttle-box with ports therein, and a valve adapted to close said ports located in said box, said valve consisting of two relatively fixed disk valves, one of which is flexible, a stem, having a shoulder thereon, connecting said disk valves, and a sleeve surrounding said stem, resting on said shoulder on said stem and abutting the lower face of the uppermost of said disk valves.

6. In a throttle-valve, the combination of a throttle-box with ports therein, and a valve adapted to close said ports located in said box, said valve consisting of the two relatively fixed disk valves, one of which is flexible, a stem, having a shoulder thereon, connecting said disk valves, said stem being of such length as to normally prevent said flexible valve from closing its port, and a sleeve around said stem between its shoulder and the lower face of the upper disk valve.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

JOHN BAKER MICHAEL.

Witnesses:

D. R. HICKS,

JAS. H. WELCKER.