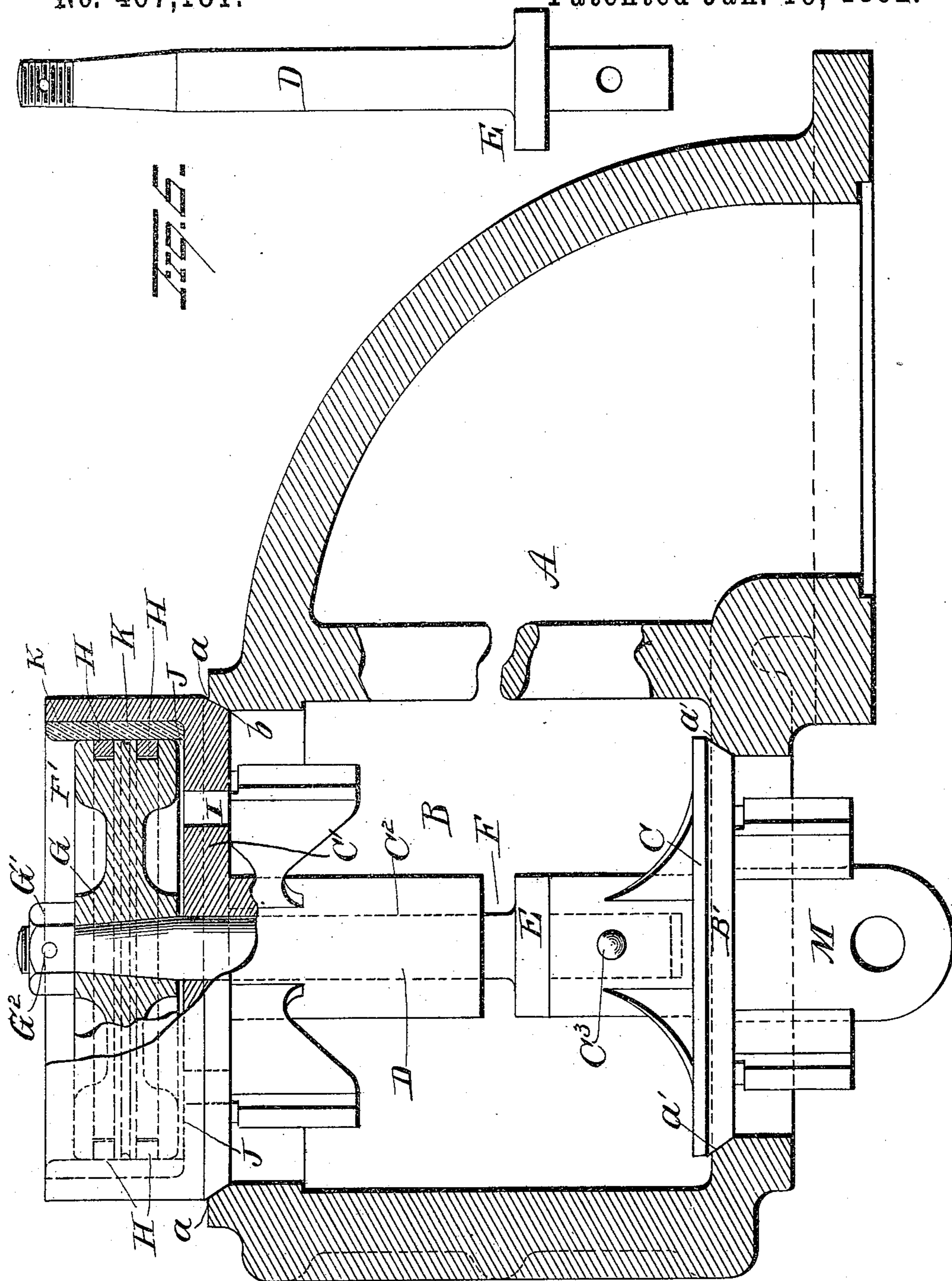


2 Sheets—Sheet 1.

No. 467,181.

Patented Jan. 19, 1892.



Witnesses.
E. H. Hingham
G. F. Downing

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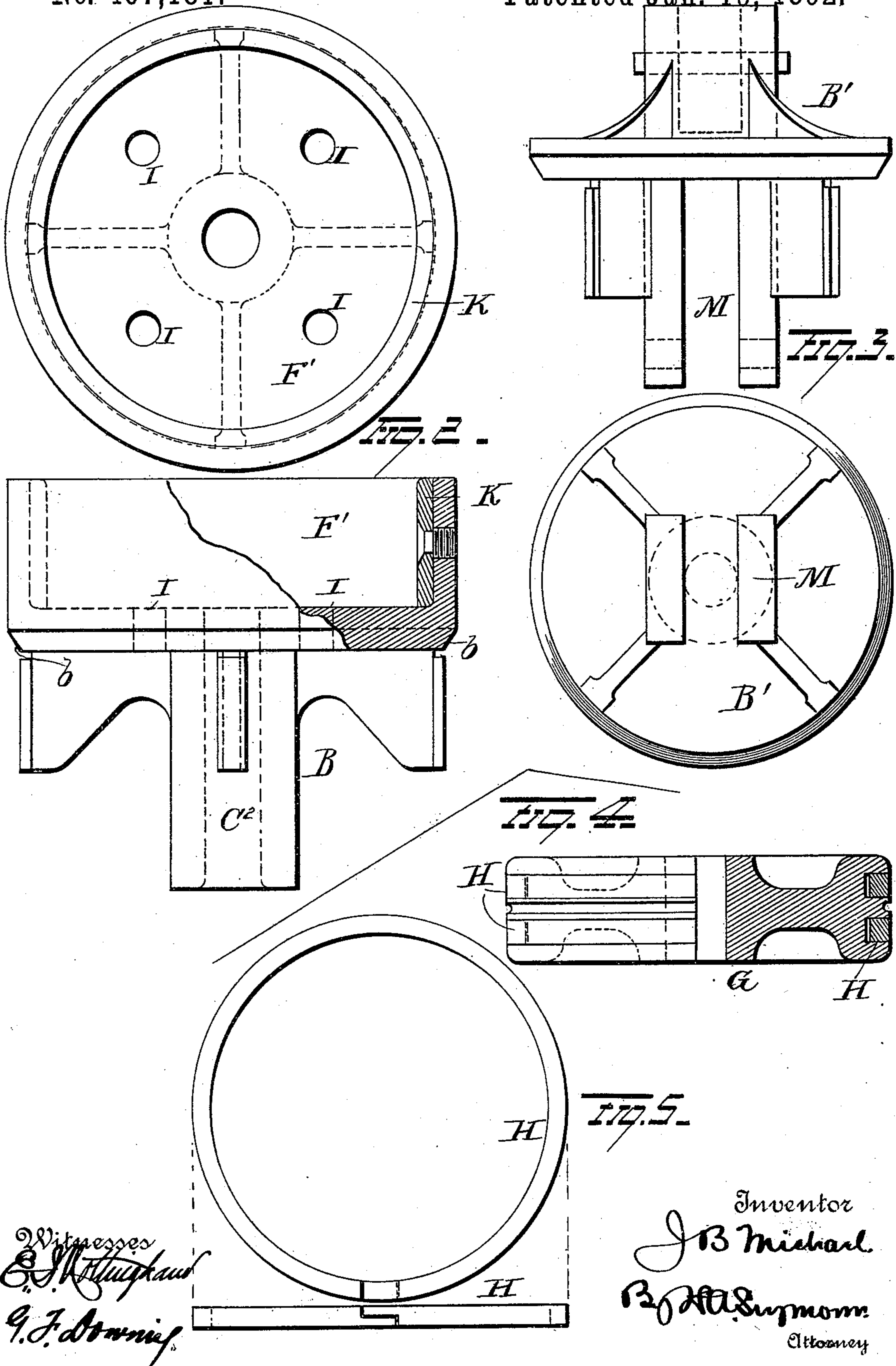
(No Model.)

2 Sheets—Sheet 2.

J. B. MICHAEL.
THROTTLE VALVE.

No. 467,181.

Patented Jan. 19, 1892.



Witnesses
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UNITED STATES PATENT OFFICE.

JOHN B. MICHAEL, OF KNOXVILLE, TENNESSEE.

THROTTLE-VALVE.

SPECIFICATION forming part of Letters Patent No. 467,181, dated January 19, 1892.

Application filed October 16, 1891. Serial No. 408,933. (No model.)

To all whom it may concern:

Be it known that I, JOHN B. MICHAEL, a citizen of Knoxville, in the county of Knox and State of Tennessee, have invented certain new and useful Improvements in Throttle-Valves; and I 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.

My invention relates to an improvement in throttle-valves for steam-engines.

Heretofore with all throttles of the type to which my invention relates of which I am aware (and more particularly the larger ones) a very serious trouble has arisen by these leaking, and especially compound engines carrying high pressures, causing an unlimited and unnecessary amount of condensed water to collect in the high and low pressure cylinders, which is very annoying and troublesome, as well as injurious, the leakage being more intense in this class of engines than other types on account of the high pressure being carried.

It is the object of my invention to obviate the deficiencies of previously-constructed throttle-valves of this type and to produce a valve which will be steam-tight and which shall effectually perform its functions in every particular.

With this object in view the invention consists in certain novel features of construction and combinations and arrangements of parts, as hereinafter set forth, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a vertical cross-sectional view of my improved throttle-valve. Figs. 2 to 6 are detail views. A represents the throttle-box or valve-chamber, having upper valve-seats *a* and lower valve-seat *a'*. Working in the throttle or valve box is my improved valve B. This valve is composed, principally, of two disks C C'. The lower disk C is made with a shoulder B' to bear on the valve-seat *a'*, and the disk C' is made with a shoulder *b* to rest on the valve-seat *a*. The lower disk C is made with a socket for the reception of the lower end of a piston-rod D, which is secured in said socket by means of a key or pin C². The piston-rod D is provided with an annular flange E, adapted to

rest on the top of the disk C. From the flange E the piston-rod D projects upwardly loosely through an opening C² in the upper disk C', a space F being left between the lower end of the upper disk and the upper face of the annular flange E. The opening C² in the upper disk is made one thirty-second of an inch larger than the piston-rod D, so as to insure its absolute freedom of action and to allow upper disk C' to seat itself firmly on seat *a*.

The four openings I in the bottom of chamber F' in the upper disk C' are drainage-openings for the purpose of relieving piston G of any possible back-pressure that might occur by steam leak, permitting same, after condensation, to escape into throttle-box A, thereby insuring a positive seating of lower disk C to seat *a'*. A piston G is fitted to operate in the chamber F', and is secured to the upper end of the piston-rod D by means of a suitable nut G', which nut may be rigidly secured to the rod by means of a pin G². The piston G will preferably be provided with metallic packing-rings H in sections or otherwise, said packing-rings being expanded into position either by steam, springs, wedge, or their own elasticity and with a water-channel H'.

The opening or space F between upper disk C' and top of annular flange E answers three purposes: First, it admits of the absolute freedom of upper disk C' in seating itself firmly, being independent of lower disk C; secondly, it permits of the admission of sufficient steam to throttle-box A and under side of upper disk C' to balance pressure on top of upper disk C', thereby insuring easy movement of upper valve-disk C' when the top of annular flange E comes in contact with the same and preparatory to its being opened; thirdly, it admits of forty-two per cent. steam opening to dry pipe, thereby permitting the lower disk C to be used independent of upper disk C', where heavy throttle service is not necessary, and also decreasing wear and tear of upper seat *a*, both disks when open one inch giving a total area of 53.4072 square inches, being sixty-four per cent. more opening than required, demonstrating the practicability of using lower disk almost continually. The space J between the bottom of chamber F' and piston G provides for the difference in expansion of valve B

and throttle-box A, (one-sixteenth of an inch being found sufficient space for this purpose,) thereby establishing an absolutely-tight valve for both upper and lower disks C and C'.

5 K represents a brass bushing pressed into chamber F', secured with three one-half-inch screws, which are securely riveted inside and out. The surface of bushing, not being susceptible to rust, allows perfect freedom of
10 metallic rings with the least amount of friction possible.

M represents lug on bottom of lower disk C, where connections are made from throttle-valve B to bell-crank attached to upright
15 pipe in dome. (Not shown.) The principle of this valve is as follows: The lower disk C, being independent of the upper disk C', seats itself firmly on the principle of differential area, the lower disk or valve C having an ex-
20 posed area to boiler-pressure of 28.2744 square inches, and the piston G, which is secured firmly to the lower disk or valve C, having also an exposed area to boiler-pressure of 35.7847 square inches, making a difference of
25 6.5103 square inches, which actual practice has demonstrated is sufficient to seat and retain lower disk or valve C firmly to its seat and operate easily when the lower disk or valve C is used independently. The upper
30 valve or disk C' is operated only when the lower valve or disk C has been opened the distance shown in space F, the pressure admitted through lower disk or valve C after filling dry pipe and throttle-box A acting as
35 a counterbalance on the under side of upper valve or disk C', the area of which is 43.4455 square inches against 50.2656 square inches, the area exposed to boiler-pressure of upper valve or disk C', making a difference of
40 6.8201 square inches, within a slight fraction of the balance of the lower disk or valve C, showing conclusively that the valve is strictly and truly an independent double-disk balanced throttle-valve.

45 Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination, with a throttle-box, of a throttle-valve located therein, said throttle-
50 valve being composed of two separate and independent disks or valves, a piston-rod secured to the lower disk or valve and passing loosely and upward through the upper disk or valve, a chamber in said upper disk or valve,
55 and a piston-head secured to said piston-rod and adapted to operate in said chamber, substantially as set forth.

2. The combination, with a throttle-box, of a throttle-valve located therein, said throttle-
60 valve being composed of two separate and independent disks or valves, a piston-rod se-

cured to the lower disk or valve, a piston-head composed of metallic rings, a chamber in the upper end of the upper valve or disk, and a piston secured to the upper end of the
65 said piston-rod and adapted to work in said chamber, substantially as set forth.

3. The combination, with a throttle-box, of a throttle-valve therein, said throttle-valve being composed of two disks or valves sepa-
70 rate and independent of each other, a piston-rod secured to the lower disk or valve and projecting loosely upward through the upper disk or valve, a flange projecting from said piston-rod between the disks, a chamber in
75 the upper end of the upper disk or valve, and a piston secured to said piston-rod and adapted to work in said chamber, substantially as set forth.

4. The combination, with a throttle-box, of
80 a throttle-valve being composed of two independent and separate disks, a piston-rod secured to the lower disk or valve and passing loosely upward through the upper disk or valve, said upper disk or valve being so dis-
85 posed when on its valve-seat that there will be an open space between said upper and lower disks, a chamber in the upper end of the upper valve or disk, and a piston secured to the upper end of the said piston-rod and
90 adapted to work in said chamber, substantially as set forth.

5. The combination, with a throttle-box, of a throttle-valve located therein, said throttle-
95 valve being composed of two separate and independent disks, a piston-rod secured to one of said disks and passing loosely and upward through the upper disk or valve, a piston secured to said piston-rod and adapted to operate in said chamber, and an opening or open-
100 ings connecting said chamber with the interior of the throttle-box; whereby to convey condensed steam to the interior of the throttle-box, substantially as set forth.

6. The combination, with a throttle-box, of
105 a throttle-valve located therein, said throttle-valve being composed of two separate and independent disks or valves, a piston-rod secured to the lower disk or valve, a piston-head composed of metallic rings expanded
110 by means of steam, a chamber in the upper end of the upper disk or valve, and a piston secured to the upper end of said piston-rod and adapted to work in said chamber, substantially as set forth.

In testimony whereof I have signed this specification in the presence of two subscrib-
ing witnesses.

JOHN B. MICHAEL.

Witnesses:

DANL. KELLY,
JAS. E. KELLY.