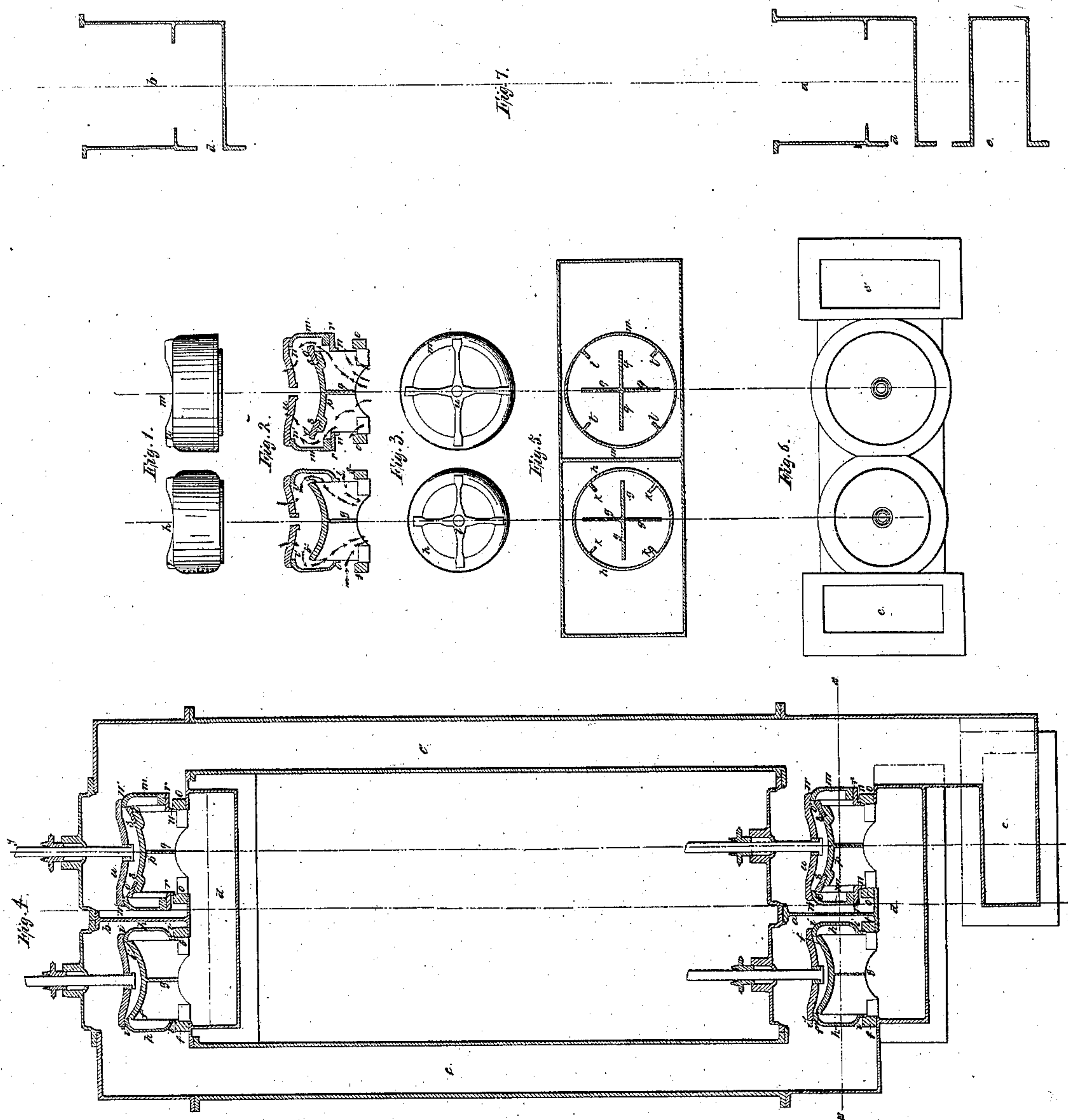


F. B. Sterens,
Steam Balanced Valve.

N^o 8,004.

Patented Mar. 25, 1851.



UNITED STATES PATENT OFFICE.

FRANCIS B. STEVENS, OF NEW YORK, N. Y.

BALANCED VALVES.

Specification of Letters Patent No. 8,004, dated March 25, 1851.

To all whom it may concern:

Be it known that I, FRANCIS B. STEVENS, of the city, county, and State of New York, have invented certain Improvements in
5 Balanced Valves; and I do hereby declare that the following is a full and exact description thereof.

My object is a convenient adaptation to the double acting steam engine, of balanced
10 valves commonly known as the Cornish double beat valves. For the balanced spindle valves as commonly constructed are liable to two objections: In the first place the valve being formed by two disks con-
15 nected by a spindle, the force of the steam acting against the disks in opposite directions puts a great strain on the spindle; so that should it be slightly eccentric the valve will be sprung from the seat and will leak;
20 and in the second place the difference of expansion between the valve spindle which is completely surrounded by steam, and the steam chests holding the valves, which is on the outside exposed to the atmosphere will
25 also cause the valves to leak. The valves commonly known as the Cornish double beat valves are obviously superior in principle to the spindle valves just described and hav-
30 ing been invented nearly a century ago and been in constant use ever since, it may be presumed that their general introduction in the double acting steam engine where bal-
35 anced valves are used, has been prevented or retarded by the difficulties presented for their adaptation to that purpose. These dif-
40 ficulties might be of the space occupied, or of the expense, or of such an adaptation as would alter but little the arrangements of the existing parts of the engine.

My object is to endeavor to arrange these valves in such manner, that the advantages
45 gained by their superiority in principle, may not be so counterbalanced by the difficulties above named, as to prevent their general introduction.

To effect this I arrange the valves on the same level; as this is the arrangement most
50 generally adopted in engines having balanced valves; and I also for the same purpose introduce certain peculiarities in the construction of the valve, that render it different from any hitherto in use. I will
55 now proceed to describe my arrangement by a reference to drawings, and as I know of no instance where the particular variety of Cornish valve that I adopt has been made

or used in this country, and of no work where it is described with a figured reference to drawings, I will also describe this valve so that I can clearly point out the alterations
60 I make.

Figure 1 represents a side view of one of each of the steam and exhaust valves the steam valve being the Cornish valve and the
65 exhaust valve having my improvement. Fig. 2 represents a vertical section of the same valves both raised off their seats, which are also shown in section. Fig. 3 represents a horizontal view of the same valves. Fig. 4
70 represents a vertical section of the side pipes, steam chests, valves, and valve seats. Fig. 5 represents a horizontal cross section of the lower steam chest, valves and valve seats taken through the red line $x-x$ of Fig. 4. Fig. 6 represents a horizontal view of the
75 lower steam chest. Fig. 7 represents a vertical section of the side pipes, taken through the red line $y-y$ of Fig. 4.

In the drawing figured as above a is the lower steam chest.
80

b is the upper steam chest.

c and c' are the side pipes leading respectively to the boiler and condenser.

d and d' are the openings from the side pipes into the cylinder nozzles.
85

e is the opening into the condenser.

h, h represents the two steam valves, differing but little if any from the Cornish valve.

m and m represents the two exhaust
90 valves, showing the alterations that I make to adapt them to the position in which they are placed relatively to the steam passages.

I will in the first place describe the different parts of the Cornish valve. f and f' are
95 respectively the lower and upper seats, the upper seat being formed on the circumference of a disk supported by a cross— g — g —cast in the center of the ring forming the lower seat—the valve h is formed by a
100 hollow cylinder, the lower part of which being turned in as shown, forms the valve face i that rests on the seat f and the upper part also turned in forms the valve face i' that rests on the seat f' . k k are ribs cast
105 on the inside of the valve to guide it. l is a cross by which the valve is lifted by the valve stem. The steam valve h thus drawn and described does not differ materially if in any respect from a Cornish double beat
110 valve; and I have been thus particular in describing it, as I wish to explain the man-

ner in which I alter it; this alteration constituting the material part of my invention.

It will be observed by a reference to the drawing that the position of the exhaust
5 valve with respect to the steam passages, and also with regard to the direction in which it is opened, is such, that if it were made similar to the valve just described the pressure of the steam would force it
10 from its seat. It is necessary therefore, in order that the valve shall be retained on its seat by the pressure of the steam, that the seat formed on the disk supported by the ribs shall be larger in diameter than the
15 seat that forms the circular opening through which the steam passes. In order to effect this I attach a ring to the valve forming the bearing for the smaller seat. This ring being smaller in diameter than the disk I
20 also attach a ring to this disk forming the larger seat. I am thus enabled to put the valve together by slipping the smaller ring over the disk and then by attaching the larger ring to the disk, and finally by slip-
25 ping the valve over the disk and attaching it to the smaller ring.

The faces of this valve having respectively the smaller and larger diameter are represented respectively by n and n' resting
30 on the seats o and o' .

p is the disk supported by the cross q .

The valve I form in two pieces by bolting to it the ring r on the edge of which the smaller valve face n is shown and the disk
35 I also form in two pieces, by bolting to the disk p the ring s on the edge of which the larger valve seat o' is shown. To put the valve in its place, the ring r must first be slipped over the disk p —then the ring s

must be bolted to the disk p and finally the
40 remainder of the valve must be shipped over the disk p and ring s and bolted to the ring r . u is a cross by which the valve is lifted by the valve stem.

$t t$ are ribs to guide the valve.

45

From the position in which this valve m is shown in reference to the steam passages it will be seen that when the valve is closed the pressure of steam will be below the valve and the vacuum will be above the
50 valve; it will also be seen from the construction of the valve that it will be held down on its seat by the pressure of steam acting from below.

I do not claim as my invention, valves
55 having seats of such relative diameters, that they shall be retained thereon by the pressure of steam; but

What I claim as my invention and desire to secure by Letters Patent, is—

60

In the above description of valve where the disk is held by a support running up through the hollow valve, so forming the valve that the upper seat shall be larger in diameter than the lower one, by means of
65 the ring r attached to the valve and by means of the ring s attached to the seat, or by any means substantially the same; for the purpose of retaining the valve on its seat by the pressure of steam whenever its
70 position or location in respect to the steam passages is such that the pressure of steam is below the valve when closed.

FRANCIS B. STEVENS.

Witnesses:

JAMES A. STEVENS,
HENRY H. ANDERSON.