

W. F. GOULD.
BALANCED SLIDE VALVE.
APPLICATION FILED FEB. 12, 1906.

992,349.

Patented May 16, 1911.

2 SHEETS—SHEET 1.

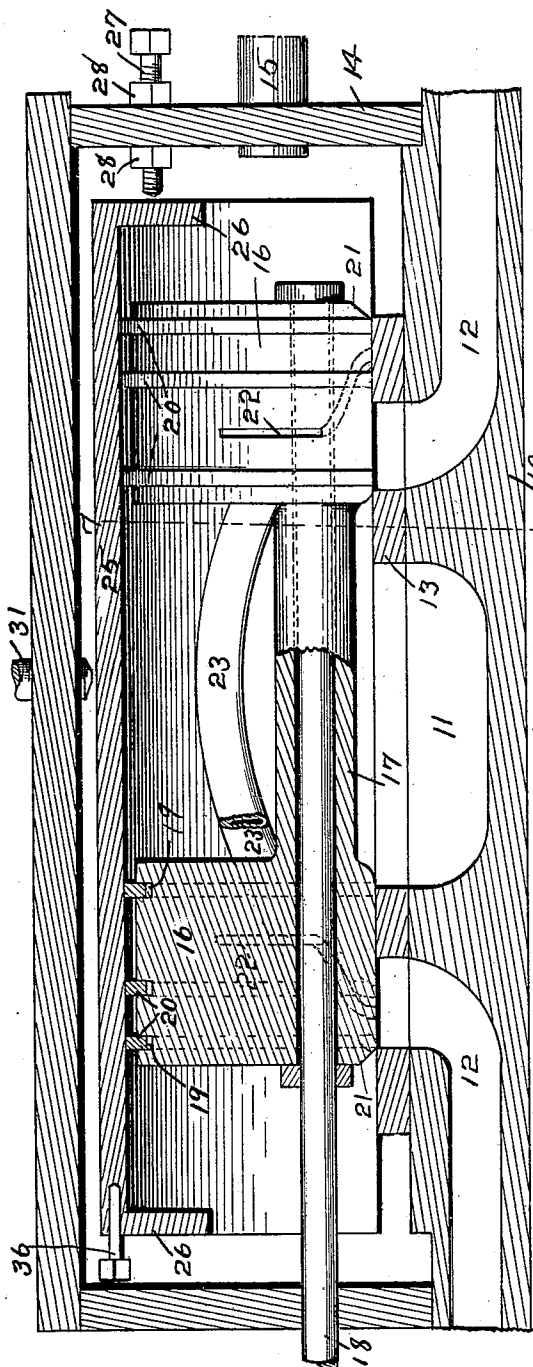
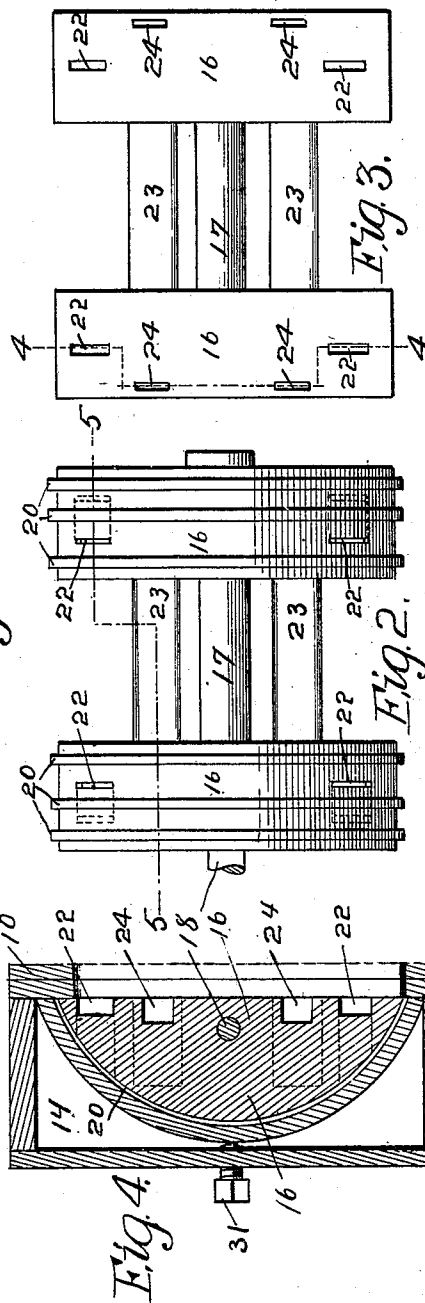


Fig. 1.



Witnesses
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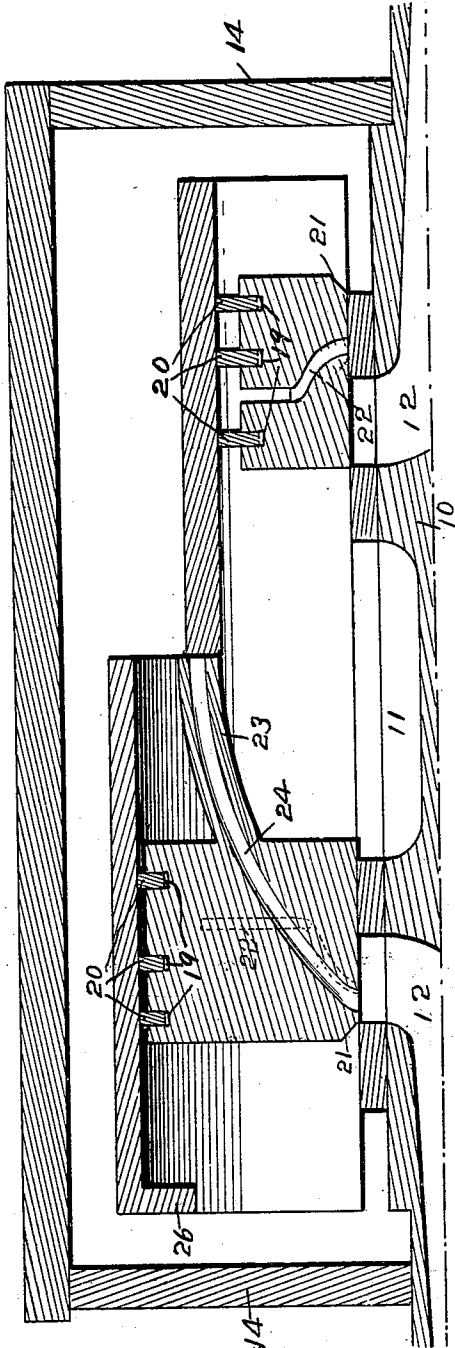


Fig. 5.

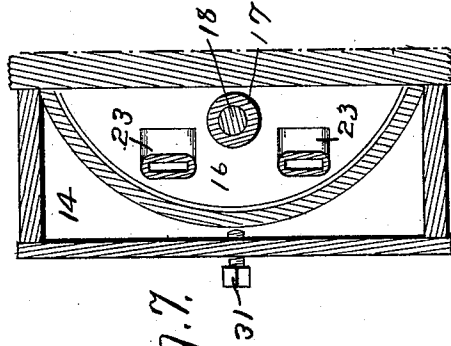


Fig. 7.

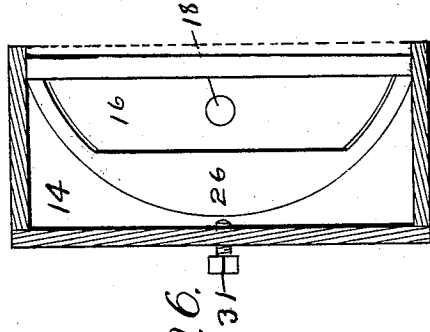


Fig. 6.

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UNITED STATES PATENT OFFICE.

WILLIAM F. GOULD, OF DES MOINES, IOWA, ASSIGNOR TO GOULD BALANCE VALVE COMPANY, OF KELLOGG, IOWA, A CORPORATION OF IOWA.

BALANCED SLIDE-VALVE.

992,349.

Specification of Letters Patent.

Patented May 16, 1911.

Application filed February 12, 1906. Serial No. 300,785.

To all whom it may concern:

Be it known that I, WILLIAM F. GOULD, a citizen of the United States, residing at Des Moines, in the county of Polk and State of Iowa, have invented a certain new and useful Balanced Slide-Valve, of which the following is a specification.

The object of my invention is to provide a balanced slide valve of simple, durable and inexpensive construction in which the valve cover may be quickly and easily adjusted to limit its movement and in which the valve may be arranged to be balanced in such manner as to operate with a minimum of friction and wear or which may be easily and quickly adjusted to be pressed against the valve seat by steam pressure as required to produce a steam tight connection, in cases where the valve seat is worn or uneven.

A further object is to provide a valve cover for a valve of this kind of strong and durable construction.

My invention consists in the construction, arrangement and combination of the various parts of the device, whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in my claims and illustrated in the accompanying drawings, in which—

Figure 1 shows a central, horizontal, sectional view through a portion of an engine cylinder and steam chest with a valve and valve cover therein embodying my invention. Fig. 2 shows a side elevation of the valve detached. Fig. 3 shows a side elevation of the inner surface of the valve detached. Fig. 4 shows a transverse, sectional view of the steam chest with a valve and valve cover therein, the said valve shown in section on the line 4—4 of Fig. 3. Fig. 5 shows a horizontal, sectional view of a portion of a cylinder and steam chest with a valve and valve cover therein, the valve being shown on the line 5—5 of Fig. 2. Fig. 6 shows a transverse, sectional view through the steam chest illustrating the end of the valve cover in position therein, and Fig. 7 shows a sectional view on the line 7—7 of Fig. 1.

Referring to the accompanying drawings, I have used the reference numeral 10 to indicate the portion of the engine cylinder shown. It is provided with the usual exhaust port 11 and the two steam inlet ports

12. Adjacent to these ports is the valve seat 13. The steam chest which is of ordinary construction is indicated by the numeral 14 and a steam induction pipe 15 enters it. The valve proper is composed of two ends of similar construction, the body portion of each being indicated by the numeral 16 and these ends are connected by the hollow bar 17 through which the valve stem 18 is passed and fixed to the valve. Each end of the valve is of segmental shape in cross section, as clearly shown in Fig. 4, being somewhat less than a half circle.

In the outer face of each valve end, I have formed three grooves 19, the central one arranged closer to the end of the valve than to the central portion thereof. In each of these grooves is a segmental packing bar 20, its outer face projecting beyond the face of the valve to thereby form steam chambers on the outer surface of the valve between the packing bars. The ends of the valve are beveled at 21, so that steam may force the valve outwardly away from the valve seat to thereby counterbalance the steam pressure in an opposite direction upon the portion of the valve beyond the packing bar at the end thereof. In this way the steam pressure upon so much of the valve as is outside of the ends of the packing bars is counterbalanced. I have also provided for balancing the pressure of steam in the steam induction port that is being exerted in a direction upon the working face of the valve, as follows: The space between the two inner packing bars on each end of the valve is so arranged as to be substantially equivalent to the area of the steam induction port of the cylinder and I have formed passageways 22 in the valve entering the space between the two inner packing bars at one end and inclined toward the working face of the valve and toward the adjacent end thereof with their inner ends opening on the working face of the valve between the two outer packing bars. In this way, steam may be admitted from the steam inlet port of the cylinder through the passageways 22 to the chamber between the packing bars on the outer face of the valve to counterbalance the outward pressure of steam upon the valve and by having the ports of said passageways that receives steam from the steam inlet ports of the cylinder arranged at points between the outer packing bars, I provide for the admis-

sion of steam under pressure to the chamber between the two inner packing bars at the time during the stroke when the steam thus admitted will most nearly counterbalance
 5 the valve. In this connection and assuming that it is desired to have a greater steam pressure on the outer surface of the valve than on the inner surface, I remove the central packing bars 20 and in this way provide
 10 for adjusting the area of the steam chamber on the outer surface of the valve. When this is done the pressure on the valve is applied only intermittently or when the inner ends of the passageways are not closed by the
 15 valve seat.

If it is desired to provide a constant steam pressure upon the valve, I remove the outer packing bars and in that way provide for a steady pressure upon part of each end
 20 of the valve and a variable pressure upon the parts of the valve between the inner packing bars of each end.

As clearly shown in the drawings, the central packing strip is detachable, it being
 25 loosely mounted in the groove 19 prepared in the valve to receive it. In order to detach said central strip, it is only necessary to remove the valve cover, whereupon said strip may be grasped and removed. Obviously
 30 when the central strip is in position, the area of the steam chamber is that of the space between the central and inner packing strips and when said central strip is removed, the area of the steam chamber is that of the
 35 space between the inner and outer packing strips. Hence the area of the said chamber may be adjusted by removing or replacing the central packing strip. In this connection it is also to be noted that the outer
 40 packing strip is also loosely placed in a groove in the valve. The advantage to be derived from this is that in the event that it became necessary to provide for a steady and uniform steam pressure upon the back
 45 of the valve tending to hold the valve to its seat more firmly and uniformly than can be done by the pressure of steam between the packing strips on the back of the valve, then the outer packing strip may be detached in the same manner as before described with regard to the middle strip and
 50 when this is done, there is a considerable area on the back of the valve between the middle and the back of the valve on which the steam pressure on the interior of the steam chest continually operates. The steam pressure in the chamber between the packing strips is variable and is only exerted when the port 22 is in communication with the inlet port of a cylinder.
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Means are also provided for producing a quick acting valve as follows: Extended transversely across the space between the ends of the valve are two tubes 23 with
 65 passageways 24 connecting with them and

extending to the under surface of the valve near its ends, said passageways being arranged with relation to the valve and to the steam inlet port of the cylinder that when one end of the valve commences to
 70 uncover one of the ports of the cylinder, the passageway 24 at the other end of the valve will project beyond the valve seat 13 and admit steam from the steam chest near one end of the valve to the port 12 at the other
 75 end of the valve.

The valve cover comprises a body portion 25 segmental in cross section and forming less than a half circle. Its side edges rest upon the valve seat and the packing bars 20
 80 engage its inner surface. At its ends I have formed the integral webs 26 to extend transversely. Said webs are valuable in assembling the valve because they prevent the packing bars from moving beyond the end
 85 of the cover and thus becoming caught on the end of the cover. Said webs are also so arranged that they do not cover the entire ends, and they permit the circulation of steam freely around both surfaces of the
 90 valve cover. By thus forming the valve cover, the side edges are firmly braced against spreading. It is desirable that slight movement be permitted for the valve cover both longitudinally and outwardly.
 95 In some instances, it is desirable that this movement be greater than at other times. For this reason, I have provided an adjusting means comprising a bolt 27 passed through the steam chest and having lock
 100 nuts 28 engaging said bolt on opposite sides of the portion of the steam chest through which the bolt is passed, the inner end of the bolt being arranged to engage the web 26 of the valve cover and in this way
 105 limit its movement. In the other end of the valve is a pin 30 designed to stand adjacent to the opposite side of the steam chest and thus limit the movement of the cover. To
 110 adjustably limit the movement of the cover outwardly, I have provided a set screw 31 seated in the outer portion of the steam chest and passed through it and adjacent to the cover 25.

In practical use and assuming the valve to be in the position shown in Fig. 1 and assuming further that it is moving toward the right, it is obvious that when it moves sufficiently to partially uncover the port 12 at the left of the figure, then steam will be admitted simultaneously into said port direct
 120 and also through the tubes 23 from the other side of the steam chest. Furthermore, the steam pressure within the steam inlet port 12 at the left of the figure pressing outwardly upon the valve is counterbalanced by the steam that passes through the passageway 22 into the chamber between the packing bars on the exterior of the valve. Steam is admitted through this passageway 22 dur-
 125 130

ing the time that the port on the inner face of the valve is passing the induction port 12 of the cylinder and also during the time that it is beyond the valve seat at either end and in this way the pressure upon the opposite sides of the valve is substantially balanced because at the times when the passageway 22 is closed, the pressure upon the under surface of the valve caused by the action of a piston in the cylinder is not so great as at the times when the passageway 20 is admitting steam. By removing one of the packing bars of either end, the steam pressure upon the outer face of the valve may be increased relative to that upon the inner face, so that the valve will be more firmly held against the valve seat, it being desirable to do this when the valve seat is worn or uneven.

Having thus described my invention, what I claim and desire to secure by Letters Patent of the United States, therefor is—

1. The combination of a slide valve, three packing strips projecting from one end of the slide valve, said strips forming the sides of a steam chamber, the central strip being detachable so that the said chamber will have a minimum width between the inner and central strips when the central strip is in position and a greater width between the outer and inner strips when the central

strip is detached, a cover forming part of said steam chambers, said valve formed with a passageway communicating between the inner and middle strips and having its lower end inclined toward the adjacent end of the valve to communicate with a steam inlet port of a cylinder when the valve is in position with the chamber between the middle and inner strips out of line with said inlet port, of a cylinder.

2. A slide valve, three packing bars mounted upon the outer face thereof, the central and end bars thereof being detachable, a valve cover to engage the packing bars and form steam chambers, and means for introducing steam into the steam chamber between the central and inner packing bars from the inner face of the valve.

3. A valve cover, a slide valve, three packing bars extended transversely across one end of the valve, to engage the cover, the central and outer ones of said bars being detachable, said valve formed with a passageway communicating with the chamber between the two inner packing bars and the under surface of the valve.

Des Moines, Iowa, February 1, 1906.

WILLIAM F. GOULD.

Witnesses:

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