J. HUTCHINGS.

DISTRIBUTING VALVE.

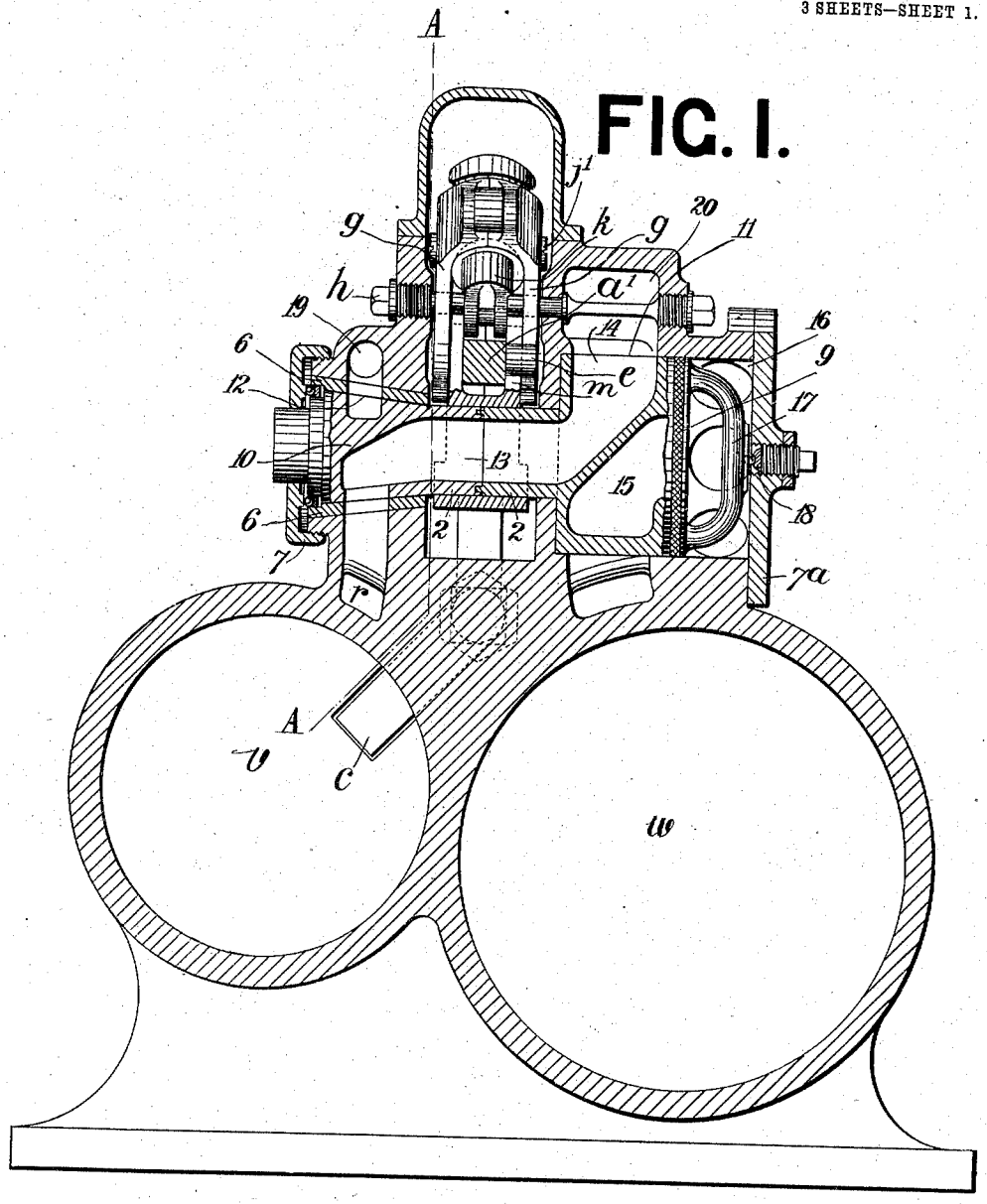
APPLICATION FILED JUNE 12, 1909.

965,820.

Patented July 26, 1910.

3 SHEETS—SHEET 1.

FIG. I.



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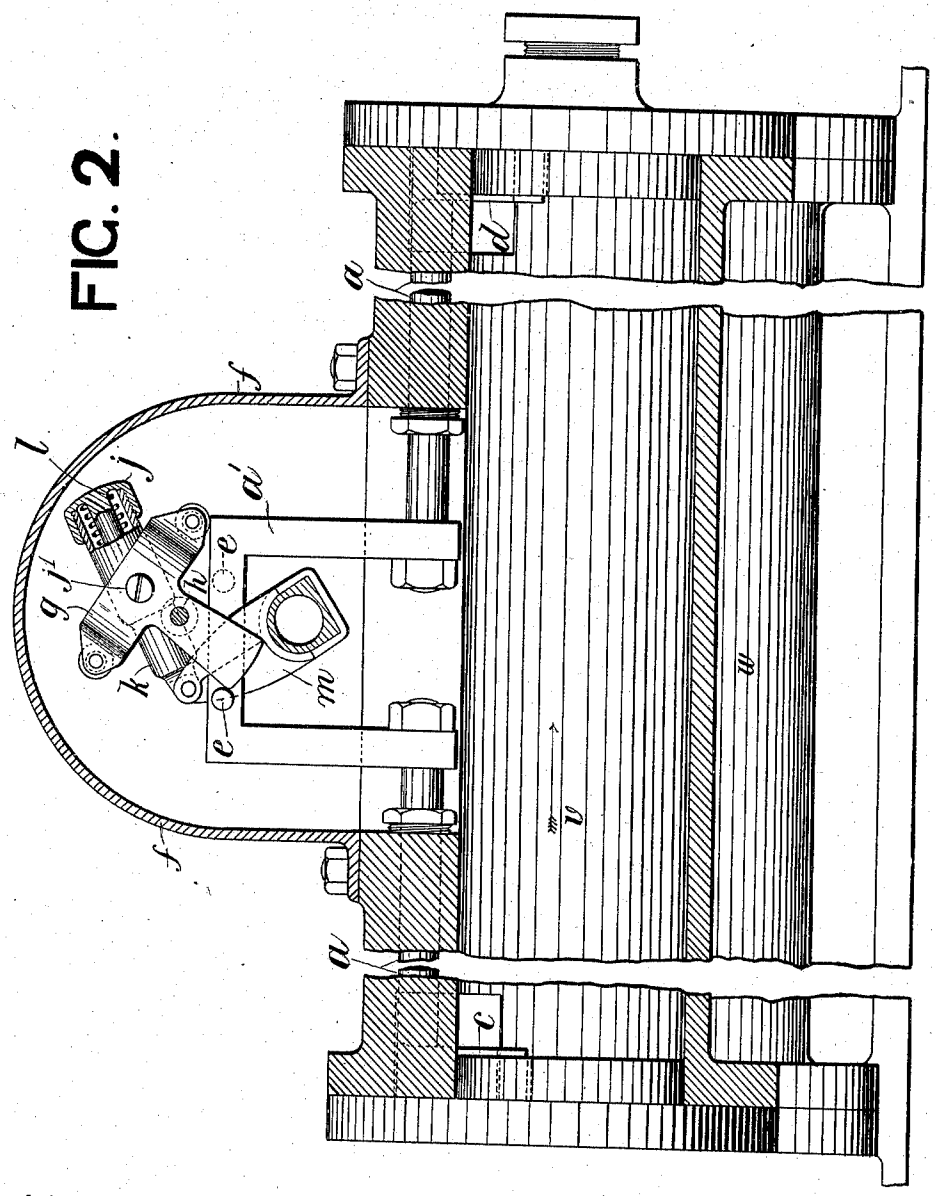
3 SHEETS—SHEET 2.

FIG. 2.



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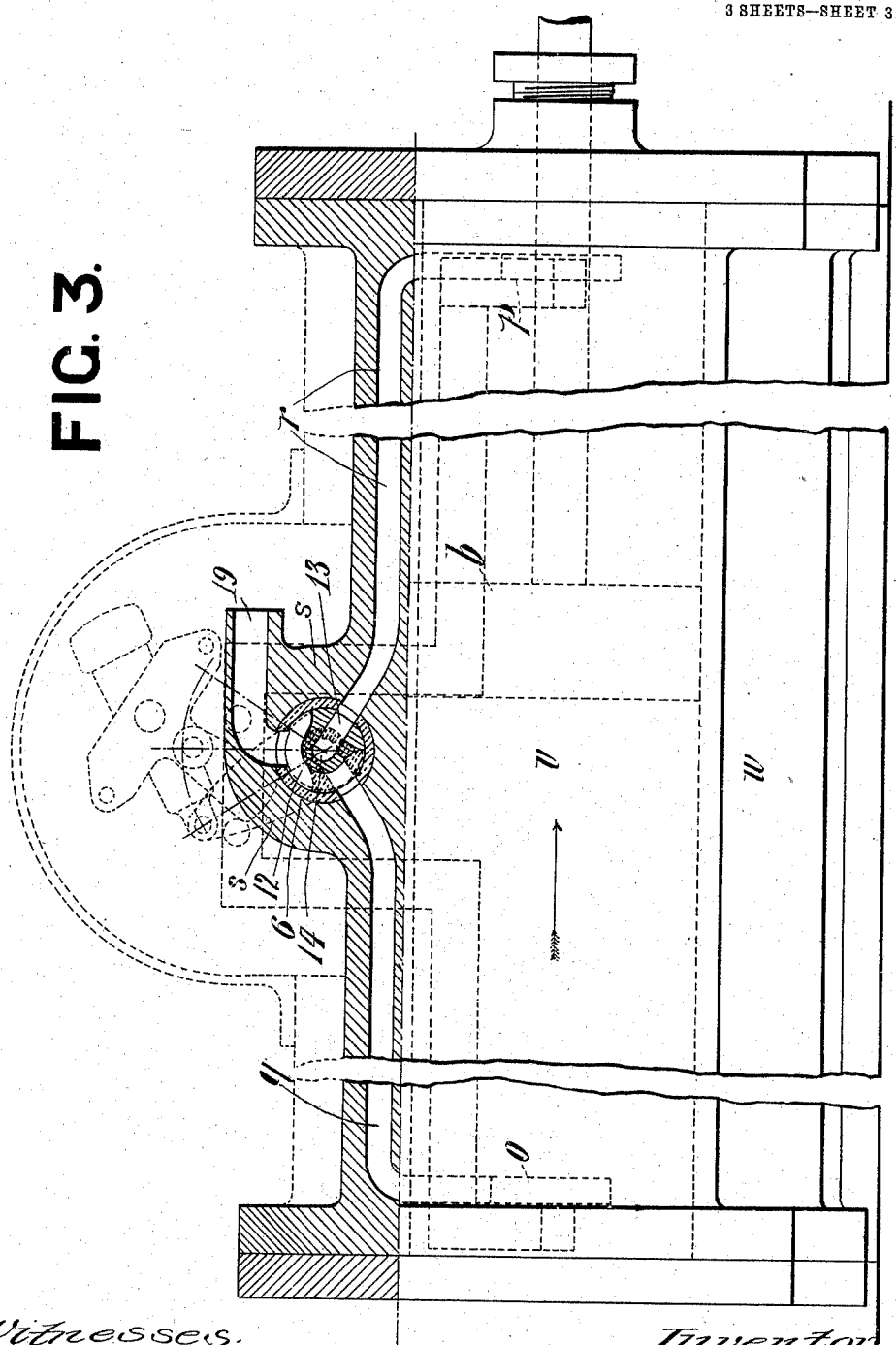
3 SHEETS—SHEET 3.

FIG. 3.



Witnesses.

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UNITED STATES PATENT OFFICE.

JOHN HUTCHINGS, OF LONDON, ENGLAND.

DISTRIBUTING-VALVE.

965,820. Specification of Letters Patent. **Patented July 26, 1910.**

Application filed June 12, 1909. Serial No. 501,799.

To all whom it may concern:

Be it known that I, JOHN HUTCHINGS, a subject of the King of Great Britain, residing at Capel House, 62 New Broad street, in the city of London, England, mining and mechanical engineer, have invented certain new and useful Improvements in and Connected with Oscillating Distributing-Valves, of which the following is a specification.

This invention relates to improvements in and connected with oscillating distributing-valves and has for its object an improved construction and arrangement of valve, valve mechanism and passages coacting with said valve for the simultaneous distribution of fluid at two different pressures, or of two fluids at the same or at different pressures. A valve of the type specified is capable of embodiment in apparatus of different descriptions, for instance, for the distribution of steam to a double acting compound steam engine, and for other purposes. Accordingly the valve comprises two members coupled together and each provided with ports respectively adapted to serve for the admission and delivery of the fluid or fluids which said valve may be controlling; and improved means operated by the piston during its reciprocation are provided whereby to automatically and instantaneously set the valve according to the desired direction of flow of the fluid or fluids; a suitable arrangement of passages being provided whereby to convey said fluid or fluids to or from the valve.

The accompanying drawings illustrate the application of the invention to a double-acting compound steam engine. Figure 1 is a cross section of the high and low pressure cylinders, taken axially of the valve. Fig. 2 is a longitudinal section, to a reduced scale taken on line A, A, Fig. 1 and illustrating more particularly the valve-operating mechanism. Fig. 3 is a similar section to Fig. 2 taken through the valve and high pressure cylinder ports and passages, the valve-operating mechanism being shown in dotted lines.

v indicates the high-pressure cylinder provided at one end with a port *o* and at the opposite end with a port *p* from which passages *q* and *r* respectively lead to the valve chest *s* having fluid inlets 19 and 20; each of said passages being adapted to serve alternately as admission and exhaust ways. The low pressure cylinder *w* is similarly provided with passages and ports.

The valve comprises two oppositely disposed inter-communicating plugs, 10, 11, whereof the plug 10 is truncated and conical and serves to control high pressure fluid and is formed with a part-circumferential admission port 12 and with a part-lateral and part-axial exhaust port 13 communicating with a part-axial and part-circumferential admission port 14 formed upon the plug 11 serving to control low pressure fluid.

15 is a part-lateral part-axial exhaust port formed in the plug 11 and communicating with a cage in the valve casing.

The plug 10 is mounted in a bushing 6 and is maintained in position by means of a cap 7 closing a ball bearing and packing strips, and the plug 11 is provided with an annular packing ring 9 and with a bridge 17 abutting against a ball bearing 18 adjustably mounted in the cap 7^a.

High-pressure steam is admitted to the face of the piston by way of the inlet 19 and passes by way of the part circumferential port 12 and the passage *q* into the cylinder *v;* high pressure fluid being expelled simultaneously from behind the piston by way of a port *p* and the passage *r*, and passing by way of the part-lateral part-axial exhaust port 13 of plug 10 and by way of the part-axial part-circumferential admission port 14 of the plug 11 into the admission passage 20 of the low pressure cylinder *w*, passing into the cylinder by way of a passage similar to the passage *q* described above with reference to the high pressure cylinder and forcing out the low-pressure piston causing low pressure fluid to be exhausted from behind said piston by way of a passage similar to the passage *r* also described with reference to the high pressure cylinder, and through the plug 11 by way of the part-lateral part-axial exhaust port 15 and cage 16 whence said fluid passes to a condenser or is disposed of in any other convenient manner.

The valve-operating mechanism comprises a pair of bars *a*, *a*, connected together by means of a bridge piece a^1 and adapted to be reciprocated in glands in the cylinder *v* by means of the contact of the high pressure piston *b* when at either end of its stroke with one or other of the lugs *c*, *d*, adapted to be

slid in recesses in the respective cylinder covers.

e, *e*, are stop pins carried by said bridge piece and adapted during the reciprocation thereof to contact with and displace operating mechanism hereinafter described.

f is a casing wherein the operating mechanism is mounted.

g is a yoke or cradle pivoted in said casing *f* by means of pins *h*, *h*, and mounted upon trunnions in said cradle *g* is a cylinder *j* between the end of which and a second cylinder *k* sliding telescopically within it is confined a spring *l*. The free extremity of said cylinder *k* is pivotally connected to the ends of a bifurcated lever *m* keyed or otherwise suitably connected to the valve spindle 2, 2, and the end of said cylinder *j* is closed by a screw cap whereby the tension of the spring *l* may be regulated.

When the piston *b* approaches the end of its stroke, it contacts with the lug *d* and thereby displaces the reciprocating bar *a* causing one of the stop pins *e* to engage the lower extremity of one of the depending arms of the cradle *g* and by its continued movement to impart angular movement thereto about its pivotal axis *h*, *h*. During the angular movement of the upper extremity of said cradle *g* the cylinder *j* also receives angular movement about its pivotal axis j^1 until it assumes a vertical position and at the same time the cylinder *k* slides telescopically into said cylinder *j* compressing the spring *l* therein. At the mid point in the traverse of the stop pin *e* the cylinders *j* and *k* and lever *m* are brought into alinement the spring *l* at that time being at maximum compression. Immediately the stop pin *e* passes said mid point and the vertical alinement of the cylinders *j* and *k* and lever *m* is passed the spring *l* suddenly expands and throws the bifurcated lever *m* over carrying the valve to the position shown in dotted lines in Fig. 3, thereby causing the part-circumferential port 12 to register with and admit fluid to the passage *r* and causing the part-lateral part-axial port 13 to communicate with the passage *q* in readiness for the exhaust therethrough of the spent high-pressure fluid which passes to the low pressure cylinder by way of port 14 in valve plug 11. At the completion of the return stroke of the piston the lug *c* is engaged by piston *b* and the second stop pin *e* is caused to effect the throwing over of the mechanism to its original position in a manner similar to that described above. This cycle of operations continues during the reciprocation of the piston.

What I claim is:—

1. An oscillating distributing-valve comprising two oppositely disposed members, one of said members being truncated and conical and provided with ports for the passage of fluid, ports in the second of said members for the passage of fluid, passages co-acting with said ports in the second member, passages co-acting with ports in the second member, an operating lever common to both said members, spring-controlled telescopic cylinders connected to said operating lever, a cradle pivotally supporting said telescopic cylinders and mounted so as to be oscillated, and means whereby to oscillate said cradle.

2. An oscillating distributing-valve comprising two oppositely disposed members, ports in one of said members for the passage of fluid, ports in the second of said members for the passage of fluid, passages co-acting with said ports in the one member, passages co-acting with ports in the second member, an operating lever common to both said members, spring-controlled telescopic cylinders connected to said operating lever, a cradle pivotally supporting said telescopic cylinders and mounted so as to be oscillated, a reciprocating bar, and studs upon said reciprocating bar whereby to oscillate said cradle.

3. In a double-acting compound steam engine a casing, high and low pressure cylinders, a two-part oscillating distributing-valve common to the high-pressure and the low-pressure cylinders and having an axial inter-communicating passage, ports being formed in the one part of said valve for the admission and delivery respectively of the high-pressure steam, ports being formed in the second part of said valve for the admission and exhaust respectively of the low-pressure steam, passages being formed in the high-pressure cylinder and co-acting with said ports in the one part of said valve, passages being formed in the low-pressure cylinder and co-acting with said ports in the second part of said valve, and means whereby to oscillate the valve to simultaneously direct the high-pressure and the low-pressure steam respectively to and from the high-pressure and the low-pressure cylinders.

4. In a double-acting compound steam engine, high and low pressure cylinders, an oscillating distributing-valve common to the high-pressure and the low-pressure cylinders and comprising two oppositely disposed inter-communicating members, one of said members being truncated and conical and having ports for the passage of high-pressure steam, ports in the second of said members for the admission and exhaust respectively of the low-pressure steam, passages being formed in the high-pressure cylinder and co-acting with the ports in the said truncated conical member, passages being formed in the low pressure cylinder and co-acting with ports in the second of said members, and operating mechanism com-

mon to both said members actuated by the reciprocation of one of the pistons whereby to oscillate the valve.

5. In a double-acting compound steam engine an oscillating distributing-valve comprising two oppositely disposed inter-communicating members adapted to simultaneously control the high-pressure and the low-pressure steam, passages formed in the high-pressure cylinder and co-acting with one of said members, passages formed in the low-pressure cylinder and co-acting with the second of said members, an operating lever common to said two members, spring-controlled telescopic cylinders connected to said operating lever, a cradle pivotally supporting said telescopic cylinders and mounted so as to be oscillated, a reciprocating bar, studs upon said bar whereby during the reciprocation of said bar to oscillate said cradle, and means whereby to reciprocate said bar.

6. In a double-acting compound steam engine an oscillating distributing-valve comprising two oppositely disposed inter-communicating members adapted to simultaneously control the high-pressure and the low-pressure steam, passages formed in the high-pressure cylinder and co-acting with one of said members, passages formed in the low-pressure cylinder and co-acting with the second of said members, an operating lever common to said two members, spring-controlled telescopic cylinders connected to said operating lever, a cradle pivotally supporting said telescopic cylinders and mounted so as to be oscillated, a reciprocating bar, studs upon said bar, and a lug at each extremity of said bar adapted to be engaged by one of the pistons at each end of its stroke whereby to reciprocate said bar.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

JOHN HUTCHINGS.

Witnesses:
FREDERICK RIPPON REYNOLDS,
ERNEST JOHN HILL.