

G. WESTINGHOUSE, Jr.
Valves for Fluid Brake Pipes.

No. 149,901.

Patented April 21, 1874.

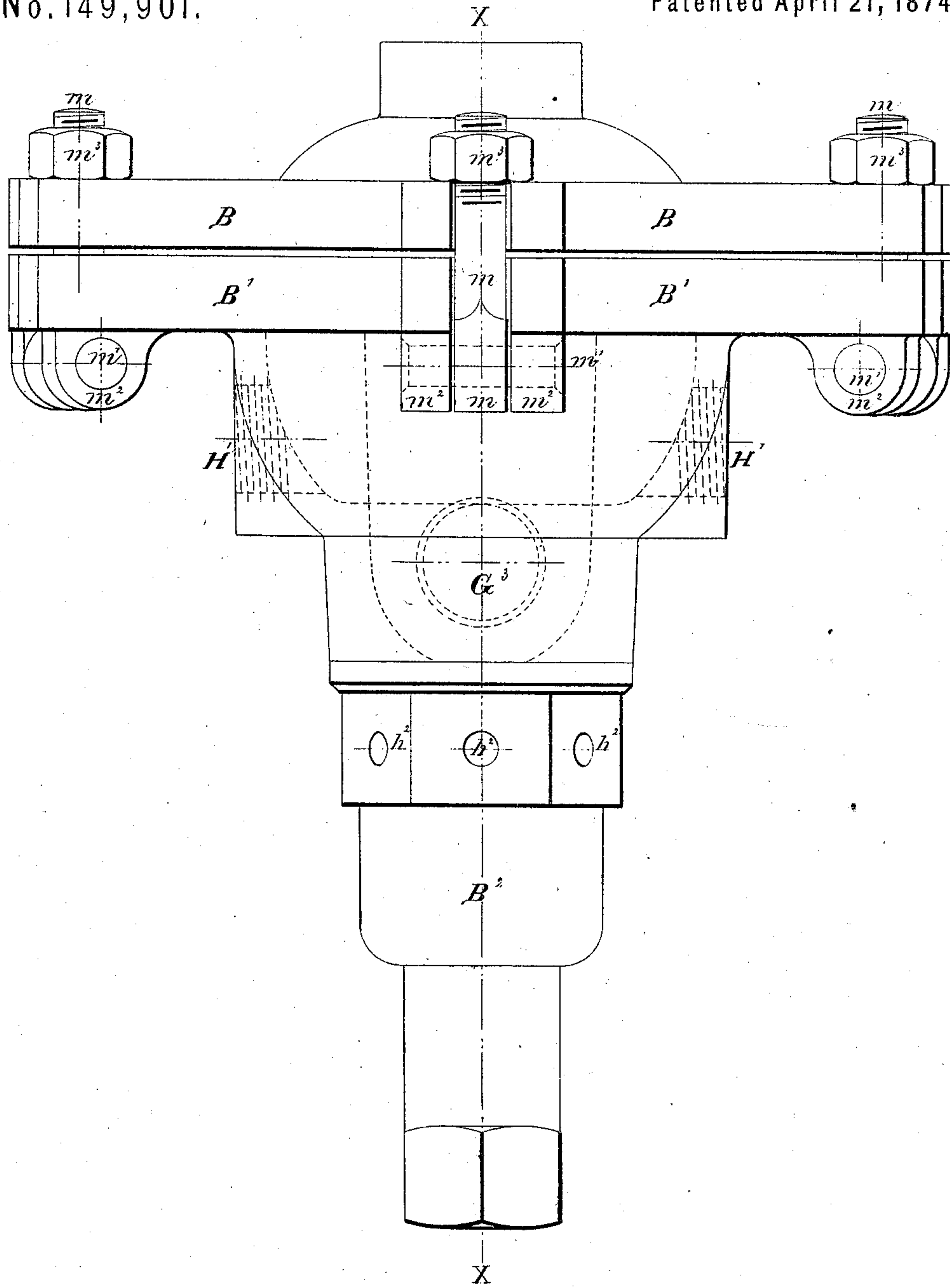


Fig. 1.

Witnesses
Sebastian Stutz
Herman Westinghouse

Inventor
George Westinghouse Jr.
by G. H. Christy
his atty.

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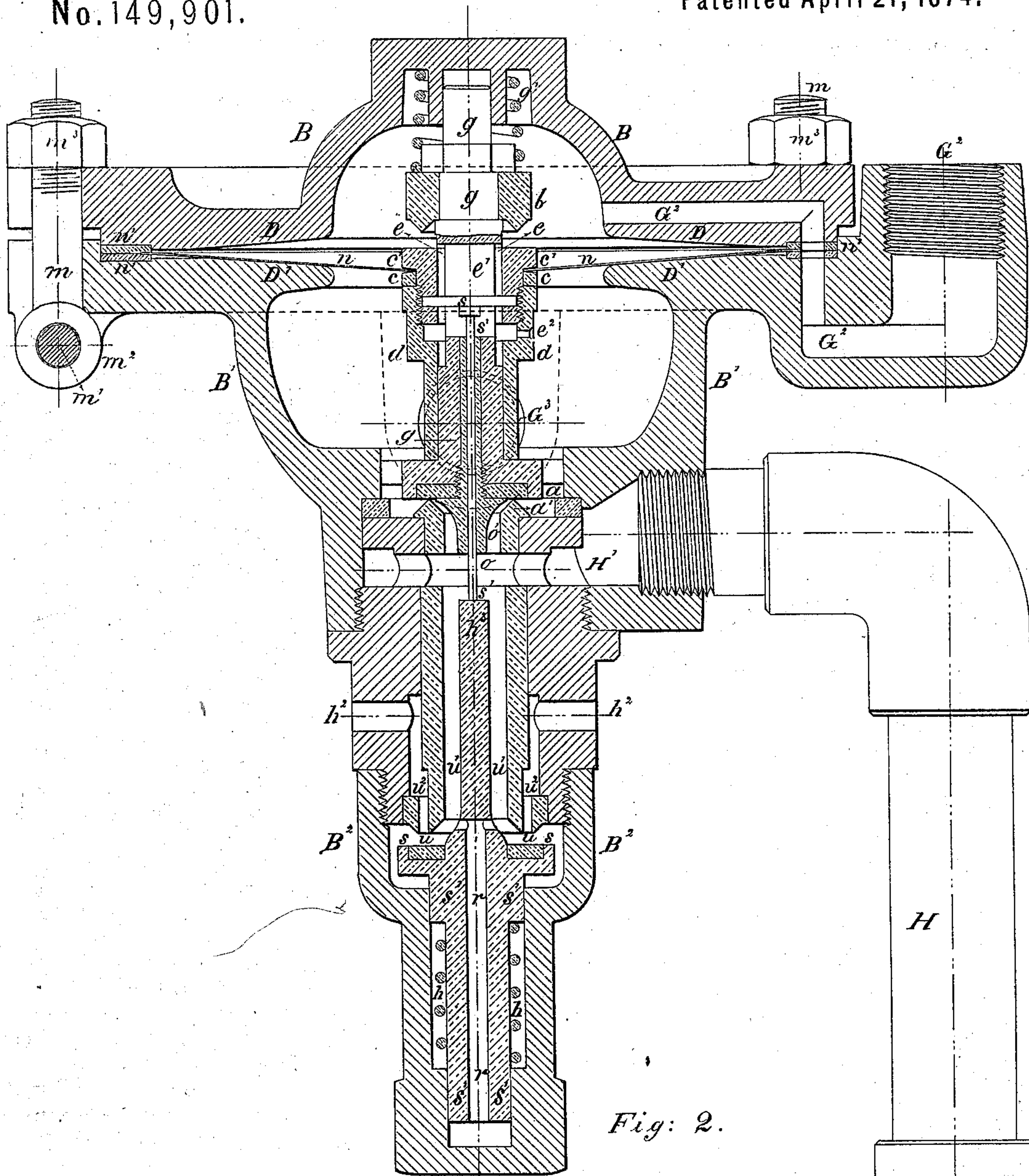
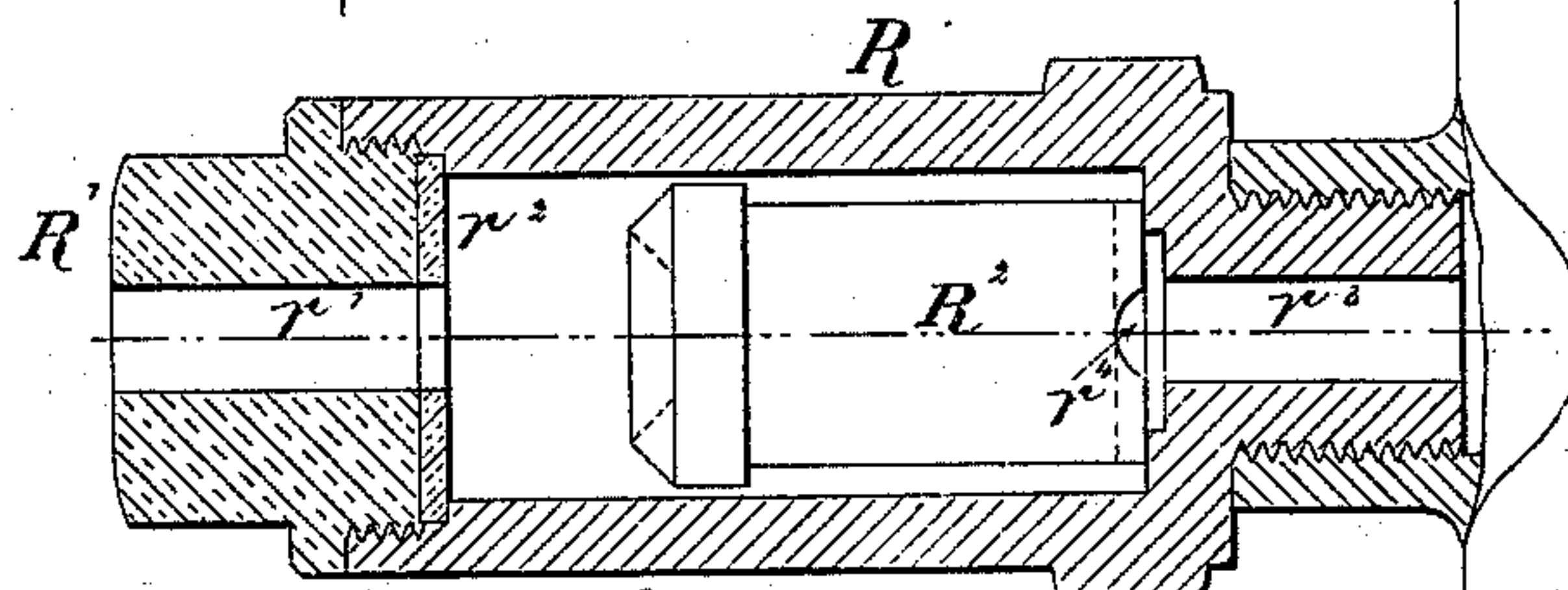


Fig: 2.



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UNITED STATES PATENT OFFICE.

GEORGE WESTINGHOUSE, JR., OF PITTSBURG, PENNSYLVANIA.

IMPROVEMENT IN VALVES FOR FLUID BRAKE-PIPES.

Specification forming part of Letters Patent No. 149,901, dated April 21, 1874; application filed December 1, 1873.

To all whom it may concern:

Be it known that I, GEORGE WESTINGHOUSE, Jr., of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Valves for Fluid Brake-Pipes; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, in two sheets, making a part of this specification, in which—

Figure 1, Sheet 1, is an outside view in elevation of my improvement; and Fig. 2, Sheet 2, is a sectional view thereof through the line *x x* of Fig. 1.

Like letters of reference indicate like parts in each.

My improvement relates more particularly to that class of air-brake apparatus in which a reservoir of compressed air is arranged under or in connection with each car, with connecting-pipes and valves, thence to the brake-cylinder, such that by reducing the air-pressure in the brake-pipes the brakes will be applied, and by restoring such pressure they will be let off or released. In such apparatus a triple valve has been employed, of such construction that the reduction of the air-pressure, as above, would automatically open a port or ports in the passage-way from such reservoir to the brake-cylinder, so as to operate a piston therein and "set" the brakes, and at the same time close all communication between the inside of the brake-cylinder and the external atmosphere, and also such that the restoration of the pressure as above would close such port or ports, and restore such communication, which, of course, resulted in releasing the brakes. My present invention consists in an improved construction of such triple valve, and also in the combination therewith of a leak-valve, the uses of which will presently be explained.

To enable others skilled in the art to make and use my present invention, I will proceed to describe its construction and mode of operation.

The valve box or case *B B¹ B²* (with some modifications of form) is, except in the respects hereinafter named, substantially the same in construction and operation as described and

shown in patent granted to me August 12, 1873, No. 141,685, and constitutes a like part of the apparatus referred to. By the port *G²* connection is made with the brake-pipes or brake-pipe; by the port *G³*, shown in dotted lines, with the reservoir, (commonly called the auxiliary reservoir;) and by the port *H'* with the brake-cylinder, in like manner and with like operation as in the patent last named. Also, the valve-stem *g*, the valve *a* thereon, and its annular seat *a'*, the spring *g'*, valve-seat *b'*, compound nut or piston *c c' d*, the reduced and slotted parts *e e¹* of the stem *g*, ports *e e²*, cross-bar *s*, pin *s'*, spring *h*, conical plug *o*, and port *o'*, are also (except in some matters of form, as shown in the drawings) of the same construction and of substantially like operation as in said patent. But for the flexible diaphragm referred to in said patent I substitute a flexible elastic diaphragm, *n*, preferably made of sheet metal, the outer edge of which is compressed between the adjacent faces of the two parts *B B¹* of the case, annularly around the inner peripheries of the same, as shown in the drawings, with or without, but preferably with, interposed elastic packing-rings or gaskets *n' n'* of india-rubber or other suitable material, such as will insure an airtight joint around the outer edge of the diaphragm, and permit of a comparatively free motion of the diaphragm in performing its function, and also to prevent the wear which would be occasioned by the edge of the diaphragm working between metallic surfaces. From these annular compressing or packing surfaces the parts *B B¹* of the case are so shaped inwardly as to give two annular and inwardly-projecting flanges, *D D'*, the distance between which gradually increases toward their inner edges, but the slope of each is such that so much of the diaphragm *n* as comes between them shall rest on one or the other at the end of each stroke of the stem *g*, or at the extremity of its motion in either direction. The sloping surfaces of these flanges *D D'* constitute seats or rests to support the diaphragm after it has done its work, and thereby prevent its breaking. So much of the diaphragm as comes between these flanges may be corrugated annularly, if so desired, in which case such flanges should be a little farther apart, accord-

ing to the depth of the corrugations, the object being to give the diaphragm a seat at the end of its motion in either direction. These flanges may extend inwardly any desired distance to or short of the compound nut or piston $c c'$. But it is not essential that the diaphragm should rest on the flanges over the entire surfaces of the latter, but merely on sufficient surface to prevent too great deflection by the fluid pressure employed, and consequent straining. The diaphragm n has an eye at the center, through which passes the stem g , and the annular edge of this eye is clamped firmly, as shown in the drawings, between two rings, which form parts of the compound nut or piston $c c'$. The joint by which this clamping is effected is preferably such that only the edge of the eye or hole of the diaphragm shall be gripped between such clamping-rings, the adjacent surfaces of such clamping-rings being slightly beveled or flared away from the diaphragm, from the annular line of grip or clamp outwardly, as shown in Fig. 2; and like packing can be employed here as at the outer edge of the diaphragm, if so desired, though I believe it will seldom be found necessary.

The function and mode of operation of the diaphragm thus made and thus incorporated into the apparatus referred to are substantially the same as that of the diaphragm n in the patent No. 141,685.

The extension B^2 of the valve box or case contains a valve, s , made with a suitable guide, s' , which valve seats against a valve-seat, so as to close an annular port, u , made therein.

By means of this port and the passages $w^1 w^2$ communication is effected (the valve s being unseated) between the brake-cylinder by the port H' , and the external atmosphere by the ports h^2 , in like manner and with like result as in patent No. 141,685; and the valve is seated and unseated by the action of the spring h and the pin s' acting on the stem h^3 , as in said patent set forth. To provide for an equilibrium of air-pressure on both sides of the valve s , I bore the holes r through it and its stem, as shown.

In the use of apparatus such as that to which this improvement appertains, when a car is detached from a train, the brake-pipes should be closed before it is detached, to prevent the brakes being applied or "set" by the reduction of the pressure. In such case, if, as will sometimes happen, the air leaks slightly from the brake-pipes, the valve a will be raised slightly from its seat, and the air-pressure will pass slowly from the reservoir by the port G^3 , through the port o' , and by the port H' , to the brake-cylinder, and thereby set the brakes. To prevent this result, I have shown, by a sectional view in Fig. 2, a relief-valve arranged on the pipe H , which latter leads from the port H^1 to the brake-cylinder. This valve consists of a cylindrical box, R , having a cap, R^1 , with a small port, r^1 , bored therein and faced with

a rubber or other suitable packing, r^2 . At its opposite end it communicates with the bore of the pipe H by a small port, r^3 . In the chamber of the case R is a valve, R^2 , working loosely therein and having on its upper end a seat of suitable form, so that, when forced up by the ordinary pressure in working the brakes, it will seat against the packing r^2 and effectually close the port r^1 ; but when the pressure in the pipe H is only such as may result from leakage, as above mentioned, such pressure will pass out through the port r^3 , and, escaping through a small groove, r^4 , or tilting the valve R^2 off its lower seat, will pass up around it without seating it upward. The amount of pressure which may in this manner be allowed to escape without the application of the brakes may be varied at pleasure by varying the size and weight of the valve R^2 .

For greater convenience and facility in opening and closing the valve-case $B B^1$, I have devised a fastening device, shown in the drawings. The part B fits onto the part B^1 like a cap, and is held in place by means of eyebolts m , which fit into recesses or between lugs, as shown. These eyebolts are held in place at one end by means of pins m^1 , which pass through the eye ends of the bolts and through lugs m^2 on the one part B^1 of the case, and said bolts are threaded at the opposite ends, and secured so as to hold the two parts of the valve-case together by means of screw-nuts m^3 . The threaded ends of the bolts project a short distance beyond the outer faces of the nuts when the latter are screwed down tight, and are riveted or upset slightly, so that, while leaving room for the nuts m^3 to be unscrewed sufficiently for the bolts m to swing outwardly from the recesses in the cap B —turning for that purpose like a hinge on the pins m^1 —they cannot be screwed off entirely, so as to be lost, but will always be in place for use. By this means I provide a convenient and speedy mode of opening the valve-case $B B^1$, for cleaning, repairing, adjusting, or replacing any of the devices included therein, without disconnecting or straining the pipes.

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

1. The flexible elastic diaphragm n , in combination with one or both the annular flanges $D D'$, arranged relatively thereto, substantially as set forth.

2. The relief-valve R^2 , in its case R , with ports $r^1 r^3$, arranged on the pipe H , and in combination therewith and with the triple valve, auxiliary reservoir, and brake-cylinder, substantially as set forth.

In testimony whereof I, the said GEORGE WESTINGHOUSE, Jr., have hereunto set my hand.

GEORGE WESTINGHOUSE, JR.

Witnesses:

JOHN D. MORELAND,
G. H. CHRISTY.