(No Model.)

A. L. ALBERTSON.

STEAM PISTON VALVE.

No. 412,226. Patented Oct. 8, 1889.

Fig. 1

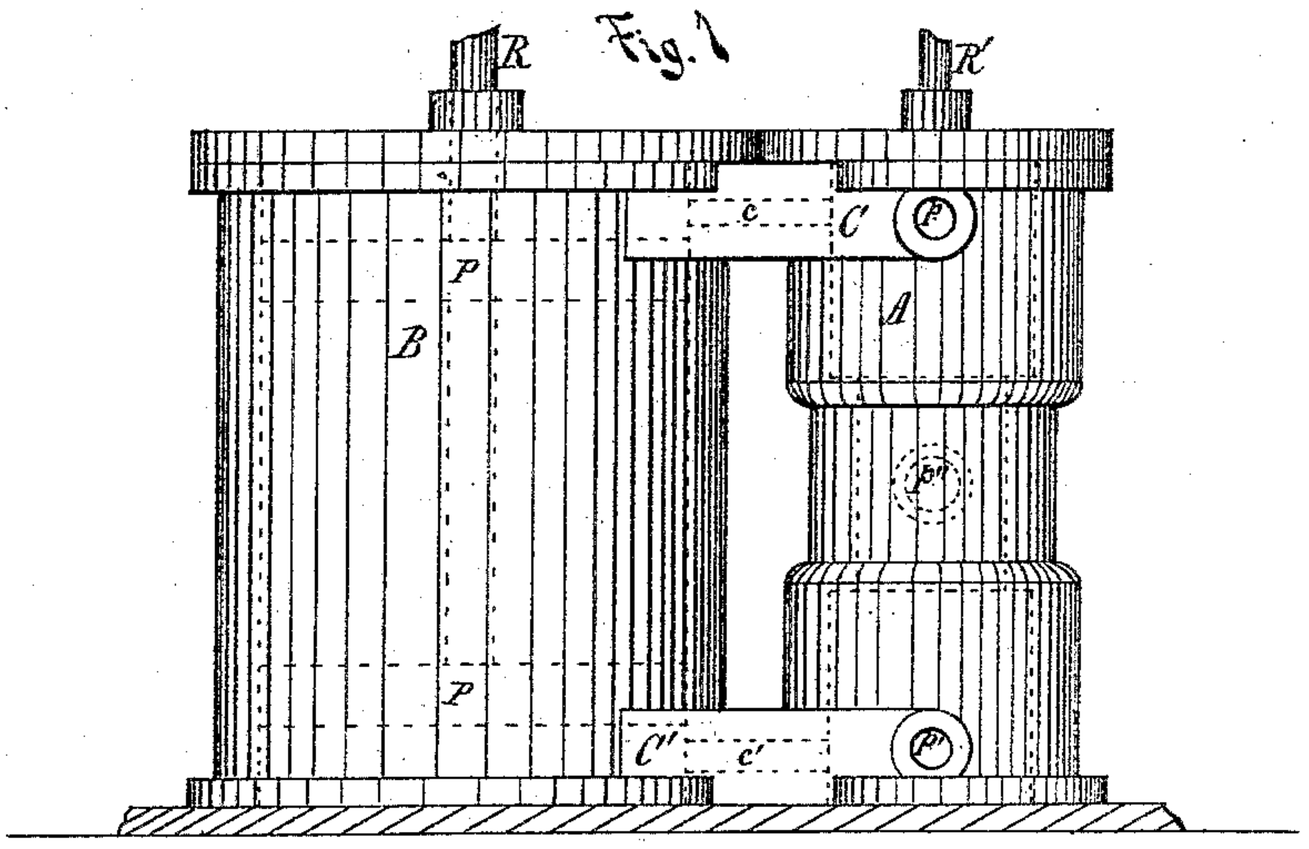


Fig. 2

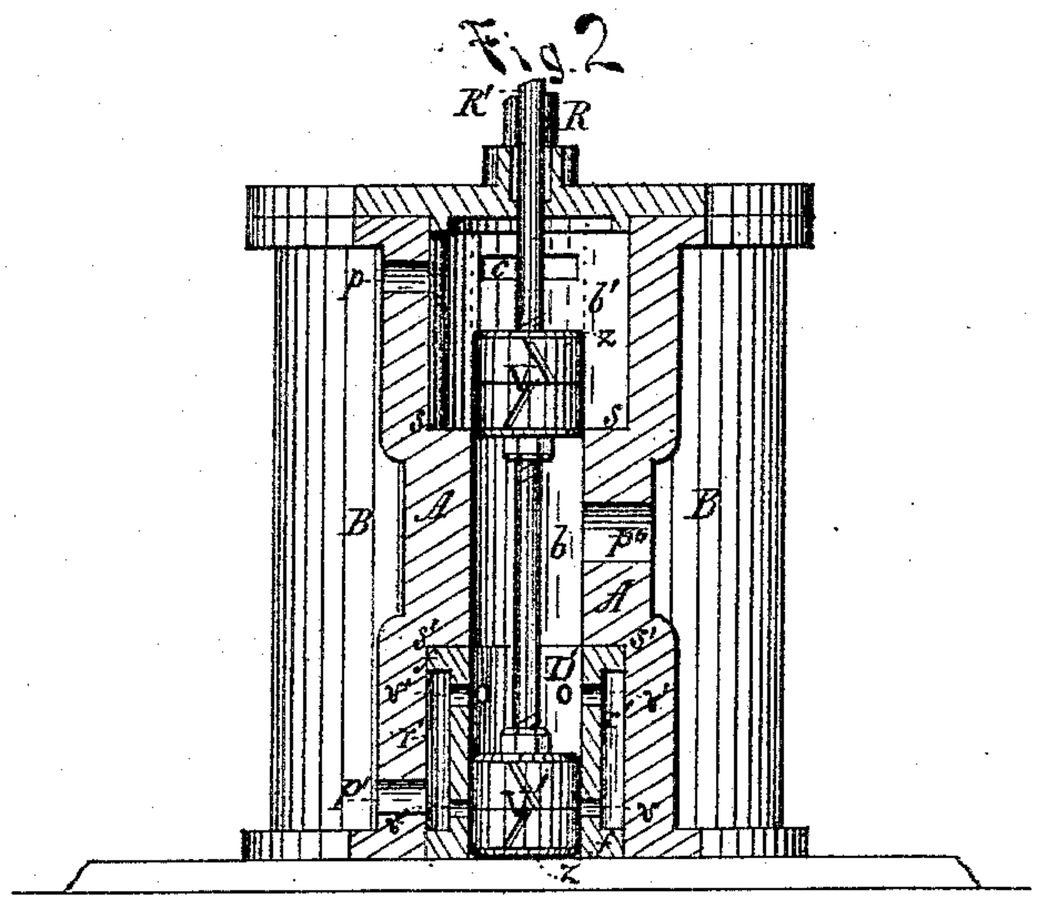
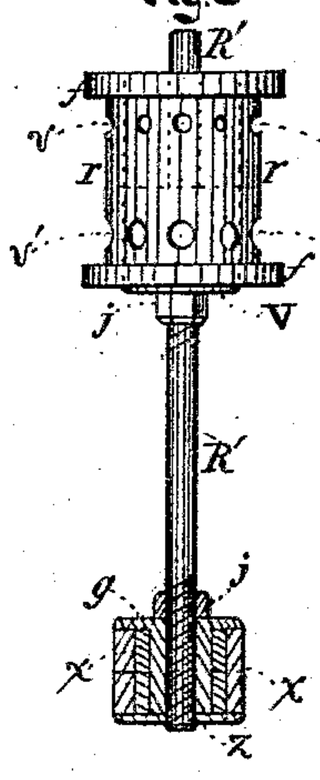


Fig. 3



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UNITED STATES PATENT OFFICE.

ABRAHAM L. ALBERTSON, OF KANSAS CITY, MISSOURI.

STEAM-PISTON VALVE.

SPECIFICATION forming part of Letters Patent No. 412,226, dated October 8, 1889.

Application filed January 24, 1888. Serial No. 261,745. (No model.)

To all whom it may concern:

Be it known that I, ABRAHAM L. ALBERTSON, a citizen of the United States of America, residing at Kansas City, in the county of Jackson and State of Missouri, have invented certain new and useful Improvements in Steam-Piston Valves, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention is an improved steam-piston valve, and embraces, in brief, the following novel features: The steam-chest, in which the pair of valves and their valve-rod work, has a diminished bore within its middle portion, forming thereby a pair of annular shoulders or rests, and, besides the usual steam entrance and escape ports, has a pair of directly-conductive steam-passages, one near each end of the chest, leading into the adjoining steam-cylinder; also, said chest is furnished with a pair of caging valve-seats, consisting of interchangeable cylinders, introductive within each and either end of the chest against said shoulders, and having each an exterior annular recess between similar end flanges, thus forming, between the bore of the steam-chest and circularly-perforated shell of said duplicate valve seat or cage, an annular steam-passage into either its respective steam-cylinder port or into the main escape-port to the outer air; and, finally, said valve seats or cages have each a sliding valve, consisting of a piston cylinder or sleeve closely covered by a triple set of adversely-cut expansion-rings, and held in place upon the one valve-rod by screwing end caps or jam-nuts—all of which and their purposes are hereinafter more fully described, and illustrated by the accompanying drawings, in which like letters designate identical parts of said invention in the different figures, respectively.

Figure 1 is a side elevation of said steam-chest and its adjoined steam-cylinder, showing in dotted lines the several bores of the two said cylinders, the pair of steam-cylinder ports, and said outer steam entrance and escape ports. Fig. 2 is the longitudinal section of said steam-chest, showing the interior parts and furnishings of the same, in front of the steam-cylinder. Fig. 3 is a side elevation of one of said valve seats or cages and its valve-rod, showing, upon the lower end of the latter, the longitudinal section of the duplicate valve of the other interchangeable valve-seat, secured in place within the steam-chest shown in Fig. 2.

The letter A represents said steam-chest, and B the steam-cylinder, to which the chest is rigidly joined, as shown, by the pair of arms C and C, within which are made the said steam-passages *c* and *c'*, leading from the ends of the steam-chest directly into each end of the steam-cylinder, and outside or above and below the limits of motion of the main piston P of the vertical cylinder shown by the drawings. Said steam-chest is of the usual outward form, and supplied with the usual steam-tight heads or caps, and, in addition to the said steam-cylinder ports *c* and *c'*, the outer steam-entrance ports *p* and *p'*, and the main steam-escape port *p''* has the diminished bore *b* equally intermedial between the vestibules or entrance-bores *b'* at each end of said chest, thereby forming the pair of annular shoulders or rests *s* and *s'*, against which said duplicate valve-seats, introduced at each and either end of the chest, are pressed and held in place by suitable screw-pins or by the interior annular flanges of said cylinder heads or caps. Said chest is also furnished with the said valve-seats D and D', which consist each of a suitably-made interchangeable cylinder to closely and smoothly fit into either end of the chest, and when resting in place against their said shoulders thereby form the said seats or cages within which their duplicate valves are made to reciprocally play. Said valve-seats have also each an annular recess *r*, formed rectangularly into the exterior surface of the cage-shell and between the pair of annular end flanges *f*, as shown, in order to form, when each valve-cage is in place within the steam-chest, an annular passage *r'* around each said shell, as shown, into and from which the counter-currents of steam are caused to flow, as hereinafter described. In order to supply the proper valve ports or vents for said currents of steam from the exterior to the interior of each of said cage-shells, and thence either into its respective cylinder-port *c* or *c'*, or into the outer air through the central escape-port *p''*, the dual circles of perforations *v* and *v'* are made through said shell,

as shown. These perforations are made so that the inner circularly-arranged vents v' of said duplicate cages shall be suitably larger in size than said outer vents v, to serve certain purposes hereinafter stated. In order to regulate said currents of steam from their entrance into the steam-chest to their exit from the same, as aforesaid, the valve-seats are furnished with the duplicate valves V and V′, which are made to reciprocally slide, by means of the eccentric valve-rod R′, within the limits of said cages. These valves are made, like to their valve-seats, to be interchangeable, and consists each of a capped sleeve g, screwed upon said valve-rod against its respective jam-nut j, which serves to suitably adjust the valves in proper place upon the rod, and covered with a triple set of adversely-cut expansion-rings x, and then secured in place by the screw-cap z, thereby making a closely-working and steam-tight piston-valve, as shown, the obliquely-adverse cuts or slits in said sets of expansion-rings being secured on said cap-sleeve so as to break joints both with each other and the said sleeve-vents, thereby to prevent any waste of steam, while they more tightly pack by expansion each piston-valve in its slide-joint.

The operation of said invention and the most beneficial of the results are as follows: The motor-steam is made to pass from the boiler into said steam-chest by means of the outer dual entrance-ports p and p', as the eccentric-rod R′ reciprocally moves the valves V and V′, and thereby alternately opens and closes both the small and large vents v and v', taken in separate pairs, of the two valve-seats—that is to say, when the valves are down in their valve-seats, as shown in Fig. 2, the small vents in the upper valve-seat D and the large vents in the lower valve-seat D′ will be simultaneously open to, while the small vents of said lower seat and the large vents of the upper seat will be shut against, the admission of steam from said respective intermedial and annular recesses r, just within said outer steam-entrance ports. This condition of said valves and valve-seats causes the steam entering the barrels of said valve-seats, as above stated, to pass at once both into the upper steam-passage c, above the uplifted piston of said steam-cylinder, and also into the barrel b' of said steam-chest, and thence through the escape-port p'' into the outer air, this process being reversely repeated by said valves, valve-seats, and ports, in relation to the lower cylinder-port c', when the lowered piston of said steam-cylinder has reciprocally raised the valves of the steam-chest. The results of said alternate processes by means of said dual valves and valve-seats, as shown, among other effective details—such as those caused by said characteristic features of duplication and interchangeability—are that a much larger than the usual volume of steam is brought to bear upon or under the motor-piston of the steam-cylinder, a larger port-area being supplied in proportion to the valve travel, and also that, while steam is being alternately admitted at one end and released at the other end of the steam-cylinder, said steam is being simultaneously admitted into both ends of the steam-chest and exhausted into the middle portion thereof between the valves, thereby giving an equally elastic pressure upon the outer ends of said main piston, and also causing perfectly-balanced valves in any portion of their slide, this last being the hitherto much needed and desired result in steam-engines, especially in those of the locomotive class.

Therefore, what I claim as new, and desire to secure by Letters Patent, is—

The combination of a steam-chest provided with steam-inlet ports near its respective ends and an exhaust-port intermediate said inlet-ports, valve-seats secured in the ends of said steam-chest, each of said valve-seats being provided with two annular series of apertures, the apertures of one series being larger than the apertures of the other series, the apertures of each valve-seat communicating with the inlet-ports, piston-valves reciprocating within said valve-seats, a steam-cylinder, and steam-ducts communicating with said chest and cylinder, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

ABRAHAM L. ALBERTSON.

Witnesses:

A. G. TRUMBULL,

ALEX. FINDLEY.