

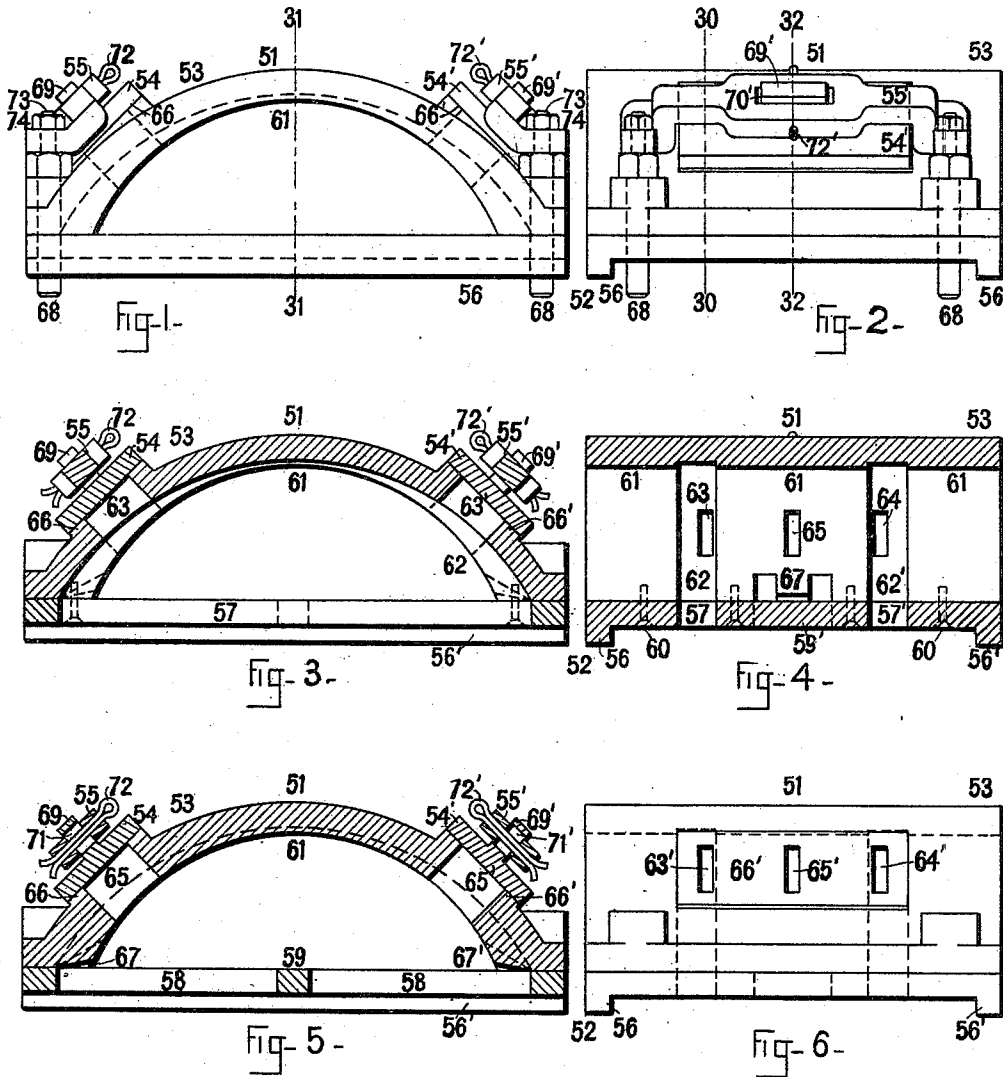
(No Model.)

4 Sheets—Sheet 1.

T. TRIPP.
BALANCED SLIDE VALVE.

No. 470,339.

Patented Mar. 8, 1892.



WITNESSES:

Walter L. Perry
John E. Carter

INVENTOR.

Thomas Tripp
BY E. Frank Woodbury
ATTORNEY—

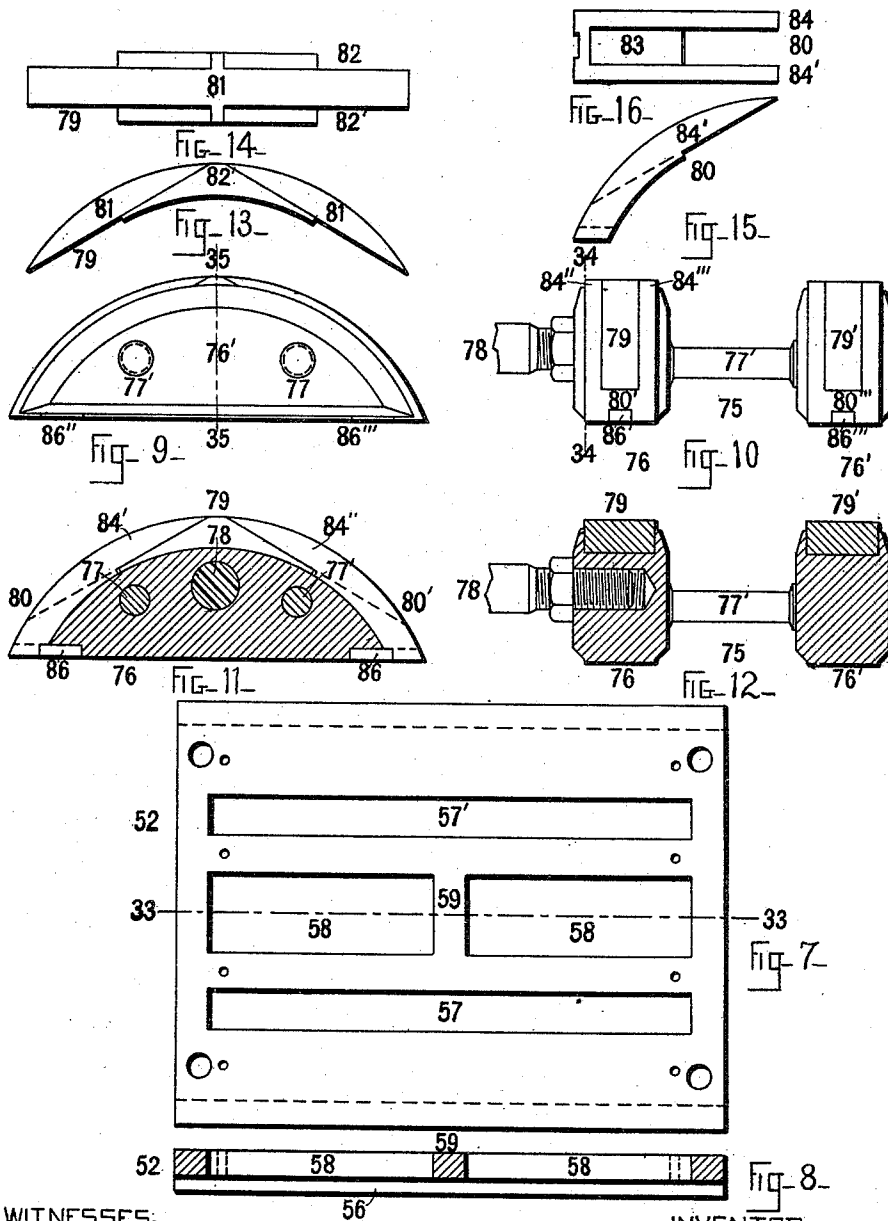
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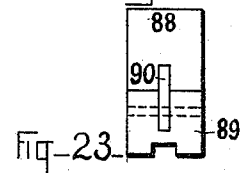
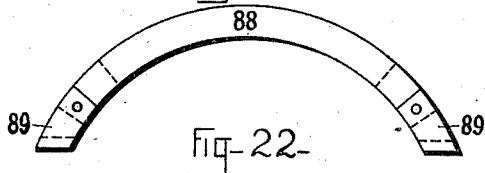
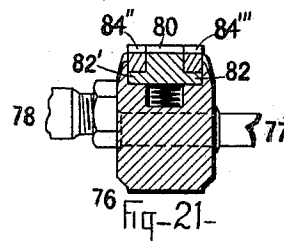
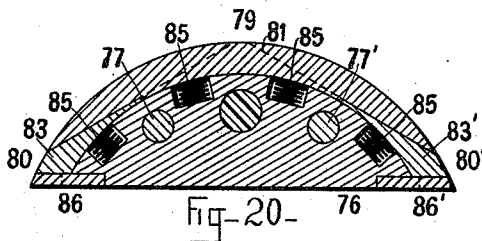
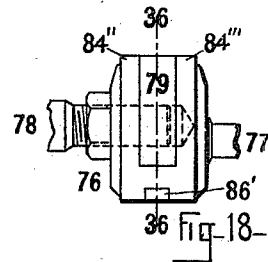
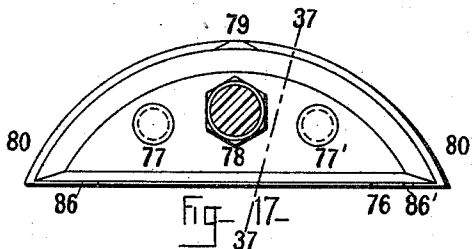
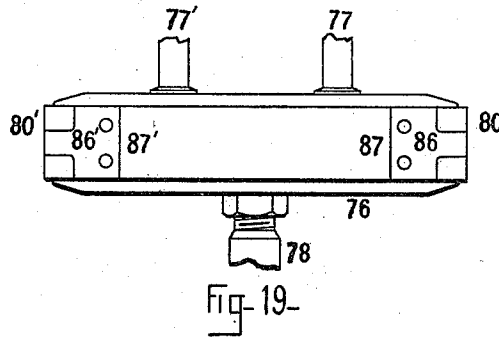
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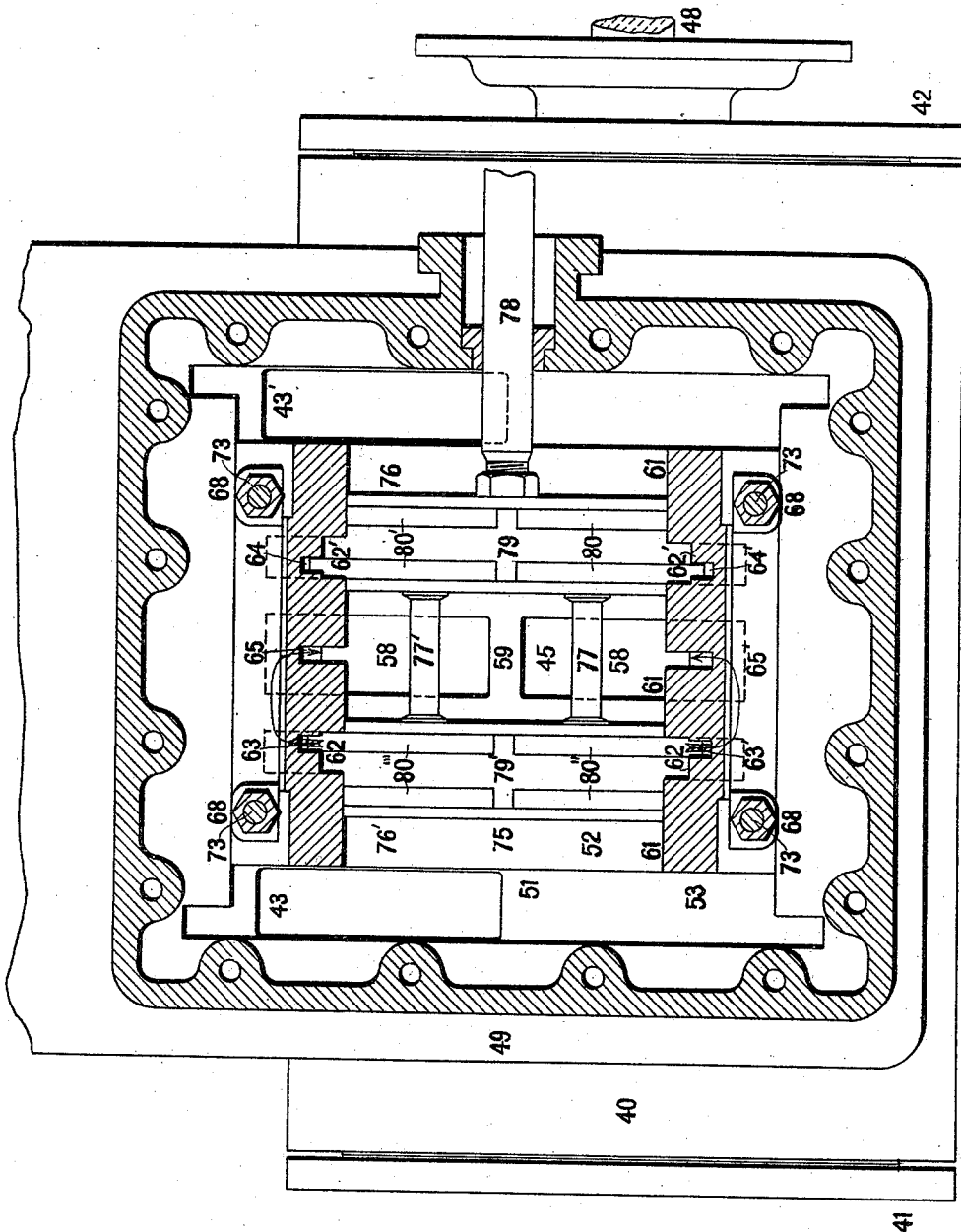


Fig. 25.

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UNITED STATES PATENT OFFICE.

THOMAS TRIPP, OF AVON, MASSACHUSETTS.

BALANCED SLIDE-VALVE.

SPECIFICATION forming part of Letters Patent No. 470,339, dated March 8, 1892.

Application filed June 3, 1889. Serial No. 312,961. (No model.)

To all whom it may concern:

Be it known that I, THOMAS TRIPP, a citizen of the United States, residing at Avon, in the county of Norfolk and State of Massachusetts, have invented a new and useful Balanced Slide-Valve, of which the following is a specification.

My invention relates to valves designed for use on engines, especially of the locomotive class; and it has for its object the production of a compound balanced valve possessing the following special advantages when applied to the present style of locomotive: It can be readily bolted to the common valve-seat and inclosed by the usual steam-chest. It is balanced, and any excessive pressure within the steam-cylinder is effectively relieved into the exhaust-port. It will on the short travel of the valve, when a locomotive is running at high speed, present about double the area of port for admission and exhaust compared with the common slide or piston valve. It is also easily manufactured and is very durable.

All the advantages possessed by the valve in its operation would be the same whether applied to a locomotive-engine or any other class of engines.

Figure 1 represents valve-chamber in front elevation. Fig. 2 represents valve-chamber in side elevation. Fig. 3 is a cross-sectional view of valve-chamber on line 30 30 of Fig. 2. Fig. 4 is a central sectional view of valve-chamber on line 31 31 of Fig. 1. Fig. 5 is a cross-sectional view of valve-chamber on line 32 32 of Fig. 2. Fig. 6 represents valve-chamber in side elevation with relief-plates removed. Fig. 7 represents bottom plate for valve-chamber in plan, and Fig. 8 is a central cross-section of same on line 33 33. Fig. 9 represents valve in front elevation. Fig. 10 represents valve in side elevation. Fig. 11 is a cross-sectional view of valve on line 34 34 of Fig. 10. Fig. 12 is a central sectional view of valve on line 35 35 of Fig. 9. Fig. 13 represents center packing-piece in front elevation, and Fig. 14 is a plan of same. Fig. 15 represents side packing-piece in front elevation, and Fig. 16 is a plan of same. Fig. 17 represents back valve-head in front elevation. Fig. 18 represents back valve-head in side elevation. Fig. 19 represents back valve-head in inverted plan. Fig. 20 is a cross-sectional view of back valve-head on line 36 36 of Fig. 18. Fig. 21 is a sectional view of back valve-head on line 37 37 of Fig. 17. Fig. 22 represents, in front elevation, a modified form of packing which may be used in the valve-heads, and Fig. 23 is a side elevation of same. Fig. 24 represents valve-chamber in central longitudinal section and valve in side elevation as applied to a locomotive-cylinder, which is represented in central longitudinal section. Fig. 25 is a full sectional view of valve-chamber and cylinder on line 38 38 of Fig. 24, representing the valve in plan.

In the drawings, Figs. 24 and 25, the following are all of a common type: cylinder 40, having front head 41, back head 42, supply-ports 43 and 43'', admission-ports 44 and 44'', exhaust-port 45, and provided with valve-seat 46, piston 47 and piston-rod 48, steam-chest 49, and steam-chest cover 50.

All the parts composing the valve-chamber and valve are preferably made of cast-iron, except the steel rods; but they may be made of any suitable material.

In order to obtain a satisfactory balanced valve for use especially upon locomotives, piston-valves have been used; but by experiment and in practical use, using an indicator, it has been found that for locomotives running at high speeds the piston-valve, restricted in its diameter by the height of the usual steam-chest, could not let steam either into or out of the cylinder quick enough. To remedy this difficulty, piston-valves of larger diameter might be used if it were not for the fact that the height of the ordinary steam-chest would not permit of any such increase in diameter. Other difficulties are encountered when piston-valves of large diameters are used, such as unwieldiness of proportions and largely-increased steam-clearance. For locomotives running at low speeds for freight service it has been practically demonstrated by use of indicator that the ordinary piston-valve is quite effective and fairly sufficient.

My valve can be located within the steam-chest of any ordinary locomotive. It is balanced. The steam-clearance is practically the same as if a common slide-valve were used, and with the valve at a length of travel such as would be used when a locomotive is running at high speed the area of port-opening

would be about double that presented by the common slide-valve. These advantages are of great economic importance and value.

The valve-chamber or cage 51 consists of the bottom plate 52, the circular case 53, the relief-plates 54 and 54', and the relief-plate guides and stops 55 and 55'.

The bottom plate for the valve-chamber is represented in plan and central cross-section by Figs. 7 and 8, respectively, and is constructed as follows: It is provided with the two lips 56 and 56', which lap over the ends of the valve-seat 46 of the cylinder 40, thereby preventing any endwise movement of the plate upon the valve-seat. The superficial area of the plate between said lips is substantially the same as that of the valve-seat 46. The admission-ports 57 and 57' each have the same area of opening and coincide with the admission-ports 44 and 44', respectively, of the cylinder. The exhaust-ports 58 have the same area of opening less the area of the bridge 59 and coincide with the exhaust-port 45 of the cylinder. The object of the bridge is when the valve is disconnected to prevent the valve-packings from catching in the exhaust-ports 58, the width either of which is greater than the width of the valve-packings. The plate is fastened to the circular case by means of the screws 60. The bottom plate is used mainly as a mechanical convenience in the manufacture, application, and use of the valve. It is obvious that, except for the reasons stated, especially when the valve is applied to an engine constructed to receive the valve, the circular case may be bolted directly to the cylinder without the intervention of the bottom plate.

The circular case 53 is provided with the following: the main bore in which the valve reciprocates, which consists of the space between the circular line 61 and the top of the bottom plate 52, supplemental ports 62 and 62', relief-ports 63 63' and 64 and 64', relief-ports 65 and 65', seats for relief-plates 66 and 66', relief-plates 54 and 54', and relief guides and stops 55 and 55', exhaust-relieving cuts 67 and 67', and bolts 68. It will be noticed that the width of the space over which the valve travels is less than the length of the admission-ports. The result of this difference is that the supplemental ports 62 and 62' have an open connection directly with the admission-ports 57 and 57', respectively, and this connection is not interfered with either by the presence or travel of the valve. The relief-ports 63 and 63' extend from the seats 66 and 66', respectively, to the supplemental port 62, and in a like manner the relief-ports 64 and 64' extend from the seats 66 and 66', respectively, to the supplemental port 62'. The relief-ports 65 and 65' extend from the seats 66 and 66', respectively, into the space within the valve-chamber directly over the exhaust-ports 58. The seat 66 is covered by the relief-plate 54, which is guided in its lifting movement by the tongue 69, which slides in the opening

70 of the guide and stop 55. The length of the opening 70 is greater than the length of the tongue, so that the uneven lifting of the relief-plate will not bind the tongue in the guide, as the tongue is provided with a slot 71, through which the cotter 72 is passed, which is fastened to the guide. The tongue is pivoted, so far as its endwise movement is concerned, on the cotter. In like manner the seat 66' is covered by the relief-plate 54', which plate is provided with the tongue 69', which slides in the opening 70', the tongue being provided with the slot 71', through which the cotter 72' passes. The bolts 68, which secure the valve-chamber to the valve-seat 46 of the cylinder, are provided with the extension-bolts 73, to which the relief-plates, guides, and stops 55 and 55' are secured by means of the nuts 74.

The valve 75 is provided with the back head 76 and front head 76', which are fastened together by the stay-rods 77 and 77'. The back head is provided with the usual valve-rod 78, with this exception, the heads are alike. The back head 76 is constructed as follows: It is provided with a circular packing composed of the three pieces 79, 80, and 80'. The packing-piece 79 (represented in elevation and plan by Figs. 13 and 14, respectively) is provided with a flange 81 and the two lips 82 and 82'. The packing-piece 80 is provided with the center piece 83 and the two flanges 84 and 84', and the packing-piece 81' is in a like manner provided with the center piece 83' and the two flanges 84'' and 84''''. The packing is assembled within the head, and is held in its outward position by means of the spiral springs 85. To the lower face of the head are fastened the packing locking-pieces 86 and 86', which are securely pinned to the head by means of pins 87 and 87', respectively. In a like manner a front head 76' is provided with the packing-piece 79', the packing-pieces 80' and 80'', and the locking-pieces 86'' and 86'''.

The modified form of packing represented in front elevation and side elevation by Figs. 22 and 23, respectively, which may be used instead of the packings described and shown, consists of the three pieces 88, 89, and 89', the joint between the pieces 88 and 89' being protected by the tongue 90, which is pinned to the piece 89'. The joint between the pieces 88 and 89 is protected in the same manner.

The operation of my valve is as follows: It is obvious that the valve is as perfectly balanced as if it were an ordinary piston-valve, for the reason that all the pressures against the valve are counterbalanced in the same manner as if a piston-valve were used. The operation of the flat sliding face of the valve in admitting and exhausting the steam into and from the cylinder is the same as if a common D slide-valve were used; but it will be noticed that, as previously stated, the length of each admission-port is greater than the length of the flat sliding face of the valve.

The same is true relative to the exhaust-port. Both admission-ports are the same, therefore, if I assume the size of one of the admission-ports to be fifteen inches long by one and one-fourth inches wide. A plain **D** slide-valve on a locomotive at high speed, the valve arranged (as is usual) to cut off the steam at six inches stroke of the piston within the cylinder, would open the admission-port about five thirty-seconds of one inch, which would give an area of opening for the admission of steam of about two and one-fourth square inches. The same opening would be presented for the exhausting of the steam. Now if one of my valves is used over an admission-port of the same size named—fifteen by one and one-fourth inches—the valve having a length of face of thirteen inches, the opening presented for the admission of steam into the cylinder would have an area of four and one-half square inches—that is to say, it would present an opening for admission twice as large as a plain **D** slide-valve would present—and my valve would present the same area of opening for the exhaust as it would for admission of steam. This great and extremely valuable increase of opening is obtained as follows: The admission-port being fifteen inches long and the length of valve-face being thirteen inches, there will be left on each side of the valve-face an opening one inch long by one and one-fourth inches wide. Therefore the two openings would have an area of two and one-half square inches. These openings form a part of the supplemental port, which extends entirely around the circular portion of the valve. Therefore the area presented for admission by a five thirty-seconds of an inch movement of the valve would be the length of the face of the valve, or thirteen inches, multiplied by five thirty-seconds of an inch, equals 1.93 square inches, plus the length of the circular face of the valve, or sixteen and three-fourths inches, multiplied by five thirty-seconds of an inch, equals 2.61 square inches, and 1.93 plus 2.61 equals about four and one-half inches.

The steam-clearance inside the valve-chamber is about one-tenth that of a valve-chamber designed to receive an ordinary piston-valve.

The valve being balanced, any excessive pressure within the cylinder should be relieved by the use of relief-plates. If it is assumed that the piston and valve are moving in lines, as indicated by arrows in Fig. 24, an excessive pressure may be created sufficient to blow out the front cylinder-head 41; but the relief-ports, as described and shown, would

entirely relieve the cylinder from injurious pressure, as indicated by arrows, in the following manner: Any pressure within the cylinder between the piston and front head 41 would lift the relief-plates, for the reason that the relief-ports 63 and 63' are always in direct communication with the cylinder through supplemental port 62 and admission-ports 57 and 44. The lifting of the relief-plates would permit the excessive pressure to escape, as indicated by arrows in Figs. 24 and 25, into the exhaust through relief-ports 63 and 63', 65 and 65', exhaust-ports 58, and exhaust-port 45.

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

1. The valve having two segmental-shaped heads, each of which is provided with the locking-pieces and the circular packing, said packing being composed of three pieces, one of said pieces having a center flange and two projecting side lips and each of the other pieces having a center piece and two side flanges, in combination with the valve-chamber having the supplemental ports, which extend around the interior of the circular case and partially around the valve, substantially as and for the purpose set forth.

2. The valve-chamber having the circular case, which is provided with the supplemental ports, which extend around the interior of the circular case opposite the admission-ports and having the bottom plate, which is provided with admission and exhaust ports, in combination with the valve having two heads fastened together, each of said heads being provided with a circular packing and locking-piece, substantially as described.

3. The valve-chamber provided with the supplemental ports, which extend around the interior of the circular case opposite the admission-ports, relief-ports, relief-plates, and relief-plate guides and stops, in combination with the valve having two heads, each of which is provided with the locking-pieces and the circular packing, said packing being composed of three pieces, one of said pieces having a center flange and two projecting side lips and each of the other pieces having a center piece and two side flanges, substantially as and for the purpose set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

THOMAS TRIPP.

Witnesses:

JAMES A. WOODBURY,
E. FRANK WOODBURY.