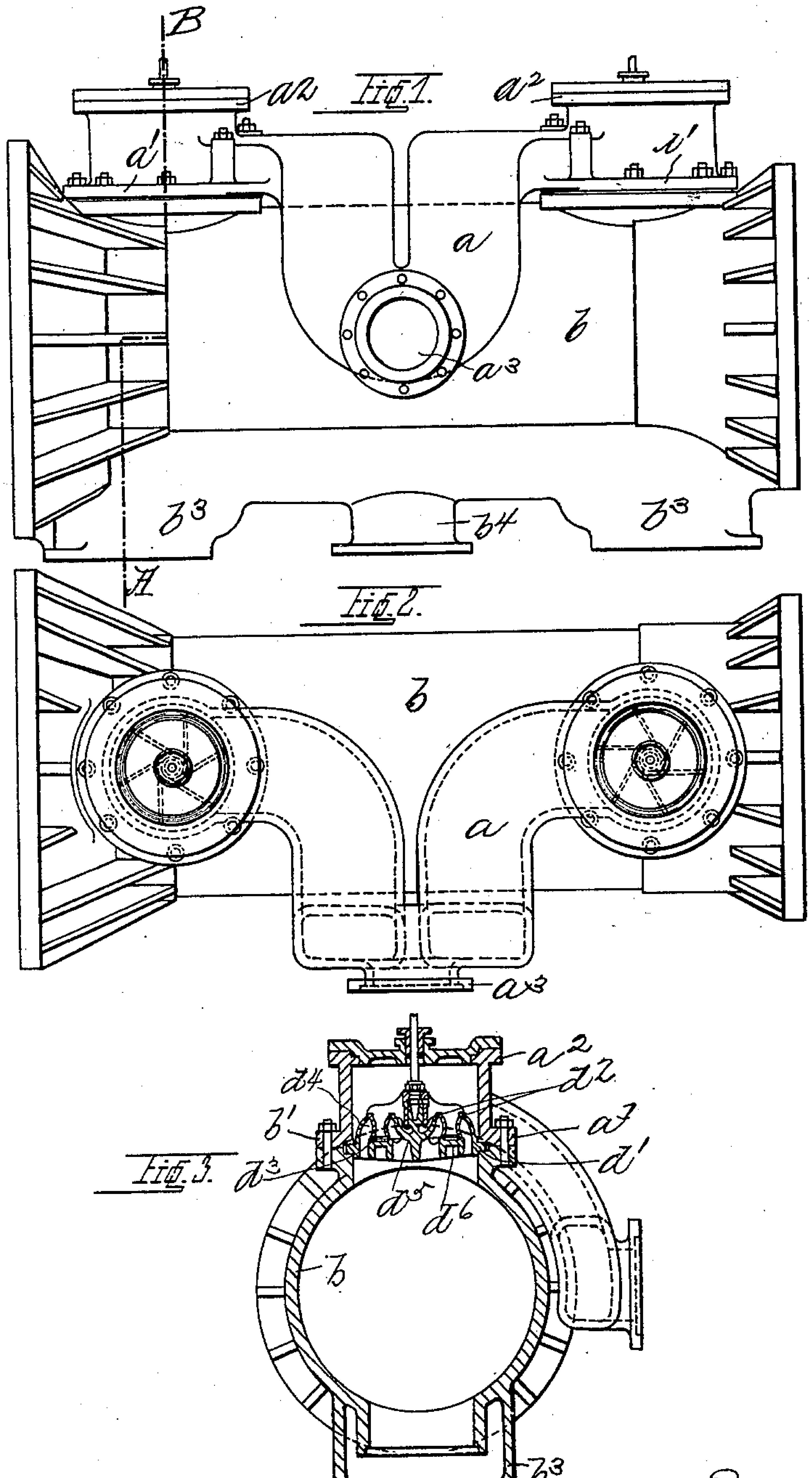
No. 658,015. Patented Sept. 18, 1900.

E. KÖNIG.

EXPANSION COMPENSATING DEVICE FOR STEAM CYLINDERS.

(Application filed June 23, 1900.)

(No Model.)



Witnesses:
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UNITED STATES PATENT OFFICE.

EDUARD KÖNIG, OF ASCHERSLEBEN, GERMANY.

EXPANSION-COMPENSATING DEVICE FOR STEAM-CYLINDERS.

SPECIFICATION forming part of Letters Patent No. 658,015, dated September 18, 1900.

Application filed June 23, 1900. Serial No. 21,367. (No model.)

To all whom it may concern:

Be it known that I, EDUARD KÖNIG, a subject of the King of Prussia, German Emperor, and a resident of Aschersleben, in the German Empire, have invented certain new and useful Improvements in Expansion-Compensating Devices for Steam-Cylinders; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

As is well known, the customary arrangement of the steam-admission parts in engines working with saturated steam is not applicable to engines working with highly-superheated steam—the so-called "hot-steam" engines. In consequence of the high temperature (about 380° centigrade) the difference in the expansion of the cylinder and of the casing inclosing the steam-inlet valves is so great that in the otherwise usual arrangement the washering-surfaces or bearing-faces of the parts warp under all circumstances and the cylinders themselves would even bend. It is quite impossible under these circumstances to keep the valve parts tight.

This invention has for its object to meet this difficulty as far as possible. In order to equalize the difference in the expansion between the wall of the cylinder and the casing of the inlet-box and to render such difference harmless, the casing of the latter, which receives the inlet-valves, is made in one piece, with a spring part carrying the inlet-socket. The seat-bodies of the inlet-valves are fixed between the lower flanges of the casing of this box and the flanges of the steam-cylinder and remain permanently perfectly tight during the resilient action of the spring part of the inlet-box.

In the accompanying drawings, Figure 1 is a side view of the arrangement; Fig. 2, a plan view, and Fig. 3 a cross-section of the same on the line A B of Fig. 1.

The inlet-box a is a doubly-bent pipe which is formed at both ends into casings, each of which is connected by an under flange a' and screws with flanges b' on the steam-cylinder. An upper flange a^2 on the two casings serves for attaching a cover. The part of the box connecting the two casings is usually bent in a V shape, so that it can have a spring action, and is adapted as closely as possible to the wall of the cylinder b. The lower bend of this tubular connecting-piece has a steam-inlet socket a^3.

The seat d of the double-seat inlet-valve e, which is provided with upper and under annular seat-surfaces d^2 and d^3, is held between the flanges a' b' of the casings and of the cylinder by means of a flange d'. The upper seat-surfaces d^2 are formed by walls d^4 d^5 and the under seat-surfaces d^3 by a disk d^6, which is connected by cross-ribs with the walls d^4 and d^5 and is provided with suitable steam-admission openings, on which disk d^6 the connecting-flange d' is formed. The upper seat-surfaces d^2 lie in one common plane and the under seat-surfaces d^3 also lie in a common plane which is parallel to the plane of the upper seat-surfaces d^2. As the part between the two casings inclosing the valves is in itself yielding and has an equalizing action when differences take place between the expansion of the cylinder and that of the inlet-box, no deleterious expansion for the washering-surfaces or bearing-faces of the inlet-valves can take place, the valve-seats cannot shrink or crack, and the valves themselves close perfectly tight even with the highest steam temperatures.

As Fig. 3 shows, the two flanges a' and b' of the casings and cylinder are so turned that when put together an annular groove suitable for receiving the valve-seat flange d' is formed. By the clamping of the flange d' of the valve-seat a perfect tightness between same and the flange of the respective casing of the inlet-box a is secured without the valve-seat, as already stated, being able to twist or be distorted. In order, however, to prevent any want of tightness at the surfaces which are to be washered between the valve-seat d and the valve-body e, owing to thermic influences on the seat and on the valve-body itself, the seat d is provided with an outer casing-wall d^4 and an inner concentric wall d^5, between which the whole valve-body e lies inclosed, as shown in Fig. 3. Thereby similar proportions of expansion are obtained for the seat

d and for the valve-body e, as both are subjected on the one side of their walls to fresh boiler-steam and on the other side of their walls to the less-hot cylinder-steam both are therefore subjected to equal expansion. From practical observations the correct proportions for these steam-encountered surfaces of the seat and of the valve-body have been ascertained. Accordingly these surfaces may be so calculated that the expansions of the seat and of the valve-body exactly equalize one another, and therefore a tight closing is always secured. Such a double or multiple-double seat-valve with unloaded annular seat-surfaces affords both great facility in the manufacture and also considerable advantages from the point of view of obtaining an equal expansion as far as possible of all parts by similar quantities of material being placed in the walls d^4 d^5 and also in the disk d^6.

Casings b^3 are formed on the cylinder b for receiving the exhaust-valves. The exhaust-valves, which are exposed to less-heated steam, may be of any suitable construction.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

1. A device for equalizing differences of expansion in the inlet parts of superheated steam-engines, which consists of a tubular connecting-piece carrying the steam-inlet socket a^3 and a casing at each end for receiving the inlet-valves, which casings are formed in one piece with the said connecting-piece and the latter being bent to the general form of a V shape in order to receive a spring action, substantially as described.

2. In a device such as described for equalizing differences of expansion, fixing the double seat d of the valve for the admission of the steam by means of a flange d' on said seat which is held firmly between a flange a' on the casing of the steam-inlet box a and a flange b' on the steam-cylinder b in such a way that the seat cannot warp, and the steam-inlet valves will close perfectly tight even at the highest temperatures, substantially as described.

3. In a device such as described for equalizing differences of expansion, forming the upper seat-faces d^2 of annular shape on concentric walls d^4 d^5 of the double seat to inclose the whole valve e and thus allow the surfaces both of the seat and of the valve, which are acted on by fresh boiler-steam and cylinder-steam respectively, to be correctly calculated for equal expansion, and providing the seat-disk, which carries the under annular faces d^3 and fixing-flange d' with suitable openings for giving passage to the hot steam, substantially as described.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

EDUARD KÖNIG.

Witnesses:
RUDOLPH FRICKE,
A. KRAUSS.