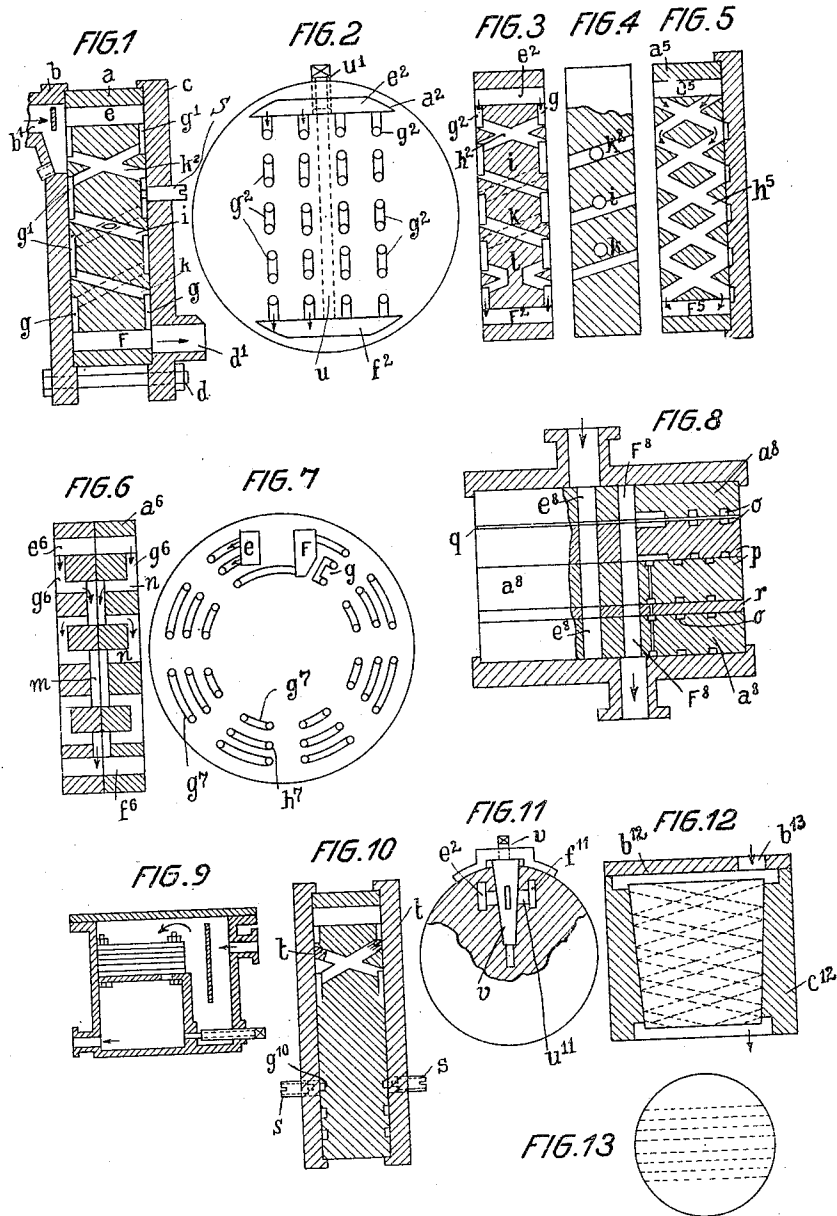


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STEAM TRAP.
APPLICATION FILED JUNE 21, 1912.

Patented Jan. 5, 1915.

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STEAM-TRAP.

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To all whom it may concern:

Be it known that I, JAKOB KRANZ, engineer, a citizen of the German Empire, residing at Neucölln, near Berlin, in the Empire of Germany, have invented a new and useful Steam-Trap; and I do hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to improvements in steam traps, and more particularly to steam traps of that class in which the condensed steam is forced out of the trap through narrow passages within which the pressure of the escaping steam is reduced by impact by continuously striking against solid surfaces or other jets of steam. And the object of the improvements is to provide an apparatus of this class in which the pressure is reduced within the passages in a very effective way, while the length of the passages is small and their cross-sectional area large.

With this object in view my invention consists in providing the passages within a body, instead of on the outside thereof, and connecting the same on the outer surface of the body. If desired two or more passages may be connected in parallel to the inlet and outlet of the trap, in which case one or more of the said passages may be thrown out of operation by means of a locking plug or the like.

For the purpose of explaining the invention several examples embodying the same have been shown in the accompanying drawing, in which the same letters of reference have been used in all the views to indicate corresponding parts.

In said drawing, Figure 1, is a cross-section of the apparatus comprising a block provided with pressure reducing passages and with means for connecting the same to the condensed steam supply and to the outlet, Fig. 2, is a side view of a disk shaped block provided with a plurality of pressure reducing passages connected to the same inlet and outlet passages, Figs. 3 and 4, are cross-sections of the block shown in Fig. 1 and showing several examples of the arrangement of the pressure reducing passages relatively to each other, Figs. 5 and 6, are similar cross-sections illustrating further examples, Fig. 7, is a side view of a further modification in which the admission and outlet passages are disposed beside each other, while the passages are arranged along

circles, Fig. 8, is a cross-section of a further example in which a plurality of disks are placed one above the other, Fig. 9, is a vertical cross-section of a steam trap of ordinary construction in which the pressure reducing passages are formed within a plurality of superposed disks of the construction shown in Fig. 8, Fig. 10, is a cross-section of a block showing methods of throwing one or more of the sets of passages out of operation, Fig. 11, is a side view partly in section of a block in which the admission and outlet ports are placed beside each other and are adapted to be temporarily connected with each other through a direct passage, Fig. 12, is a cross-section of a further modification showing a conical pressure reducing block, and Fig. 13, is a plan view of Fig. 12.

Referring to the example illustrated in Fig. 1, my improved steam trap consists of a solid block *a* which is tightly held between the side walls *b* and *c* of the steam trap by means of screw bolts *d* or in any other suitable way. At its upper end the side wall *b* is formed with an admission stud *b'* connected with a low part of the steam pipe, and at its lower end the wall *c* is formed with an outlet stud *d'*. The block *a* is formed at its upper and lower part with ports *e* and *f* respectively which communicate with the admission and outlet studs *b'* and *d'*. As shown the block *a* is formed with a plurality of bores *k*, *k*² and *i* which are inclined in opposite directions. The bores *k*² cross each other, the bores *i* meet at the sides only, while the bores *k* do not meet at all. At their outer ends the upper and lower passages are respectively connected to the upper and lower ports *e* and *f* through grooves *g*, and the intermediate bores are connected with one another by outer grooves *g'*. Certain of the grooves *g'* may be thrown out of operation, as for instance, by means of a screw plug *s* adapted to be screwed into the groove from the outside of the apparatus.

The function of the steam trap shown in Fig. 1 is as follows: The condensed steam is admitted to the port *e* through the admission stud *b'* and it is forced through the passage *g*, *k*, *k*², *i* *g'* and *f* by the pressure of the steam acting thereon. Should there be no water of condensation within the steam pipe, the steam has access to the port *e* and it tends to flow with great velocity through the passage *g'*, *k*², *i*, *k*, *g*. However, two jets of

steam strike against each other at the middle parts of the bores h^2 when said bores cross each other, and thereafter the jets strike against the inner surfaces of the walls b and c . Thereby the energy of the steam is gradually reduced by impact, so that little or no steam escapes through the outlet stud d' .

In the example shown in Figs. 2 to 4 the block a^2 is in the form of a disk having upper and lower elongated ports or slots e^2 and f^2 respectively. The ports e^2 and f^2 are connected with each other through a plurality of passages g^2 , h^2 , i , k , l , and the passages in each set may be arranged in different ways as has been shown in Figs. 3 and 4. For example the bores h^2 are arranged in the same way as the passages h shown in Fig. 1. The bores i and k are likewise inclined in different directions. As appears from the cross-section shown in Fig. 4, the inclined bores i meet at their sides only, while the bores k do not meet at all, but pass each other. The bores l extend through a part only of the thickness of the block, whereupon they are returned to the same sides of the block. The function of the apparatus is substantially the same as has been described with reference to Fig. 1. Fig. 2 also shows means whereby the ports e^2 and f^2 may temporarily be thrown in direct communication for withdrawing a large amount of water. As shown such means consists of a bore u connecting the passages e^2 and f^2 and adapted to be closed by means of a screw plug u' .

It is not necessary, that the length of the grooves g' and g^2 is that shown in Figs. 1 to 3. As shown in Fig. 5 the said length may be reduced substantially to the diameter of the bores or passages h^5 .

The grooves g may have rectilinear, curved, or loop shaped form.

In Fig. 6 I have shown an example in which the bores n are perpendicular to the block a^6 , and in which successive transverse bores n are connected by longitudinal bores m . In this case the block a^6 is preferably made in two sections, as is shown in the said figure. It will readily be understood, that only one of the sections may be provided, which will also produce a pressure reducing block.

In the example shown in Fig. 7 the admission and outlet ports e^7 and f^7 are disposed adjacent to each other, and the passages g^7 and h^7 are arranged along circles. In the example shown in the said figure the passages of the outer circle begin from the ports e^7 and end in the passage f^7 . The passages of the second circle begin from the port e , but they do not end in the passage f^7 but are connected with the passages of the innermost circle which at its opposite end terminates in the port f^7 . Ordinarily

a single set of circular passages will be sufficient. But in some cases it may be necessary to combine several circular passages with each other, in the manner shown in the figure.

In Fig. 8 I have shown an example in which a plurality of disks a^8 are located one above the other. Each of the disks is formed with grooves o and p , and bores h^8 which communicate with admission and outlet ports e^8 and f^8 respectively. As shown, all the ports e^8 and f^8 respectively register with each other, so that each disk has its function independently of the other ones. If desired the grooves o and p may be connected in series, in which case the last one of the grooves of one disk is not connected with the outlet port f^8 , but with the first groove of the following disk.

As is shown in Fig. 8, the location of the grooves of adjacent disks a^8 may be such, that they are disposed at the same distances from the axis of the block, as is shown at o , or that they are displaced relatively to each other, as is shown at p . For separating the grooves of adjacent disks thin tightening disks q or strong plates r may be provided. If the block shown in Fig. 8 is used in a closed casing, as is shown in Fig. 9, the tightening disks q and r may be dispensed with.

In Fig. 10 I have shown an apparatus in which one or more passages may be thrown out of operation. This may be done either by means of screw plugs s which are adapted to be screwed into the said passages from the outside of the apparatus, or by means of plugs t , which are adapted to be placed into the ports h^{10} .

In Fig. 11 I have shown an example in which the admission and outlet ports e^{11} and f^{11} may temporarily be directly connected with each other. As shown, a short passage u^{11} is provided between the passages e^{11} and f^{11} , which may be closed by a valve plug v .

In Fig. 12 I have shown an example in which the block a^{12} consists of a cone which is adapted to be placed into a cylinder c^{12} having a conical bore, and which is closed at its top by a cover b^{12} provided with an inlet opening b^{13} .

I claim herein as my invention:

1. In a steam trap, the combination of a housing; and a block, fitted into said housing and provided with a plurality of passages passing substantially transversely through the interior of the block, and grooves in the surface of the block connecting the ends of certain of the passages, the housing being provided with inlet and outlet passages communicating with certain of the grooves of the block, said grooves communicating with opposite ends of certain of the passages.

2. In a steam trap, the combination of a housing; and a block fitted therein and provided with a plurality of pairs of passages passing through the block; the block being provided with grooves connecting certain of the passages, and the housing being provided with channels communicating with certain of the grooves.

3. In a steam trap, the combination of a housing; and a block fitted therein and provided with a plurality of pairs of passages passing through the block; the block being provided with grooves connecting certain of the passages, and the housing being provided with channels communicating with certain of the grooves; the passages of one of said pairs being in oblique relation to each other and intersecting.

4. In a steam trap, the combination of a housing; and a block fitted therein and provided with a plurality of pairs of passages passing through the block; the block being provided with grooves connecting certain of the passages, and the housing being provided with channels communicating with certain of the grooves; the passages of one of said pairs being tangential to each other.

5. In a steam trap, the combination of a housing; and a block fitted therein and provided with a plurality of pairs of passages passing through the block; the block being provided with grooves connecting certain

of the passages, and the housing being provided with channels communicating with certain of the grooves, passages of one of said pairs intersecting each other.

6. In a steam trap, the combination of a housing; a block fitted therein and provided with a plurality of pairs of passages passing through the block; the block being provided with grooves connecting certain of the passages, and the housing being provided with channels communicating with certain of the grooves; and a closing screw provided in said housing and adapted to close one of said grooves.

7. In a steam trap, the combination of a housing; and a block, fitted into said housing and provided with a plurality of straight passages passing substantially transversely through the interior of the block, and grooves in the surface of the block connecting the ends of certain of the passages, the housing being provided with inlet and outlet passages communicating with certain of grooves of the block.

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

JAKOB KRANZ.

Witnesses:

HEINRICH RAUCHHOLZ,
HENRY HASPER.