June 24, 1930. E. RUSCHKE 1,765,883

SAFETY DEVICE FOR BOILER FEED AND DELIVERY PIPINGS

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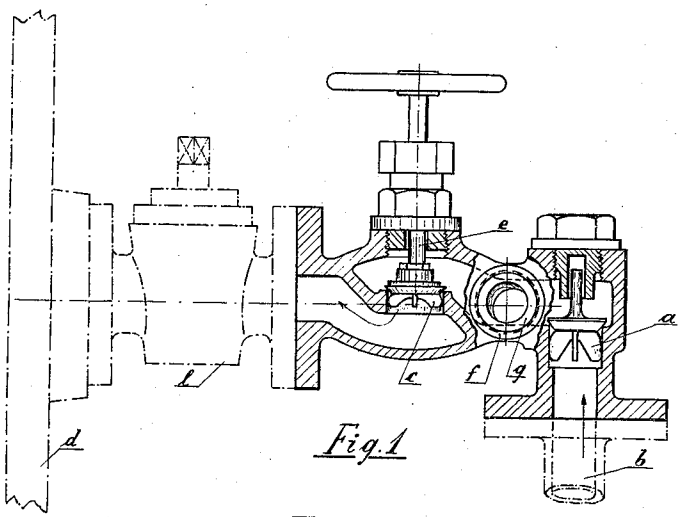


Fig. 1

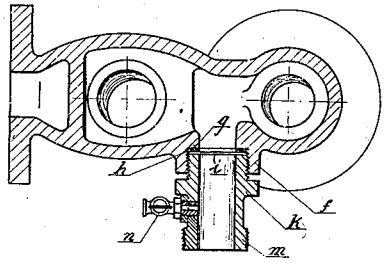


Fig. 2

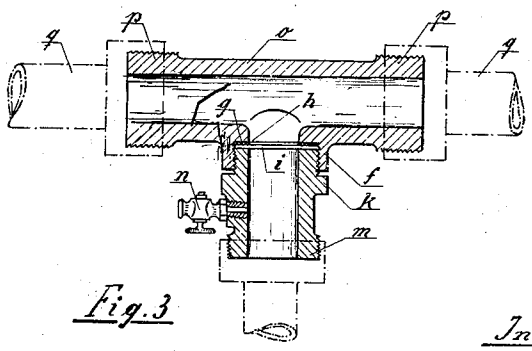


Fig. 3

Fig. 4

Inventor

Ewald Ruschke

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# UNITED STATES PATENT OFFICE

EWALD RUSCHKE, OF LUDER, HANOVER, GERMANY

## SAFETY DEVICE FOR BOILER FEED AND DELIVERY PIPINGS

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Fractures of pipes and valves which happen frequently in boiler feed pipings are due in most cases to the fact that the boiler feed-valves or intermediate valves are not opened in proper time, or that the stationary valve-head of the feed-valve combined with a check valve has been detached from its spindle by rusting, water-hammer or the like, so that the feed pump has to work against closed valves and produces a water pressure which is too high for the feed pipe. The spring-loaded safety valves mounted in certain feed-pipings, do not always give sufficient protection, as they are sometimes tightened more strongly by the staff in opposition to the rules so that they must evidently fail in emergency cases.

This invention relates to a safety device for boiler feed- and delivery-pipes and the like, which absolutely prevents pipe-fractures due to excessive pressure, even when no special safety valve exists. To attain this object a short branch tube is arranged at a suitable point of the feed pipe in which branch tube a thin metal diaphragm is interchangeably mounted so that it is exposed on the one side to the pressure in the feed pipe and on the other side to the atmospheric pressure. When the pressure in the feed pipe, owing to errors of the staff or to disturbances in the pipings, exceeds the admissible limit only the metal plate is destroyed, the piping remaining intact. The water flowing out through the torn metal plate can be delivered at any convenient point until the feed pump has been stopped, whereupon a fresh metal plate is inserted into the branch tube.

Two embodiments of the invention are illustrated, by way of example, in the accompanying drawing, in which:—

Fig. 1 shows the safety device arranged between the stationary valve-head of the boiler feed valve and the check valve-head.

Fig. 2 is a horizontal central-section of Fig. 1.

Fig. 3 shows the safety device as a separate fitting to be mounted at any convenient point of the feed pipe.

Fig. 4 shows the screw stopper for the safety device.

In the generally used combined feed valves the loose cone $a$ of the check valve is connected to the feed pipe $b$, and the stationary valve-head $c$ of the shut-off valve is connected directly to the boiler $d$, the water flowing out underneath this stationary valve-head. When the stationary valve-head $c$ is detached from its spindle $e$ for any reason whatsoever, the water supply to the boiler is interrupted so that in the feed pipe a too high pump pressure will be produced. In this case a fracture of the feed valve between the stationary valve-head and the loose cone would be most dangerous, as the hot boiler water could then flow out without any possibility of shutting it off, as the hot boiling water prevents access to the feed valve.

To avoid these dangers the safety device according to the application may be arranged directly on the feed valve between the shut-off valve and the check valve.

With this object in view a tubular extension $f$ is either cast in one piece with the feed valve or subsequently mounted on the same, said tubular extension having a ring-shaped bearing surface $g$. On this bearing surface or on a packing ring $h$ placed on this bearing surface a thin circular metal disk $i$ is placed and secured in its position by a screw stopper $k$. The thickness of the metal disk $i$ depends on the actual working pressure of the plant and is selected so that the metal disk will tear when the admissible pressure for the piping is exceeded. The thin disk $i$ must evidently be made of non-corrodible metal. The tubular extension $f$ may be arranged on the feed valve so that the outflowing water is conducted to a place where it cannot cause any inconvenience, so that a shut-off cock $l$ between the feed valve and the boiler $d$ can be easily closed. Instead of a simple screw stopper $k$ as shown in Fig. 4, a screw stopper is preferably used which has a pipe connection $m$. Through this pipe connection the outflowing water can be returned by means of a connecting pipe for instance to the feed water tank or to the suction pipe, or to the outer side of the building.

In order that also in this case it may be possible to ascertain whether the metal plate

has torn, i. e., whether there is a leak in the piping, a small control cock *n* is screwed into the screw stopper *k* and held open permanently during the service. At fracture of the plate *i* a thin water jet flows out of the cock *n* which can then be closed at once.

The above described safety device might be constructed as shown in Fig. 3 as a separate fitting. In this case the tubular extension *f* is arranged on a short pipe *o* which by means of screw pipe joints *p* or by means of flanges may be inserted at any convenient point in the feed pipe *q*. The other elements of the safety device are the same as above described.

The screw stopper *k*, *m* may be altered without departing from the scope of the invention. The safety device may be evidently arranged on ordinary intermediate valves and branch tubes of the feed pipe, the connection being either screw connections or flange connections.

I claim:—

1. A safety device for boiler feed valves characterized by the combination of an interchangeable diaphragm plate with a boiler feed valve and built directly into the valve case between the valve head and the shut off valve and adapted to protect the valve case against excessive pressure and at the same time protect the feed water pipe on fracture of the hand operated valve.

2. A safety device for boiler feed- and delivery pipes, comprising in combination, the boiler pipe, a short pipe branching from said boiler pipe, a changeable thin metal diaphragm mounted in said branch pipe, a screw stopper for securing said thin metal plate in its position so that it is exposed on the one side to the pressure in the feed pipe and on the other side to the atmospheric pressure, a pipe-connection on the outer end of said screw stopper, and a small control cock in said screw stopper for indicating the fracture of the metal plate.

In testimony whereof I affix my signature.

EWALD RUSCHKE.