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I. MAYER & J. HÜBNER.

CUT-OUT OR ISOLATING VALVE.

APPLICATION FILED DEC. 22, 1902.

NO MODEL.

Fig. 1.

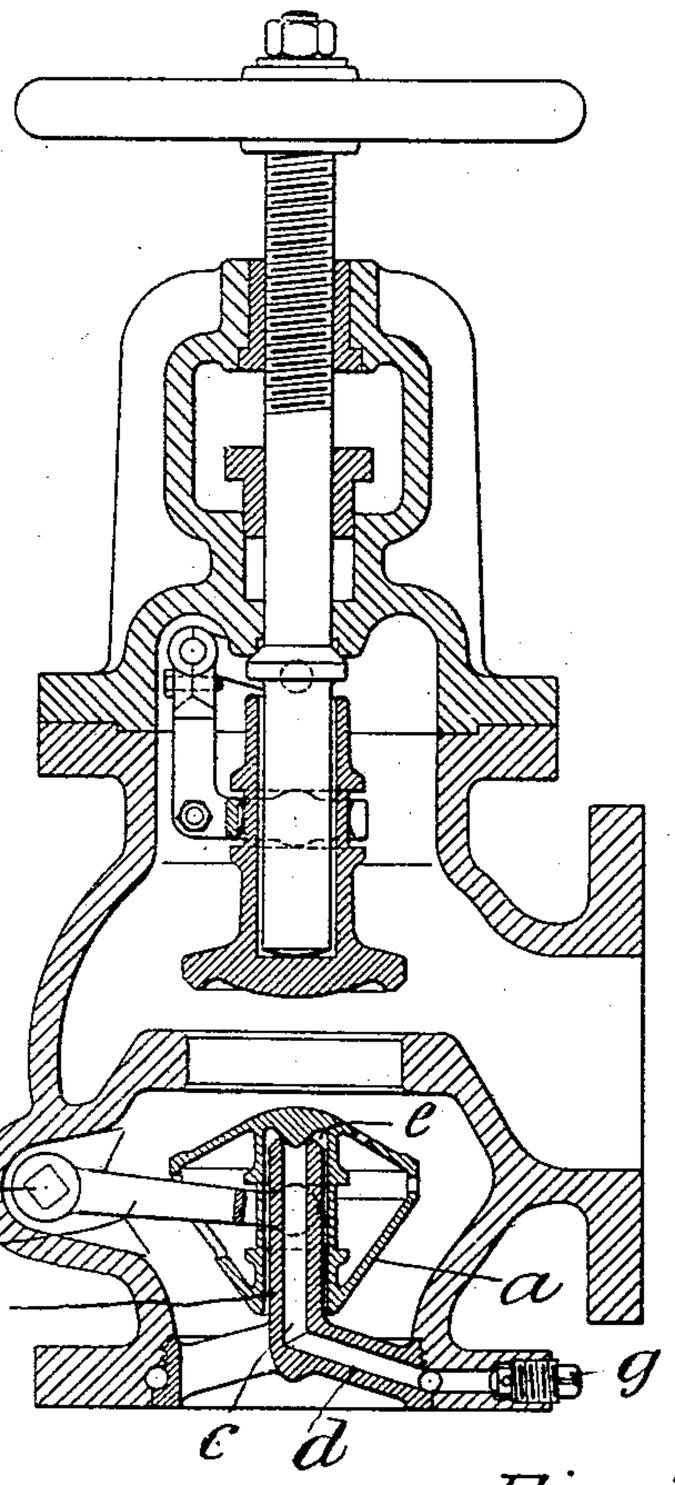


Fig. 2.

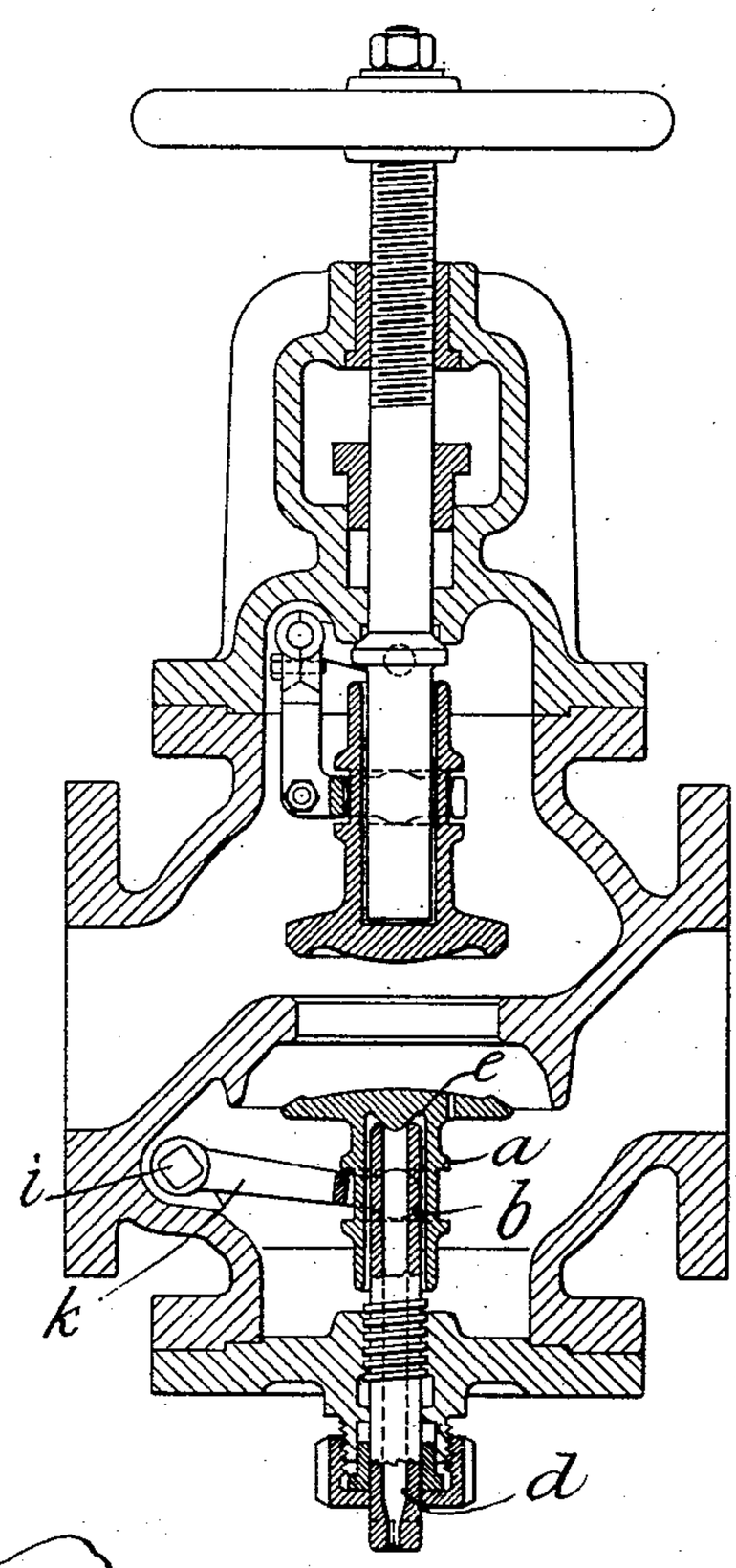
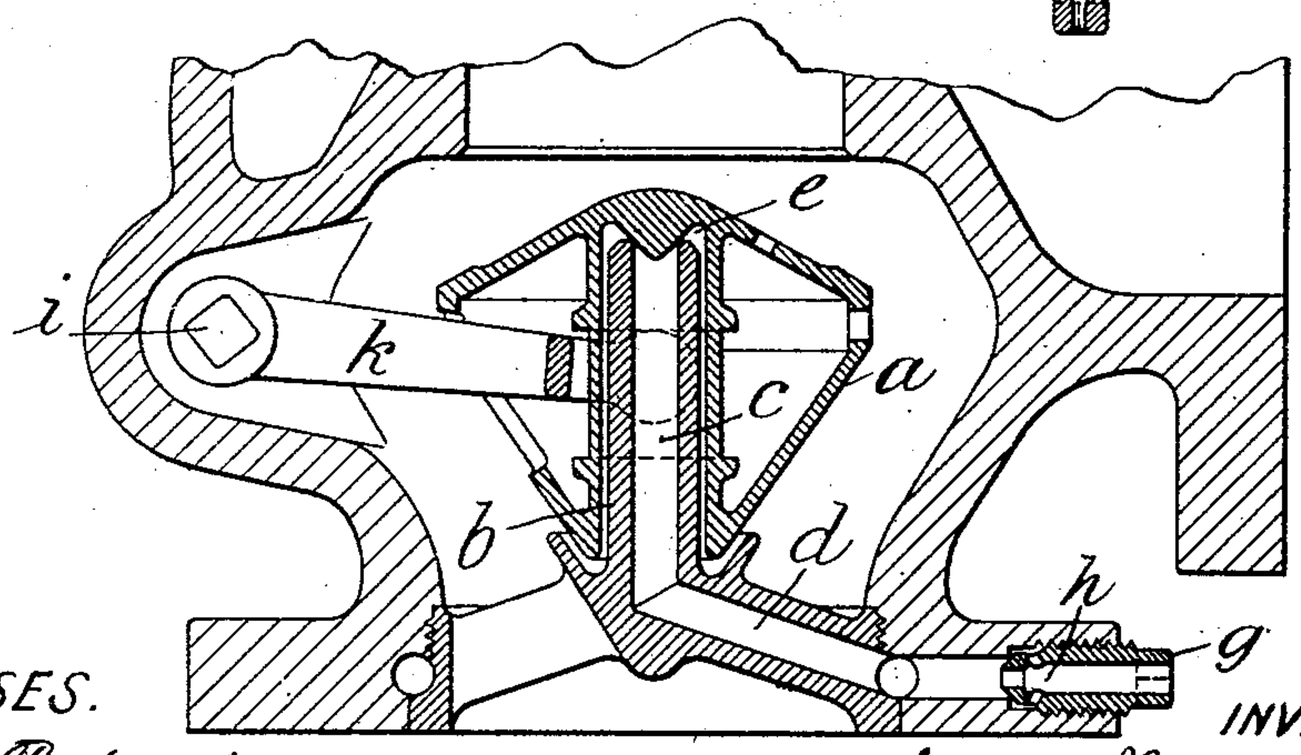


Fig. 3.



WITNESSES.

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No. 745,874. Patented December 1, 1903.

UNITED STATES PATENT OFFICE.

ISIDOR MAYER AND JOSEF HÜBNER, OF VIENNA, AUSTRIA-HUNGARY.

CUT-OUT OR ISOLATING VALVE.

SPECIFICATION forming part of Letters Patent No. 745,874, dated December 1, 1903.

Application filed December 22, 1902. Serial No. 136,275. (No model.)

To all whom it may concern:

Be it known that we, ISIDOR MAYER and JOSEF HÜBNER, subjects of the Emperor of Austria, residing at XIX/6 Muthgasse 64, Vienna, Austria-Hungary, have invented certain new and useful Improvements in Cut-Out or Isolating Valves; and we 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.

The cut-out or isolating valves of ordinary stop-valves acting in case of pipe fracture as made hitherto must be made very heavy and be arranged at some distance from their closing position in order to prevent any unintended premature self-closing. The disadvantages of this arrangement are known. Heavy bodies produce violent shocks when the closing is effected, and the compulsory large stroke easily leads to a failure to act, especially in case of the least sticking of the closing body, owing to overheating or other causes. Moreover, with the slightest deviation from the perpendicular position the heavy automatic cut-out valves act very unreliably, and therefore are quite unsuitable, especially for use in connection with boilers on ships.

The present invention relates to an automatic cut-out valve duly acting in case of a pipe fracture, which is free from the above-mentioned defects, may be made as light as possible, with a small stroke, and, further, will act perfectly in all positions and under the most violent vibrations, besides which the automatic valve is capable of being regulated to a great extent, as it can be adjusted to close with certainty at any particular fall of pressure.

Many attempts have been made by means of the springs which act contrary to the direction of the closing motion to increase the ideal weight of the closing valve-body and to prevent the premature closing thereof while making it lighter. Such arrangements, however, are fundamentally defective. If the counter-springs employed in this case are in the steam-chamber, they undergo rapid alterations and are soon spoiled when the pressure is great and the temperature high. In addition to this they have the disadvantage, like externally-arranged springs, that under different degrees of steam-pressure and velocity they fail to adapt themselves to the varying conditions of equilibrium, owing to the permanent nature of their counter-action, and therefore can only be adjusted to very distinct working conditions, in which, however, in practice changes of steam-pressure and velocity occur, and thus the closing is affected too soon or too late.

According to the present invention the necessary ideal weight for the proper action of the automatic closing-valve is produced automatically by the steam or the pressing medium flowing through the pipes, so that the valve once adjusted effects the closing movement under all variations of steam-pressure and velocity when a certain diminution of pressure is desired.

In the accompanying drawings, Figure 1 is a sectional elevation of a stop-valve in which the discharge-pipe is connected to the casing at right angles to the inlet to which the improved isolation-valve is applied. Fig. 2 is a similar view of a valve in which the inlet and discharge openings are in line, showing the application of the improved isolation-valve thereto. Fig. 3 shows, on a larger scale, the construction according to Fig. 1.

As seen in the drawings, the automatic-closing cut-out valve a is seated on a spindle b, the bore c of which runs into the outlet-passage d.

If x be the steam-pressure, expressed in atmospheres, in the valve-casing under normal working and f the surface of the bore in square centimeters, the seated self-closing body a will be lowered under a steam-pressure of x. f kg and the weight thereof be ideally increased to the same extent. At the moment when the cut-out valve is raised the steam contained in the chamber e escapes through the bore c and passage d into the open air, and the steam now under a pressure of about y atmospheres acts momentarily on the large sectional surface nf of the chamber e. This considerably-increased pressure, amounting to $y.n\,f\,kg$, would therefore press the valve a, that was being raised, powerfully against its seat. The pressure $y.\,nf$ is therefore much greater than $x\,f$, because y is about one to two atmospheres less than x. Nevertheless the surface nf amounts to a

multiple of the surface *f*. In order to prevent the valve *a* from being too forcibly pressed against its seat and that the steam-weighting of the valve *a*, which takes place at the moment of the raising, may be regulated as desired, it is only necessary to produce a certain counter-pressure in the outlet-passage *d*, which suitably counteracts the escape of steam from the chamber *e*. It will easily be seen that by the establishing, for example, of a suitable counter-pressure Z equal steam-weighting can be produced alike when the valve *a* is seated as at the moment when it is raised. Thus this will be the case if $x.\ f=(y-z).\ n.\ f.$

The counter-pressure Z may be reduced, and in this case $xf<(y-z)\ nf$—that is to say, that at the moment when the closing movement begins—the steam-weighting of the valve-body will be increased to a certain extent and the completion of the automatic closing delayed. Thus by this means the ideal weight of the automatic-closing valve can be increased as desired by weighing the same by means of the steam, and thus light bodies with slight stroke can be employed, and, moreover, the sensitiveness be regulated by adjustment of the counter-pressure. The lower the counter-pressure is adjusted the greater will be the extent of the steam-weighting at the moment of the raising, the less sensitive will the valve be, and, vice versa, the higher the counter-pressure in the passage *d* is adjusted the more sensitive will the valve be.

The previously-described adjustment of the counter-pressure can be advantageously effected by throttling the opening in the passage *d*, that runs to the outside by means of a valve-screw *g*, as shown, for example, in Figs. 1 and 3. This screw may, moreover, be furnished with a narrow central bore *h* of such cross-section that at the moment of the raising of the valve *a* the counter-pressure Z in the passage *e* begins, so that hereby the same weight of steam remains on the valve *a* as prevails in the closing position. By the venting of the screws *g* the counter-pressure can be reduced to the desired extent, and thereby insure the accurate automatic closing of the valve *a*.

It is easy to perceive that the steam-weighting conditions which prevail in the closed position and at the moment of the raising can be also effected by suitably adapting the surface *f*, the bore *c*, or the *nf* of the chamber *e*—that is to say, that by means of such adaptation the moment of the self-closing can be arranged in accordance with a certain diminution of pressure in the pipes.

For example, the difference between *f* and *nf* will be less, and thereby the valve more sensitive in proportion as the sides of the hollow spindle *b* are made thinner, as herewith the surface of the valve-seat which closes the hollow spindle is relatively increased.

In the case of a self-closing valve intended to act upon a moderate decline of pressure and regulated in this way by the dimensions of the bore *c* and the diameter of the spindle *b* the proper and suitable steam-weighting is produced at the moment of the raising without trouble, and in connection herewith no special regulation of the counter-pressure in the passage *e* is necessary. If, however, beyond this it be desired to regulate the sensitiveness of such a self-closing valve, the same can be satisfactorily effected by altering its stroke.

A self-closing valve of the kind, with means of regulating the stroke, is shown in Fig. 2 of the drawings. As will be seen, the passage *d* runs directly to the open air without any throttling of the opening. The self-closing valve *a*, however, may be raised and lowered in other known ways by means of the externally-adjustable rotary shaft *i*, which carries the adjusting-lever *k*. The hollow spindle *b* must, of course, likewise be raised or lowered, as the valve *a* must be seated thereon.

It will be at once seen that the two methods of regulation—viz., counter-pressure and adjustment of the stroke—may be combined, and, moreover, that the counter-pressure in the passage *d* cannot only be produced by throttling the outlet-opening, but also by connecting it with a low-pressure chamber outside the valve-casing. This latter arrangement is specially suitable in cases where the self-closing action only takes place when there is a considerable diminution of pressure and where the self-closing valve is made somewhat large—that is, where the suitable ideal counter-weight of the self-closing valve can be obtained with a slight supplementary action of the steam-weighting, the extent of which can be easily regulated by the adjustment of the counter-pressure in the low-pressure chamber.

It will be seen without further explanation that the further form and nature of the self-closing valve are of no importance as regards the idea on which the invention is based, and finally that the described arrangement and means of regulating the action of the same may be equally well employed in connection with all gases and fluids.

What we claim, and desire to secure by Letters Patent, is—

1. An automatic cut-out or isolating valve comprising a valve-casing, a valve-seat in the casing, a hollow spindle or tube in the casing open at its inner end and communicating with the open air, and a valve-body seated on the spindle and normally closing the inner end thereof and weighted by the pressure exerted by the steam, gas or fluid flowing through the valve-casing on that part of the valve which rests on the open end of the hollow spindle, substantially as described.

2. An automatic cut-out or isolating valve comprising a valve-casing, a valve-seat in the casing, a hollow spindle or tube in the casing, open at its inner end, a low-pressure chamber

communicating with the other end of the spindle, a valve-body seated on the spindle so as to normally close the inner end thereof and weighted by the difference of pressure exerted by the steam, gas or fluid flowing through the valve-casing on that part of the valve on the open end of the hollow spindle and the pressure in the hollow spindle, substantially as described.

3. A cut-out or isolating valve which acts in case of pipe fracture, comprising a valve-casing, a valve-seat in the casing, a hollow spindle or tube in the casing open at its inner end and communicating with the open air, a valve proper seated on the spindle normally closing the inner end thereof and weighted by the difference of pressure exerted by the steam, gas or fluid flowing through the valve-casing on that part of the valve on the open end of the hollow spindle and the pressure in the hollow spindle, and a valve-screw adjustably inserted in the outlet from the hollow spindle and adapted to create a counter-pressure in the outlet-passage, substantially as described.

4. An automatic cut-out or isolating valve comprising a valve-casing, a valve-seat in the casing, a hollow spindle or tube in the casing open at its inner end and communicating with the open air, and a valve-body seated on the spindle and normally closing the inner end thereof and weighted by the pressure exerted by the steam, gas or fluid flowing through the valve-casing on that part of the valve which rests on the open end of the hollow spindle, and means for regulating the stroke of and thus the action of the valve, substantially as described.

In testimony whereof we have affixed our signatures in presence of two witnesses.

ISIDOR MAYER.
JOSEF HÜBNER.

Witnesses:
ALVESTO S. HOGUE,
AUGUST FUGGER.