

(No Model.)

A. L. IDE.

WATER ESCAPE DEVICE FOR ENGINE CYLINDERS.

No. 362,629.

Patented May 10, 1887.

Fig. 1.

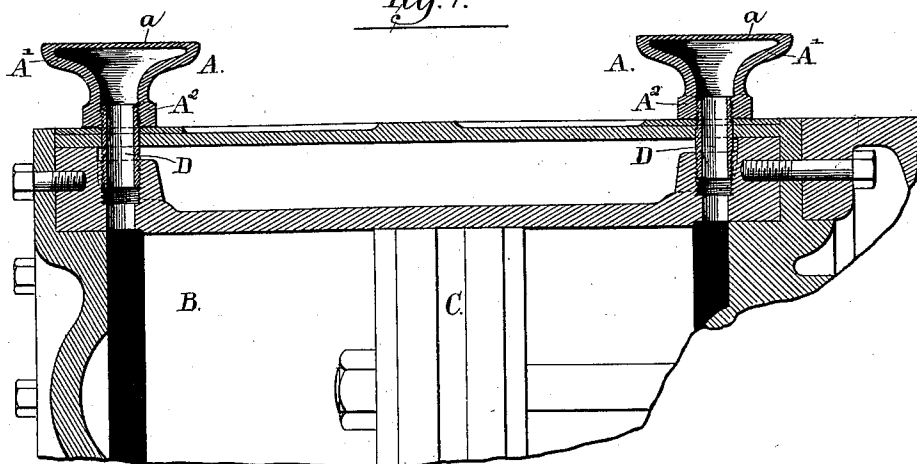


Fig. 2.

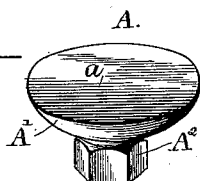


Fig. 3.

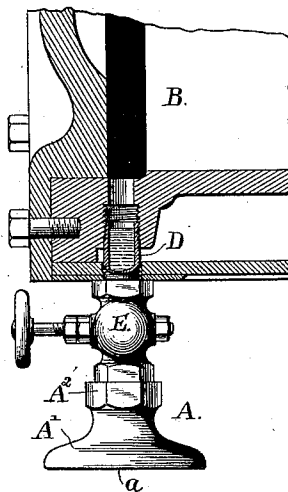
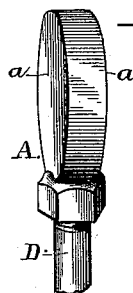
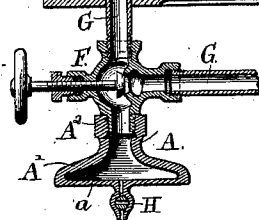


Fig. 4.



Witnesses:

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UNITED STATES PATENT OFFICE.

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WATER-ESCAPE DEVICE FOR ENGINE-CYLINDERS.

SPECIFICATION forming part of Letters Patent No. 362,629, dated May 10, 1887.

Application filed December 29, 1885. Serial No. 186,976. (No model.)

To all whom it may concern:

Be it known that I, ALBERT L. IDE, of Springfield, in the county of Sangamon and State of Illinois, have invented certain new and useful Improvements in Cylinder-Relief Devices; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to safety or relief devices to be applied to steam-engine cylinders for preventing injury to or bursting of the latter by the compression between the cylinder-heads and the piston of water which may accumulate in the cylinder by condensation of the steam or otherwise.

The invention consists in the matters hereinafter described, and pointed out in the appended claims.

As is well known to those familiar with the subject, water is very liable to accumulate in engine-cylinders, not only by the condensation of steam when the latter enters the cold cylinder in first starting the engine, and by the entrance of water to the cylinder from the steam-pipe within which it may have become condensed, but also by the entrance of water with the steam while the engine is running, by reason of the foaming of the water in the boilers, or from other causes.

Devices have heretofore been commonly used for allowing the escape of the water from the cylinder, consisting of cocks or valves at both ends of the cylinder, which are opened before the engine is started to allow any accumulated water to escape. Such valves are, however, necessarily closed when the engine is running, to avoid loss of steam, and when water enters the cylinder at such time the valves cannot be opened with sufficient promptness to give relief, and in such case breakage of or injury to the engine is liable to result.

It has been proposed heretofore to employ, instead of the valves mentioned, spring-relief valves communicating with the interior of the cylinder and arranged to open when the pressure of the confined water exceeds the pressure of the valve-springs, which latter are made of sufficient strength to hold the valve closed against the steam-pressure in the cylinder, but

to yield and allow the escape of water under an unsafe pressure. These valves have been used with good results upon engines running at a slow speed; but they have proved worthless or of little value on high-speed engines, or those making from four hundred to six hundred strokes per minute, such as are now commonly used for motors in electric lighting, for the reason that inasmuch as the time of each stroke in such engine is exceedingly short, approximating one-tenth of a second in some instances, the valve cannot open with sufficient promptness to give the required relief. A relief-valve, also, will obviously close at each stroke of the piston when opened by the action of the pistons upon the water, so that they fail to promptly relieve the excessive pressure caused by the presence of the water. Another objection to the use of spring relief-valves is their liability to become inoperative by the corrosion of the metal composing them; and a further objection to said valves is that in cases where they operate properly, solid particles are liable to get between the valve and seat, so that they will not close tight, and are thereby caused to leak or drip water.

It has also been heretofore proposed to employ as a safety or relief device for cylinders thin plates of metal placed in apertures in the cylinder-head, said plates being adapted to break and give relief under an excessive pressure in the cylinder. The use of such plates is, however, restricted to single-acting engines, or to the outer cylinder-head of other engines, inasmuch as it is not usually practicable to place them in the head through which the piston-rod passes on account of the absence of sufficient space therein for the purpose. A further objection to the employment of plates such as is above described is that the breakage of a plate necessitates the stoppage of the engine for a considerable length of time to permit the insertion of a new plate.

The device herein shown as embodying my invention consists, generally, of a metal chamber or hollow casting connected with the interior of the cylinder, and having its walls formed with a relatively thin part or portion adapted to yield or burst under an excessive or dangerous pressure in the cylinder. The said chamber is preferably made from some granular

metal—such as cast-iron—and provided with relatively small inlet opening or orifice, whereby it may be conveniently attached to the cylinder by a connecting-tube or otherwise.

5 In carrying out my invention I preferably make said chambers of cast metal, with a flat plate or diaphragm of a definite size and thickness, and I find by experiment that a chamber so made will safely withstand given pressure, 10 and will become ruptured or burst when the pressure within the cylinder is increased beyond a certain limit—as, for instance, I find that a chamber having a flat plate or diaphragm about four inches in diameter and one-sixteenth 15 of an inch thick will stand a pressure of one hundred and fifty pounds per square inch, and that such chamber will yield or burst at a pressure of about two hundred and fifty pounds per square inch, which latter pressure is an 20 entirely safe one for engine-cylinders as usually constructed.

The chambers made as above stated are preferably in practice attached to the lower part of the engine-cylinder in such manner that they 25 will usually remain full of water, so that the amount of steam-space in the cylinder is not increased, and no steam is wasted in filling them. When so placed, a small valve may be located in the lower part of the chamber to 30 allow the escape of water in cases where the engine is exposed to cold, so as to render the water therein liable to become frozen. The said chambers may, however, be attached to the top of the cylinder, in which case they may 35 be conveniently connected with the pipes commonly inserted at this point for connecting a pressure-indicator, as will hereinafter more fully appear.

In the case of the bursting of one of the relief-chambers constructed as above described, 40 steam can be shut off from the cylinder, the old chamber removed, and a new one secured to the cylinder in a very short space of time. If preferred, however, a cock or valve may be 45 placed in the passage between the relief-chamber and cylinder, whereby in case of the rupture of the chamber, said passage may be closed and the chamber replaced by a new one without stopping the engine.

50 In the accompanying drawings, illustrating my invention, Figure 1 is a fragmentary sectional view showing the upper portion of an engine-cylinder provided with relief-chambers constructed in accordance with my invention. 55 Fig. 2 is a perspective view of one of the chambers or drums shown in Fig. 1 detached from the engine. Fig. 3 is a fragmentary sectional view of an engine-cylinder, showing a relief-chamber attached to the lower portion thereof 60 and a valve or cock located between the cylinder and the chamber. Fig. 4 is a view illustrating a modified form of the relief-chamber. Fig. 5 is a view illustrating a relief-chamber attached to a water-escape pipe placed below 65 a steam-chest located beneath the cylinder.

In the said drawings, A indicates the metal relief-chamber or hollow casting; B, the steam-

cylinder, to which the drum is attached; and C, the piston within the cylinder.

In the form of the chamber A shown in Figs. 70 1, 2, 3, and 5 the walls of said chamber comprise a generally conical part, A', and a flat circular part, a, made thinner than the part A', and adapted to yield or break outwardly under an excessive pressure within the cylinder, 75 but of sufficient strength to withstand the usual steam-pressure therein. The said chamber is preferably provided with a suitable neck or hub, A², herein shown as screw-threaded internally, and squared or provided with flat 80 faces upon its exterior surface for the application of the wrench, whereby the chambers may be readily screwed upon the threaded ends of suitable nipples or tubes upon the cylinder. The relief-chamber A may, however, in practice 85 be made in any form which is found convenient or desirable, it being preferable, however, to employ a shape which will give a relatively small internal area to be filled with steam or water. Another form of said chamber 90 is illustrated—for instance, in Fig. 4—in which the said chamber is made in the form of a drum provided with two opposite parallel walls, a a, either or both of which may burst or become ruptured under an excess of pressure 95 in the cylinder.

In Fig. 1 the relief-chambers A A are shown as screwed upon the outer ends of short pipes D, such as are commonly inserted in the cylinder near the cylinder-heads for the purpose 100 of attaching a pressure-indicator. In Fig. 3 the chamber is shown as attached below the cylinder in a similar manner, a valve or cock, E, being in this case shown as inserted between the chamber and the cylinder, said cock 105 being for the purpose of closing the passage connecting said chamber and cylinder. The location of the relief-chamber in the position last described has the advantage that the said chamber will commonly be partially or entirely 110 filled with water, as shown, so that there is no material increase in the steam-space of the cylinder, and therefore no waste of steam to fill the said chamber. By the employment of the valve E the passage from the cylinder 115 to the relief-chamber may be immediately closed in case the chamber is ruptured, and the latter thereafter removed and a new chamber placed upon the cylinder without stopping the engine. 120

Another means of attaching the relief-chamber is shown in Fig. 5, in which is illustrated a cylinder having a steam-chest located beneath it—such, for example, as is shown in a prior Patent No. 319,261, granted to me upon 125 the 2d day of June, 1885. In this case the relief-chamber is attached to the casing of one of the cylinder-cocks F, for allowing the escape of the water of condensation from the cylinder in starting the engine, the said cock F, as 100 shown, being located in a pipe, G, leading from the lower part of the steam-chest, and serving for the escape of the water from the said cylinder and from the steam-chest. The said valve,

as clearly shown in the drawings, is so constructed that communication is always open between the vessel and the cylinder.

When the chamber is located at the lower part of the cylinder, it may be desirably provided with a valved outlet, as indicated, for instance, at H, Fig. 5, whereby the water may be allowed to escape from the chamber, as may be necessary in case the water therein is liable to become frozen. It is to be understood, however, that the relief-chamber may be attached to the cylinder in either of the ways described, or in any desired or preferred manner without departure from my invention.

I am aware that it has been proposed heretofore to employ in connection with a steam-boiler a safety device consisting of a pipe or passage leading from the boiler and containing a metal diaphragm adapted to break or burst under a dangerous pressure in the boiler, and thereby allow the steam therein to escape harmlessly through the said pipe or passage. An escape device of this character differs from the chamber herein shown and claimed, for the reason that the bursting diaphragm in the said prior construction is placed in a passage leading to the open air or other convenient place for the discharge of steam and permanently connected with the boiler, so that in case of the rupture of the diaphragm it becomes necessary to remove said passage or disconnect the parts thereof for the insertion of a new diaphragm. In my construction, on the contrary, the bursting diaphragm forms part of a cham-

ber which is bodily removable from the cylinder, whereby when one chamber is burst another may be quickly and readily applied.

I claim as my invention—

1. A metal relief-chamber consisting of an integral casting provided with a neck or orifice for attachment to an engine-cylinder or other inclosure subject to interior pressure, said relief-chamber being constructed to yield or burst under an excess of pressure in said inclosure, substantially as described.

2. The combination, with an engine-cylinder or other inclosure subject to interior pressure, of a detachable relief-chamber formed of an integral casting, and the walls of which comprise one or more flat plates, which are thinner than the other parts of said walls, substantially as described.

3. The combination, with an engine-cylinder, of a relief-chamber having a narrow neck or orifice for attachment to the cylinder, and formed of an integral casting, said chamber being provided with an outlet in its lower part, having a valve or cock which remains normally closed, and is adapted to be opened by hand to allow the escape of water from the chamber, substantially as described.

In testimony that I claim the foregoing as my invention I affix my signature in presence of two witnesses.

ALBERT L. IDE.

Witnesses:

HARRY L. IDE,
CHAS. A. ORR.