(No Model.)

W. BURLINGAME.

SAFETY DEVICE FOR BOILERS.

No. 540,419. Patented June 4, 1895.

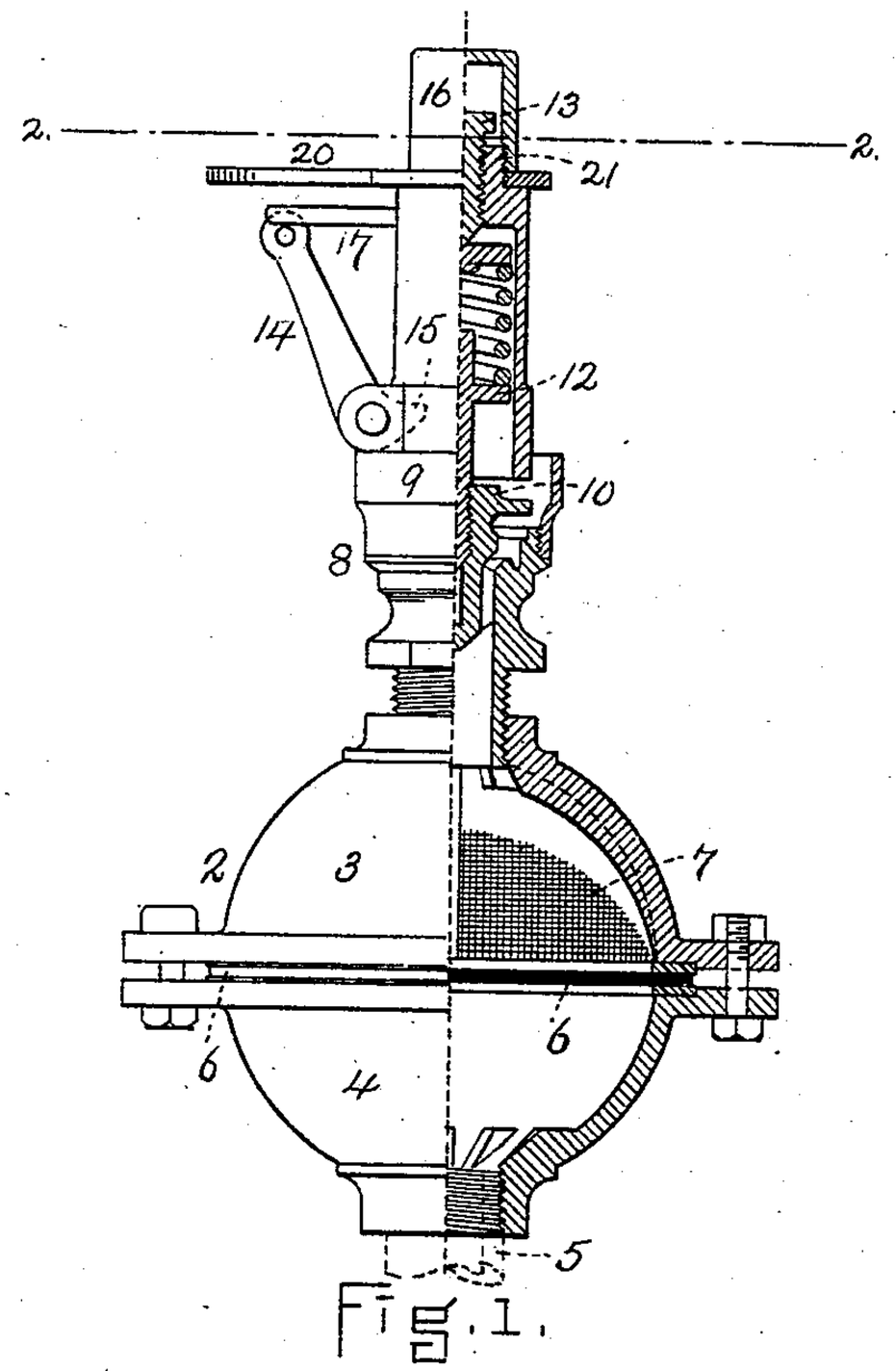
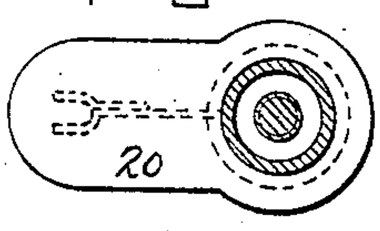


Fig. 1.

Fig. 2.



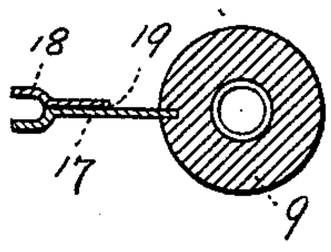


Fig. 3

WITNESSES:

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UNITED STATES PATENT OFFICE.

WILLIAM BURLINGAME, OF EXETER, NEW HAMPSHIRE.

SAFETY DEVICE FOR BOILERS.

SPECIFICATION forming part of Letters Patent No. 540,419, dated June 4, 1895.

Application filed April 10, 1895. Serial No. 545,178. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM BURLINGAME, a citizen of the United States, residing at Exeter, in the county of Rockingham and State of New Hampshire, have invented certain new and useful Improvements in Safety Devices for Boilers; 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 figures of reference marked thereon, which form a part of this specification.

This invention relates to apparatus operated under pressure and which are provided with some safety device in the form of a valve adapted to prevent excessive pressure from accumulating. In general these safety or relief valves have been held closed against a given pressure and when such is reached said valves are intended to open.

The purpose and object of my invention are to employ a safety valve, but in lieu of maintaining it closed, I propose to keep it open. This I effect by means of fusible metal which is melted on the escape of steam or otherwise. Hence the valve is released only at such times as the pressure exceeds the normal and said valve is then in readiness to come to its seat and prevent further escape of steam or other gas as soon as the pressure has been reduced to the normal. In connection with said safety valve I employ a bursting or breaking plate, so called. The function and operation of the various instrumentalities combined under my invention will be hereinafter fully described and explained.

The drawings herewith presented represent, in Figure 1, a vertical central sectional elevation of a safety device embodying my invention. Fig. 2 is a horizontal section on line 2 2 in Fig. 1. Fig. 3 is a horizontal section transversely of the valve-casing, the holding-arm being likewise in section.

In said drawings, 2 represents a metallic casing or spherical casting composed of two halves, 3, 4 respectively upper and lower. The lower one is connected by the pipe 5 to the boiler or to the system under pressure. Not shown. These two halves are provided with flanges adapted to be bolted together and to hold a rigid diaphragm or breaking plate 6, preferably seated upon gaskets of some elastic substance in order to create a steam or water tight joint. In the present instance this breaking or bursting plate is composed of slate or other substance of such strength as to resist but not to exceed the maximum pressure desired in the boiler, drier or other vessel when actively employed. The breaking pressure of a plate of slate say one eighth of an inch in thickness will be between forty and fifty pounds to the square inch. Hence the maximum pressure can readily be varied to suit existing circumstances. Within the chamber created by the casing and above the breaking plate is positioned a guard in the shape of a foraminated partition or shield 7, of coarse wire, in order to allow free escape of the steam, water or other gas but to retain and hold back the fragments produced by the rupture of the breaking plate should the maximum pressure be exceeded. Said shield is preferably semi-spherical in shape with its edges extending out to the inner walls of the casing. The upper half 3 is connected with and surmounted by a safety valve 8 of any approved form of construction, in the present example comprising an upright valve case 9 in which is located the valve 10 normally held to its seat by a spring actuated piston 12, while an adjusting screw 13 is employed to regulate the pressure at which the valve is to open. A valve lever 14 pivoted exteriorly of the shell is fitted with an offset 15 which extends through the casing and engages the piston and thus enables the valve to be opened against the pressure of the spring should occasion require. A removable cap 16 conceals the adjusting screw and protects it from the escaping steam or gases.

Among the various devices which have been employed for safety on various vessels operating under pressure, it has generally been the custom to use a valve which has been held to its seat by weighted levers, springs, or other mechanical equivalents. In other words safety valves or relief devices are usually kept seated against a normal, predetermined pressure and open only when such pressure is exceeded. Frequently, owing to lack of use, the valve does not rise, or through carelessness or stupidity the valve cannot rise, when

the pressure becomes excessive, and accidents are thus liable to occur.

Under my invention, I propose to keep the safety valve open at all times and allow it to operate or close only when the pressure has been reduced to the normal. To this end, I attach a holding arm or rod 17 rigidly by bolts or otherwise to the valve casing. This rod projects radially therefrom and is bent at its outer extremity to co-operate with a similarly shaped piece or removable finger 18. This latter is attached to the rod by fusible metal indicated at 19, the arm and its separable finger conjointly forming a fork or crotch in which the valve lever rests thereby retaining the valve normally raised, or in an open position.

In order to render the release of the valve lever more instantaneous and positive a deflector or shield 20 is positioned just above the arm 17. Said deflector is preferably apertured at one end in order to slip over the boss 21 on the valve casing while the cap when screwed down serves to hold it firmly in place. However, this may be secured in some other way or may be entirely omitted without affecting the substance of my invention, since the safety valve can be released by the steam when it escapes through the passages usually provided in devices of this class.

The operation of the above described group of parts is as follows: The breaking plate is in position and intact, while the safety valve is held raised from its seat the valve lever resting in the crotch on the holding arm. These several parts remain in the same relative position as long as the boiler pressure does not exceed the safety limit of the breaking plate. Should the maximum pressure designed for the system be exceeded, rupture of the plate ensues, and the valve being open, steam is free to escape therethrough. The heat of the escaping steam, however, melts the fusible metal, the finger 18 drops off and the valve lever is released. This act frees the safety valve which is now in readiness to operate performing its ordinary function, that is, continuing to remain open so long as the pressure is above the normal, but closing immediately when said normal pressure is reached.

Thus it will be understood that no sticking of the valve upon its seat can occur, while the rupture of the breaking plate creates no disturbance of the system under pressure, since the system is closed by the action of the safety valve so soon as the normal pressure is attained, although the breaking plate is broken. It is furthermore to be understood that this safety device is to be employed in connection with the usual escape or relief valve, and this arrangement is necessary, since the system in operation is maintained generally at a pressure considerably less than the breaking pressure. Hence in the event of the rupture of the plate the system will then be under control of two safety valves until such times as will enable the broken plate to be removed and a new one substituted.

What I claim is—

1. In combination with a system under pressure, and a breaking plate, a safety valve normally open, to be automatically closed by the rupture of said plate substantially as stated.

2. The combination with a system under pressure, and a breaking plate, of a safety valve normally open and locked, and mechanism adapted to automatically release said safety valve, consequent upon rupture of the plate, substantially as described.

3. In combination with a vessel operating under pressure, of an escape valve, a breaking plate between the valve and said vessel, mechanism adapted to hold the escape valve locked and open, and means to automatically release the valve upon rupture of the plate, substantially as specified.

4. The combination with a vessel under pressure, a breaking plate, and an open locked safety valve, of a holding arm, a valve lever, and a finger adapted to separate from the arm at a predetermined temperature, to release the safety valve, substantially as explained.

5. In combination with a pipe to connect with a vessel under pressure, a breaking plate to close said pipe, and a foraminous shield above the plate, a safety valve, a valve lever normally locked to hold the safety valve open, and mechanism to release the lever upon rupture of the breaking plate, substantially as described and set forth.

6. The combination with a system under pressure, a breaking plate, and a relief valve, of a valve lever, a device for locking said lever, and a deflector adjacent to said locking device, all operating substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM BURLINGAME.

Witnesses:

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FRANCIS C. STANWOOD.