No. 688,863. Patented Dec. 17, 1901.

C. M. KEMP.

SAFETY FIRE CHECK.

(Application filed Jan. 7, 1901.)

(No Model.)

Fig. 1.

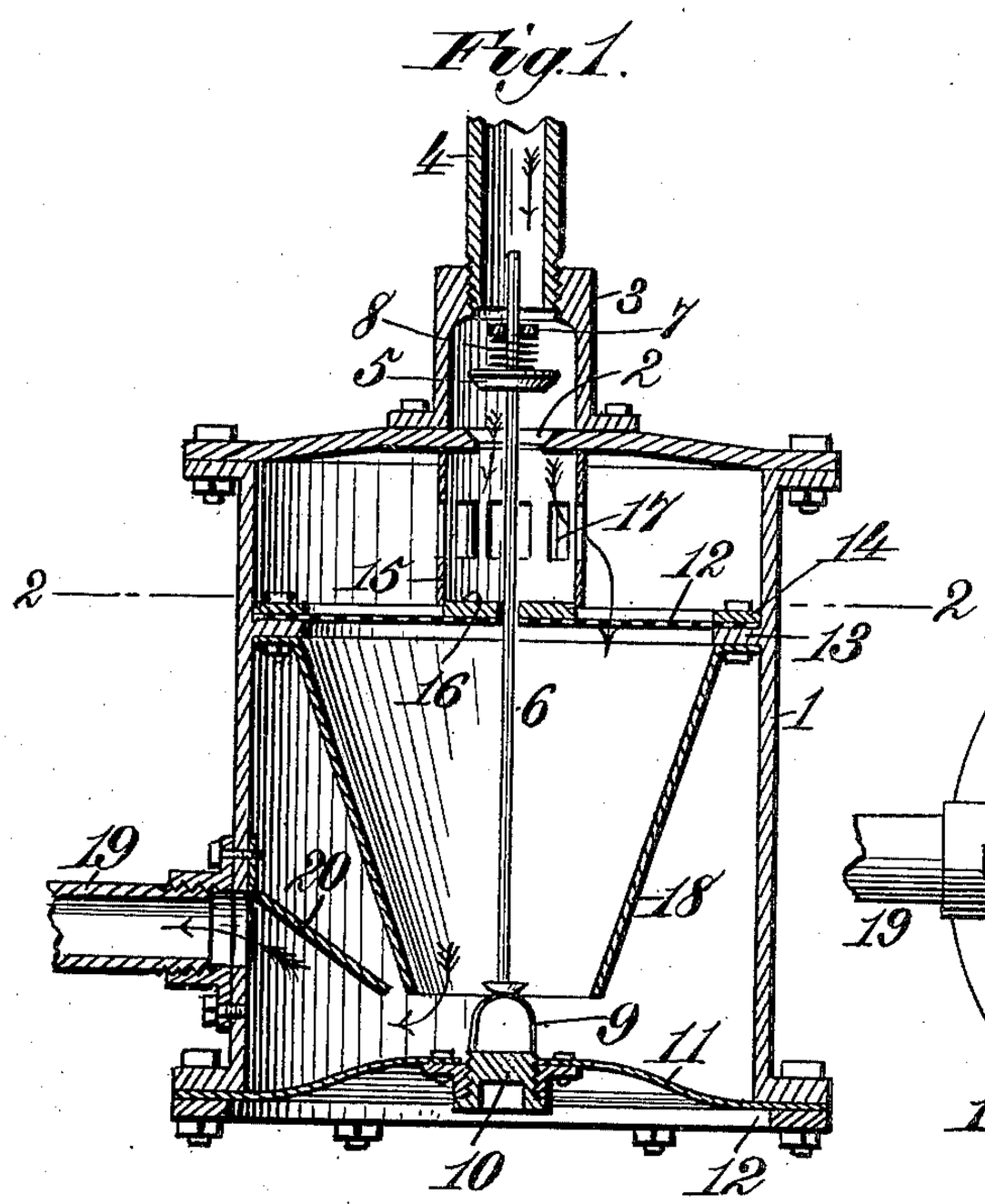


Fig. 2.

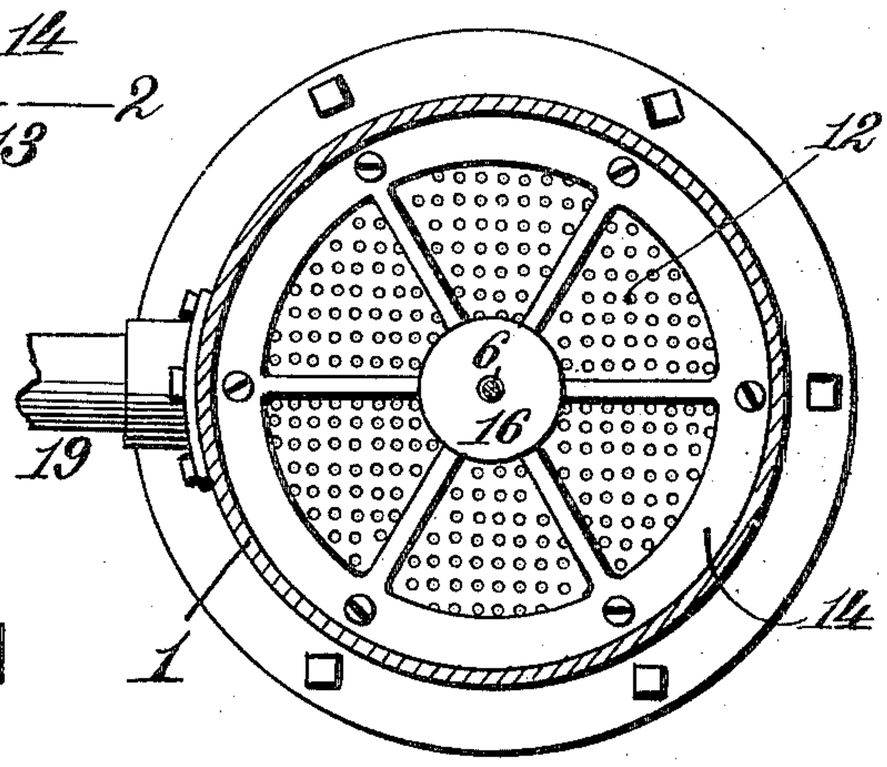
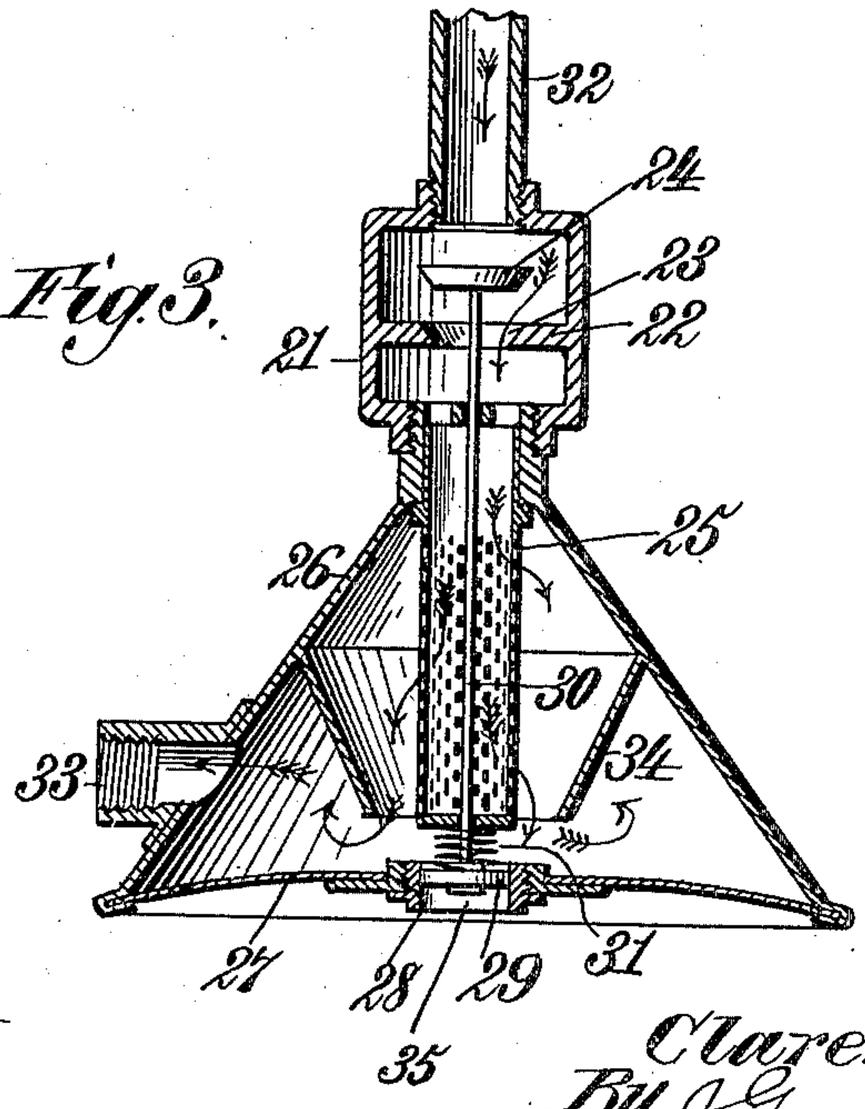


Fig. 3.



Witnesses.
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UNITED STATES PATENT OFFICE.

CLARENCE M. KEMP, OF BALTIMORE, MARYLAND.

SAFETY FIRE-CHECK.

SPECIFICATION forming part of Letters Patent No. 688,863, dated December 17, 1901.

Application filed January 7, 1901. Serial No. 42,423. (No model.)

To all whom it may concern:

Be it known that I, CLARENCE M. KEMP, a citizen of the United States, residing at Baltimore, in the State of Maryland, have invented new and useful Improvements in Safety Fire-Checks, of which the following is a specification.

In the operation of gas-generating plants, and especially that type in which the gas is compounded of air mingled with the enriching elements of volatile oils, great care must be exercised to prevent diastrous explosions and conflagrations, due to firing of the body of oil from which the supply is drawn or the body of gas in the converter from which comes the supply for immediate consumption by reason of fire or explosions in the building in which the plant is installed; and it is with the object of guarding against such occurrences and preventing injury to the apparatus or building should an explosion of thin gas or an accidental ignition of the gas in the mains or burner feed-pipes occur that I have invented the fire-check which I will now describe.

Briefly stated, the invention consists of a check to be placed intermediate the generating instrumentalities and the point of consumption and comprising means, as a valve, whereby the flow of gas is automatically cut off should there be an explosion of thin gas or a conflagration in the building, such as would derange the mains and burner feed-pipes and threaten a firing back to the supply.

I have illustrated in the drawings herewith two forms of means for carrying my invention into effect, like characters indicating like parts in the several views, in which—

Figure 1 is a central vertical section of the check, showing the preferred construction. Fig. 2 is a transverse section on line 2 2 looking in the direction of the arrows. Fig. 3 is a view similar to Fig. 1 of a slightly-different form of check, although embodying the same general characteristics of construction as the check shown in the other views.

Referring to the views by numerals, 1 indicates a casing of any suitable or desired form having a valve-controlled gas-inlet 2 in its top and surmounted by a valve-chamber 3, which is connected with a suitable inlet-pipe 4, which leads to the converter or gas-supply. Within said valve-chamber 3 is mounted a valve 5, the stem 6 of which is supported at its upper end by a transversely-placed bar or web 7, and a spring 8 between said bar 7 and the valve 5 exerts a constant downward pressure upon the valve, tending when unopposed to force the valve to its seat and close the inlet 2. The lower end of said stem 6 preferably extends the entire length of the casing 1 and rests upon a support 9, formed of metal fusible at a low temperature, said fusible support being of such height as to normally hold the valve 5 away from its seat and the gas-inlet 2 open. Furthermore, the support 9 is carried by a removable plug or bushing 10, adjustably mounted in the bottom 11 of the casing, so as to permit an adjustment of the valve 5 relative to its seat, as well as the removal of the bushing to renew the fusible support.

The bottom 11 of the casing consists of a thin metal diaphragm, which, as shown, is bent or convexed upwardly into the casing, said diaphragm being secured to the casing by means of a ring 12, bolted to the lower flange thereof.

Extending across the casing 1, and preferably near the top of the same, is a foraminous partition 12, supported by an inwardly-projecting flange or rib 13 in the casing 1, said partition 12 being held in place and braced against abnormal upward pressure by means of an open-work plate or spider 14, bolted to the flange 13. To still further guard against shattering of the partition 12 and its spider by reason of shock and excessive pressure due to explosions in the casing, I provide the short pipe or annular casing 15, which bears at its upper end against the under side of the top of casing 1 and at its lower end encircles and bears upon a circular plate or hub 16 of the spider 14, through which hub the stem 6 of the valve plays freely. The annular casing 15 is provided with numerous ports 17, which permit passage of the gas entering at the inlet 2. Depending from the said flange 13 is an inverted frustum of a hollow cone 18, the lower end of which reaches within close proximity of the fusible support 9. The said casing 1 is provided with a gas-outlet 19, preferably near the bottom thereof, and projecting inwardly from the inner wall of the

casing 1 is a downwardly-sloping deflector 20, the purpose of which, as well as of the other parts above described, will appear in the statement of operation which will now be given.

The operation: Under normal conditions the check is in the state shown in Fig. 1, the valve 5 being upheld by the fusible support 9, so that the inlet 2 is open, and gas entering the casing 1 through inlet-pipe 4 will pass through ports 17 downwardly through the foraminous partition 12, traverse the cone 18, and passing beneath the deflector 20 reach the outlet 19, from which it goes by means of the main or burner feed-pipes to the points of consumption. If abnormal conditions arise due to an explosion in the main or burner feed-pipes, the shock or force of the explosion will be communicated to casing 1 and result in a high pressure therein. Such pressure will cause the thin metal diaphragm 11 to be forced or buckled outwardly, together with the support 9, thereby permitting the valve 5 to fall and, closing the inlet 2, cut off the flow of gas from the converter or supply. Said valve 5 not only falls by reason of gravity when its support 9 is removed, but its descent is accelerated and augmented by the spring 8 and the gas-pressure upon the valve, so that it seats very quickly and strongly. The partition 12 is, it will be clear, protected from injury because of the abnormal pressure within the casing by the bracing-spider 14 and annular casing 15 above it, this construction enabling it to withstand a very severe shock without being torn or ruptured. It will be seen that the deflector 20 is so placed relative to the bottom 11 that it directs the force of the back currents from outlet 19 due to explosion downwardly against the said bottom, so as to insure the forcing out of the same and the consequent operation of the valve, for without said deflector the shock would be dissipated through the entire area of the casing and might fail to cause the check to act. In event of an ignition of the gas in the main or burner feed-pipes, should such reach the safety fire-check without causing an explosion sufficient to force the bottom 11 outwardly and drop the valve, the highly-heated gases and flame will enter the casing through outlet 19 and be directed upon the fusible support 9, causing it to quickly melt or weaken and allow the valve to seat itself as above described, the foraminous partition 12 preventing the fire from passing to the inlet-pipe 4, leading to the converter. The hollow cone 18 serves to direct the inflowing stream of gas, which will be ignited below the partition 12 in case the flame rushes back into the casing from the gas-main upon the fusible support 9, thus augmenting the melting action of the flame deflected upon it by the deflector 20 and insuring prompt fusing, though the action of the first-mentioned flame will be sufficient ordinarily to fuse the support 9.

Referring to Fig. 3, I will now describe the form of check shown therein. The numeral 21 indicates a cylindrical casing divided centrally by a horizontal partition 22, centrally apertured, as shown at 23, said aperture being adapted to be closed by a valve 24. Screwed into the lower end of the casing 21 is a pipe 25, closed at its lower end and provided with numerous minute perforations, as shown, or, if preferred, said pipe may be formed of wire-gauze, it being well known that flames will not penetrate such a structure. Suspended from the casing 21 and surrounding said tube or pipe is a hollow metallic casing 26, preferably of the form of a frustum of a hollow cone, and fitted in the bottom of said casing is a thin sheet-metal diaphragm 27, slightly concavo convex, with its convex side disposed uppermost. The diaphragm 27 is centrally apertured, as at 28, and in said aperture is a support 29, of fusible metal or alloy. Upheld by said support is a valve-stem 30, carrying the valve 24 at its upper end, the fusible support operating to hold the valve up or away from its seat in the partition 22. A coiled spring 31 is disposed about the lower end of the valve-stem and is confined between the end thereof and the bottom of the perforated tube or pipe 25. The inlet-pipe 32, leading from the converter, enters the upper end of the cylindrical casing 21, and leading from the side of the casing 26 is an outlet-pipe 33, which enters the building and leads to the different points of consumption, and said inlet-pipe may be provided with a gate-valve (not shown) of ordinary construction, by means of which the supply of gas from the converter may be cut off when desired. Should a fire break out in the building, the fire-check operates to effectually prevent it from spreading to the converter and hydrocarbon-tank. Should flames attempt to pass through the gas-main, the perforated tube 25 will prevent their passage, and should the heat become excessive the fusible support will weaken and melt, thereby permitting the valve 24 to close by gravity, and the seating of said valve is rendered positive and certain by the coiled spring 31. Moreover, should an explosion occur in the gas-main its force or pressure would be exerted on the concavo-convex diaphragm 27, forcing the latter outward or downward, causing the valve 24 to seat itself, and the closing of said valve is aided also by the gas-pressure on its upper side. A cone-shaped guard or deflector 34 is preferably fixed in the casing 26, its contracted end being disposed immediately above the fusible support, whereby should flames or excessive heat seek to pass through the fire-check from the gas-main the same will be caused to pass directly over the fusible support, and thereby act quickly upon the latter, and should the gas supplied through the gauze or perforated pipe be burning the cone deflector will direct the heat toward the fusible

metal to cause its support of the valve-stem to quickly give way. In this construction I preferably omit the deflector 20, (shown in Fig. 1,) as the cone 34 is in such position that it serves to direct both flames to the fusible support. I prefer to fit an iron or brass thimble or bushing 35 in the aperture 28 in the bottom 27 and fix the fusible support in said bushing.

The check which I have invented is simple in construction, efficient in operation, and is capable of long use, as it is made of heavy metal, able to withstand the wear and tear incident to service, and it may be readily fitted and adapted to the various makes of gas-generating plants in use without any material changes or remodeling of the same.

I do not wish it to be understood as limiting my invention, except so far as it is limited by the appended claims, for the structure necessary to practice the invention may be widely varied from what I have shown, and such variation being merely the skill of the mechanician is within the range of my invention.

I claim—

1. A fire-check for gas apparatus comprising a casing having an inlet and an outlet; a valve controlling said inlet, and a yielding support for said valve to maintain it in a normally open position, said support being yieldable under pressure.

2. A fire-check for gas apparatus comprising a casing having an inlet and an outlet; a spring-valve controlling said inlet, and a yielding plate or diaphragm to maintain said valve in a normally open position.

3. A fire-check for gas apparatus comprising a casing having one of its walls formed of thin, yielding material and provided with an inlet and an outlet, and a valve controlling said inlet; said valve being supported in a normally open position by the yielding wall of said casing.

4. A fire-check for gas apparatus comprising a casing having a thin yielding bottom and provided with an inlet and an outlet; and a spring-valve controlling said inlet; said valve being supported in a normally open position by said yielding bottom.

5. In a fire-check for gas apparatus, the combination with a casing having a thin, yielding wall and provided with an inlet and outlet; of a valve controlling said inlet and supported in a normally open position by said yielding wall; and a deflector to direct back currents from said outlet against said yielding wall.

6. In a fire-check for gas apparatus, the combination with a casing having an inwardly-convexed wall formed of thin, yielding metal and provided with an inlet and an outlet; of a valve controlling said inlet and supported in a normally open position by said inwardly-convexed wall.

7. In a fire-check for gas apparatus, the combination with a casing provided with an inlet and an outlet and having a bottom formed of a thin metal diaphragm convexed or bulged inwardly; of a spring-valve controlling said inlet and supported in a normally open position by said convexed bottom.

8. In a fire-check for gas apparatus, the combination with a casing having an inlet and an outlet; of a valve controlling said inlet; and a removably-mounted, fusible support to maintain said valve in a normally open position mounted in said casing.

9. In a fire-check for gas apparatus, the combination with a casing having an inlet and an outlet; of a valve controlling said inlet; and a fusible support adjustably mounted in one wall of said casing and operating to maintain said valve in a normally open position.

10. In a fire-check for gas apparatus, the combination with a casing having an inlet and an outlet; of a valve controlling said inlet; and a fusible body mounted in a removable and adjustable support located in one wall of the casing and operating to maintain said valve in a normally open position.

11. In a fire-check for gas apparatus, the combination with a casing having an inlet and an outlet; of a valve controlling said inlet; a fusible support to maintain said valve in a normally open position; and means for deflecting back currents from said outlet upon said fusible support.

12. In a fire-check for gas apparatus, the combination with a casing having an inlet and an outlet, of a valve controlling said inlet; a fusible support to maintain said valve in a normally open position; means for deflecting back currents from said outlet upon said fusible support; and means for directing the currents from said inlet upon said fusible support.

13. In a fire-check, the combination with a casing having an inlet and an outlet; of a valve controlling said inlet; a fusible support to maintain said valve in a normally open position; a deflecting-plate in proximity to said outlet to direct back currents therefrom upon said fusible support; and a cone-shaped deflector to direct the currents from said inlet upon said fusible support.

14. In a fire-check for gas apparatus, the combination with a casing having an inlet, and an outlet; of a valve controlling said inlet; and a yieldingly-mounted fusible support to maintain said valve in a normally open position.

15. In a fire-check for gas apparatus, the combination with a casing having a yielding wall and provided with an inlet and an outlet; of a valve controlling said inlet, and a fusible support mounted in said yielding wall to maintain said valve in a normally open position.

16. In a fire-check for gas apparatus, the combination with a casing having one of its walls formed of a thin, yielding metal dia-

phragm, and provided with an inlet and an outlet; of a valve controlling said inlet; and a fusible support for said valve mounted on said yielding diaphragm to maintain said valve in a normally open position.

17. In a fire-check for gas apparatus, the combination with a casing having a yielding wall and an inlet and an outlet; of a valve controlling said inlet; and a fusible support to maintain said valve in a normally open position removably mounted in said yielding wall.

18. In a fire-check for gas apparatus, the combination with a casing having a yielding wall and an inlet and an outlet; of a valve controlling said inlet; and a fusible support to maintain said valve in a normally open position adjustably mounted in said yielding wall.

19. In a fire-check for gas apparatus, the combination with a casing having a yielding wall and an inlet and an outlet; of a valve controlling said inlet; and a fusible support to maintain said valve in a normally open position removably and adjustably mounted in said yielding wall.

20. In a fire-check for gas apparatus, the combination with a casing provided with an inlet and an outlet and having its bottom formed of a thin, yielding metallic diaphragm; of a spring-valve controlling said inlet; a bushing removably and adjustably mounted in said yielding bottom; and a fusible support to maintain said valve in a normally open position carried by said bushing.

21. In a fire-check for gas apparatus, the combination with a casing having an inlet and an outlet; of a valve controlling said inlet; means for maintaining said valve normally open; and a foraminous partition intermediate said inlet and outlet.

22. In a fire-check for gas apparatus, the combination with a casing having an inlet and an outlet; of a valve controlling said inlet; means for maintaining said valve in a normally open position; a foraminous partition intermediate said inlet and outlet to prevent passage of flame to said inlet; and means for protecting said foraminous partition from rupture in event of an explosion in said casing.

23. In a fire-check for gas apparatus, the combination with a casing having an inlet and an outlet; of a normally open valve controlling said inlet; a foraminous partition intermediate said inlet and outlet; and an open-work plate or spider above said partition to brace the same against rupturing strains incident to explosions in said casing.

24. In a fire-check for gas apparatus, the combination with a casing having an inlet and an outlet; of a normally open valve controlling said inlet; a foraminous partition secured to the walls of said casing intermediate the inlet and outlet; an open-work plate or spider above said partition to form a brace therefor; and a centrally-placed pipe provided with gas-ports extending from said spider to the top of the casing to further brace said partition against explosions in said casing.

25. In a fire-check for gas apparatus, the combination with a casing having an inlet and an outlet, and provided with a yielding bottom; of a foraminous partition intermediate said inlet and outlet; a bracing plate or spider superposed on said partition; a pipe provided with gas-ports extending from said spider to the top of the casing and serving to brace said foraminous partition against explosions in said casing; a spring-valve controlling said inlet, the stem of which passes through said partition; and a fusible support mounted on said yielding bottom upon which the valve-stem rests and by which said valve is maintained in a normally open position.

26. In a fire-check for gas apparatus, the combination with a casing having an inlet and an outlet; of a spring-closed valve controlling said inlet; an inwardly-projecting rib on said casing; a foraminous partition supported by said rib; a bracing spider-plate superposed on said partition and secured to said rib; a bracing-pipe into which said inlet opens extending from said spider-plate to the top of said casing, said pipe being provided with gas-ports; a cone-shaped deflector depending from the said casing-rib; a valve controlling said inlet and having a stem passing through said bracing-pipe, spider-plate and partition; a bottom for said casing formed of a thin, yielding diaphragm; a fusible support on which said valve-stem rests and which maintains said valve in a normally open position carried by said yielding bottom; and a plane deflector to direct flame-currents from said outlet upon said fusible support.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

CLARENCE M. KEMP.

Witnesses:
ANNA E. GRIESE,
MARY E. MOWAN.