K. HÖFFLER.

OPENING AND CLOSING APPARATUS FOR GAS PIPES.

APPLICATION FILED AUG. 30, 1909.

950,393.

Patented Feb. 22, 1910.

Fig. 1

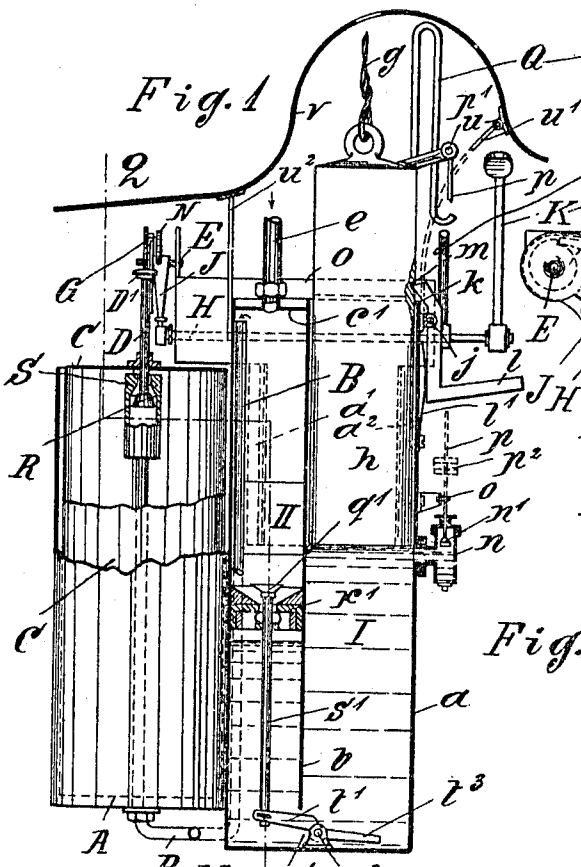


Fig. 2

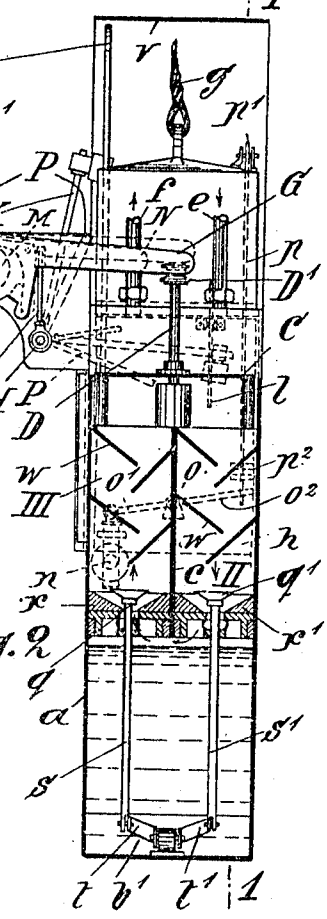


Fig. 3

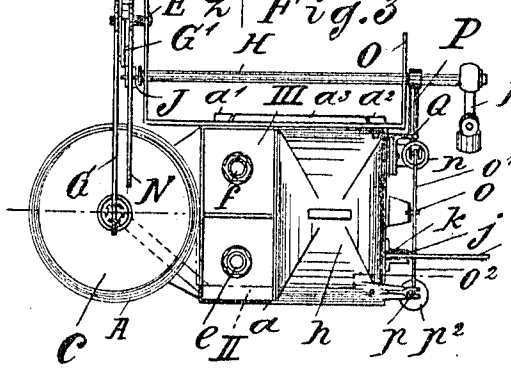


Fig. 4

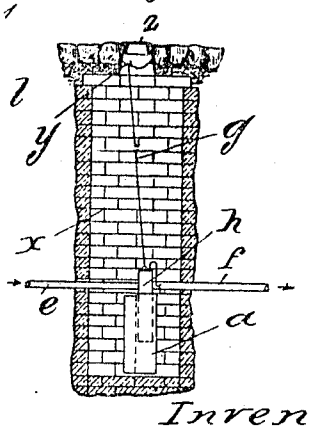
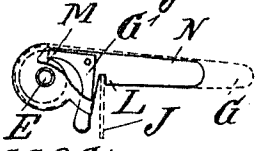


Fig. 5



Witnesses:

Nikolaus Meurer

Carl Meyer

Inventor:

Karl Höffler

UNITED STATES PATENT OFFICE.

KARL HÖFFLER, OF NEUERBURG, GERMANY.

OPENING AND CLOSING APPARATUS FOR GAS-PIPES.

950,393. Specification of Letters Patent. Patented Feb. 22, 1910.

Application filed August 30, 1909. Serial No. 515,368.

To all whom it may concern:

Be it known that I, KARL HÖFFLER, a citizen of the Empire of Germany, residing at Neuerburg-on-the-Eifel, in the Empire of Germany, have invented a new and useful Opening and Closing Apparatus for Gas-Pipes, of which the following is a specification.

In gas pipe systems mostly metallic cocks are used for controlling the distribution of gas, but they present various defects. In spite of careful fitting by grinding and notwithstanding the lubrication of their sliding-faces the cocks are liable to become loose partly by wear and tear during the use and by squeezing out of the lubricating oil and partly by the loosening of the nuts which serve for keeping the plugs in contact with the casings, so that losses of gas will result. This is particularly the case with the larger cocks, such as are disposed in the street gas pipes, and as the cocks inserted between these pipes and the pipings in buildings. Such cocks are often very difficult of access, when the said defects will be the more disagreeable.

My invention relates to an apparatus adapted to open and to close gas pipes while avoiding the said defects.

The new apparatus comprises a prismatic vessel divided into two vertical compartments communicating with one another through an opening at the bottom and partly filled with a sealing liquid, a displacer movable in one of the vertical compartments and adapted to displace a part of the sealing liquid and to withdraw for interrupting and establishing respectively the communication between two chambers formed in the other vertical compartment, which chambers are at the top separately connected with two gas pipes. This apparatus can collect any condensing-water and discharge any excess of the sealing liquid. The apparatus is further provided with means for locking the displacer in its raised position and for automatically releasing the displacer on the gas pressure exceeding a predetermined limit.

I will now proceed to describe my invention with reference to the accompanying drawing, in which—

Figure 1 is a vertical section through the apparatus on the line 1—1 in Fig. 2, Fig. 2 is a vertical section through the same on the broken line 2—2 in Fig. 1, Fig. 3 is a plan view of the apparatus, the turnable protecting cover being removed, Fig. 4 is a vertical section on a reduced scale through a street-pit, in which an apparatus is disposed, and Fig. 5 is a detail, which will be referred to later on.

Similar characters of reference refer to similar parts throughout the several views.

A prismatic vessel a of a rectangular cross section is divided by a vertical partition b extending downward to a point above the bottom into two compartments, which communicate with one another through the opening b^1. One compartment (in Fig. 1 on the right) is marked I, while the other compartment is in its upper part divided by a vertical partition c into two chambers II and III, which are closed above by a top c^1 and below by two valve seats r and r^1 of any known construction. On the top c^1 are fastened the ends of two gas pipes e f, of which one e serves for supplying gas to the chamber II and the other one f for conducting off gas from the chamber III. Two conical valves q q^1 are fastened at the upper ends of vertical rods s s^1, which are guided in the seats r r^1 and are at their lower ends pivotally connected with the arms t t^1 of a three-armed lever rocking at t^2 on the bottom. The third arm t^3 (Fig. 1) of this lever is a weight-plate, which normally tends to lift the two valves q q^1 off their seats r r^1. A displacer h, which may be a float, can vertically move in the compartment I and is suspended from a cord g or chain or the like attached with its upper end to some stationary point, for example y in Fig. 4. The displacer h is provided with a notch m, in which a lock k can engage. The lock k rocks at j on the vessel a and a leaf spring l^1 may be inserted between the vertical portion of its lower bent arm l and the wall of the vessel a for pressing the lock k on the displacer h. A sealing liquid (for example glycerin, alcohol, or the like) is introduced into the vessel a, and when gas is turned on through the supply pipe e, its pressure will force the liquid out of the chamber II, so that the level of the liquid will be deeper in the left compartment (Fig. 1) than in the right compartment I. As the level of the liquid in the left compartment is then at a point beneath the seats r r^1, the gas is permitted to pass in the direction of the arrows from the chamber II to the other one III, from whence it can further pass through the pipe f. Baffling

plates *w* which are alternately oppositely inclined, may be provided in the two chambers II and III for preventing the sealing liquid from spurting upward. The gas pipe *e* is connected with some source of gas, and the gas pipe *f* is connected with the respective pipe system, either in some building or in the streets. It will be understood, that any condensing-water getting into the apparatus through either of the pipes *e f* will collect in the lower part of the vessel *a* and may mix with the sealing liquid.

In general the pressure of the gas will be nearly constant and in consequence also the difference in height of the levels of the liquid in the two compartments on both sides of the partition *b* will remain approximately the same. In order to prevent the level in the compartment I from exceeding the predetermined limit, a discharge valve box *n* is disposed on the vessel *a* near the said level for normally permitting any excess of the liquid to escape. The valve n^1 in the box *n* is by its rod pivotally connected with the arm o^1 (Fig. 2) of a two-armed lever o^1 o^2, which is mounted to rock on the vessel *a* at *o*. The other arm o^2 is outweighed by the arm o^1, the valve n^1 and its rod, so that this valve n^1 is normally open. The top of the displacer *h* is provided with a bracket p^1 on which a vertical rod *p* hangs. This rod *p* has a thicker lower end which is guided in an eye provided in the arm o^2 and normally carries on its shoulder a few weight-plates p^2. When the arm *l* is depressed for withdrawing the lock *k* from the notch *m* and thus permitting the displacer *h* to drop, the latter will take along with it the rod *p*, so that the weight plates p^2 will soon strike the arm o^2 and turn it for closing the valve n^1 and thus preventing any discharge of the sealing liquid. The displacer *h* will force the liquid so much downward in the compartment I and upward in the left compartment in Fig. 1, as to interrupt the communication between the two chambers II and III, when the passage of the gas will be stopped. The weight of the plate t^3 is so adjusted, that any excess of the pressure in the two chambers II and III beyond a predetermined limit will close the two valves *q* q^1 and thus prevent the sealing liquid from being forced out of the vessel *a* through the discharge valve box *n*. There is a small play left between the displacer *h* and the inside of the compartment I, so that the discharge valve box *n* remains in permanent communication with the compartment I, even if the bottom of the displacer *h* should be beneath the opening leading to the box *n*. The said higher pressure in the two chambers II and III may take place, if the gas is shut off and compressed air is admitted to the pipe system for testing the tightness of the respective section of the system, as is well known.

A vessel A is in Fig. 1 attached to the left side of the vessel *a* and is shown to have a circular cross section. It is put in communication with the chamber II by a bent pipe B, one arm of which extends upward to a point near the top c^1, while the other arm is at its upper end connected with a valve box S. A cylindrical vessel or bell C closed at the top and open at the bottom is introduced into the vessel A, play being left between them. The vessel A is partly filled with a liquid (for example water) and serves as a sort of gas-holder. A vertical rod D is fastened on the top of the bell C and is rigidly connected with a valve R below and a disk D^1 above. When the bell C rests on the bottom of the vessel A an annular space will be left in the box S around the rod D, so that gas is permitted to pass from the chamber II to the space in the bell C above the level of the liquid and normally raise the bell C to a certain height, so that the valve R still remains open.

The rear side of the vessel *a* in Fig. 1 is provided with two vertical ledges a^1 and a^2, between which a plate a^3 (Fig. 3) can be inserted. This plate a^3 is in any known manner rigidly connected with a support O, which is in Fig. 3 shown to be a doubly bent plate. In the support O a horizontal shaft H is mounted to rock, which in Figs. 1 and 3 carries at its left end a locking arm J and at its right end a weighted lever K and a lever P. The weighted lever K is adapted to strike and depress the arm *l* for withdrawing the lock *k* from the notch *m*. The support O carries a pin E, on which two levers G and N are mounted to rock independently of one another. One lever G rests with its free end on the disk D^1 and has intermediate its ends a pin on which a weighted pawl G^1 (Fig. 5) is mounted to rock. The lever N is provided on its underside with a notch L, in which the above mentioned locking arm J can engage. This lever N is rigidly connected with a ratchet wheel M having a single tooth space. This ratchet wheel M is so placed on the lever N, that on the latter being supported by the locking arm J in the manner shown at Fig. 5, the pawl G^1 will be normally just in contact with the radial side of the tooth space in the ratchet wheel M, as long as the normal gas pressure prevails in the two chambers II and III. On the bell C being further raised by the excess of the gas pressure the disk D^1 will turn the lever G upward, so that the pawl G^1 carried by the lever G will turn the ratchet wheel M and thereby the lever N in the same direction, until the locking arm J comes out of engagement with the notch L, whereby the weighted lever K is released, so that it can fall and

depress the arm *l* for withdrawing the lock *k* from the notch *m*. Then the displacer *h* will drop for interrupting the communication between the two chambers II and III and thus stop the passage of the gas in the manner described above. At this moment the valve R will close the box S and interrupt the communication between the bell C and the chamber II. Thereby the bell C is prevented from further rising, so that no gas can escape from it to without. The displacer *h* is provided with a doubly bent rod Q, which forms a gripper and serves for raising the arm P and by its shaft H also the weighted lever K until the locking arm J engages in the notch L of the lever N. As long as the normal gas pressure prevails in the distribution pipe system, the bell C will occupy its normal position, so that the raised weighted lever K is checked by the locking arm J engaging in the notch L of the lever N. When, however, during night the last place of consumption in some building is shut off from the apparatus, the pressure in the two chambers II and III will slightly rise. This increase of the gas pressure in the bell C suffices for further raising the latter, so that in the manner described above the weighted lever K will be released and operate the arm *l* for withdrawing the lock *k* from the notch *m*. Thus the apparatus is enabled to automatically shut off the pipe system in the respective building or the respective section of the distribution pipe system from the gas-works. It will be necessary to again raise the displacer *h* for opening the apparatus and permitting the passage of gas.

It will be seen, that it is easy to take off the support O with all the parts carried by it by withdrawing the plate a^3 from the ledges a^1 a^2.

Fig. 4 illustrates an example of how the apparatus described may be disposed in a street pit *x*. In this case the apparatus may be provided with a protecting cover *v* (Fig. 1), which is shown as being turnable at *u* on suitable supports u^1 and resting on a support u^2. Or the apparatus may be inclosed in a protecting box (not shown). After removing the cover *z* it is possible to seize the upper end of the cord or rod *g* for raising the displacer *h* and thus establishing the communication between the two chambers II and III, in other words for permitting the passage of the gas. In this case the lock *k* may be dispensed with for permitting the displacer *h* to move downward. Or a second rod similar to *g* may be provided and pivotally connected with the arm *l*, when it will be possible to withdraw the lock *k* by depressing the said rod for releasing the displacer *h*.

It will be obvious, that in case of fires or dangers the apparatus can be operated for shutting off some section of the gas distribution system from the gas-works, as all that is required is merely to open the cover *z* and to lower the displacer *h* for interrupting the passage of the gas from the chamber II to the other one III. In case the gas pipe system in a building requires to be shut off from the gas-works, it is only necessary to lower the displacer *h* of the apparatus.

The apparatus described can be varied in many respects without departing from the spirit of my invention.

I claim:

1. In an opening and closing apparatus for gas pipes, the combination with a prismatic vessel, of a vertical partition dividing said vessel into two prismatic compartments communicating with one another through an opening at the bottom, a top on said vessel for closing one compartment while leaving open the other compartment, a vertical partition dividing the upper part of the closed compartment into two chambers, two pipes attached to said top and one serving for supplying gas to one chamber and the other for conducting off gas from the other chamber, a sealing liquid partly filling said vessel, a prismatic displacer movable in the open compartment and adapted to displace a part of the sealing liquid for interrupting the communication between the two chambers, means for raising said displacer and thus establishing the communication between the two chambers, a spring-pressed lock on said vessel and adapted to engage in said displacer for supporting it in its raised position, and means for withdrawing said spring-pressed lock.

2. In an opening and closing apparatus for gas pipes, the combination with a prismatic vessel, of a vertical partition dividing said vessel into two prismatic compartments communicating with one another through an opening at the bottom, a top on said vessel for closing one compartment while leaving open the other compartment, a vertical partition dividing the upper part of the closed compartment into two chambers, two pipes attached to said top and one serving for supplying gas to one chamber and the other for conducting off gas from the other chamber, a sealing liquid partly filling said vessel, a prismatic displacer movable in the open compartment and adapted to displace a part of the sealing liquid for interrupting the communication between the two chambers, means for raising said displacer and thus establishing the communication between the two chambers, a valve box on said vessel beneath the level of said sealing liquid in the open compartment and adapted to permit any excess of the sealing liquid to escape, a valve in said valve box, and means operated by said displacer for opening said

valve on the displacer being raised and for closing it on the displacer being lowered.

3. In an opening and closing apparatus for gas pipes, the combination with a prismatic vessel, of a vertical partition dividing said vessel into two prismatic compartments communicating with one another through an opening at the bottom, a top on said vessel for closing one compartment while leaving open the other compartment, a vertical partition dividing the upper part of the closed compartment into two chambers, two pipes attached to said top and one serving for supplying gas to one chamber and the other for conducting off gas from the other chamber, a sealing liquid partly filling said vessel, a prismatic displacer movable in the open compartment and adapted to displace a part of the sealing liquid for interrupting the communication between the two chambers, means for raising said displacer and thus establishing the communication between the two chambers, a valve box on said vessel beneath the level of said sealing liquid in the open compartment and adapted to permit any excess of the sealing liquid to escape, a two-armed lever rocking on said vessel, a valve in said valve box and suspended from one arm of said two-armed lever and being normally open, a vertical rod suspended from said displacer and guided with its lower thicker end in the other arm of said two-armed lever, and a weight bearing on the thicker end of said vertical rod and adapted on said displacer being lowered to depress the other arm of said two-armed lever and thus to close said valve.

4. In an opening and closing apparatus for gas pipes, the combination with a prismatic vessel, of a vertical partition dividing said vessel into two prismatic compartments communicating with one another through an opening at the bottom, a top on said vessel for closing one compartment while leaving open the other compartment, a vertical partition dividing the upper part of the closed compartment into two chambers, two pipes attached to said top and one serving for supplying gas to one chamber and the other for conducting off gas from the other chamber, a sealing liquid partly filling said vessel, a prismatic displacer movable in the open compartment and adapted to displace a part of the sealing liquid for interrupting the communication between the two chambers, means for raising said displacer and thus establishing the communication between the two chambers, two seats closing the two chambers at the bottom, two valves guided in said two seats, two vertical rods connected with said two valves, and a weighted lever pivotally connected with said two vertical rods and so adjusted as to normally open said two valves and to close them on the pressure in the two chambers exceeding a limit.

5. In an opening and closing apparatus for gas pipes, the combination with a prismatic vessel, of a vertical partition dividing said vessel into two prismatic compartments communicating with one another through an opening at the bottom, a top on said vessel for closing one compartment while leaving open the other compartment, a vertical partition dividing the upper part of the closed compartment into two chambers, two pipes attached to said top and one serving for supplying gas to one chamber and the other for conducting off gas from the other chamber, a sealing liquid partly filling said vessel, a prismatic displacer movable in the open compartment and adapted to displace a part of the sealing liquid for interrupting the communication between the two chambers, means for raising said displacer and thus establishing the communication between the two chambers, a gas-holder, a bell movable in said gas-holder, a liquid partly filling said gas-holder, a bent tube for establishing the communication between the top of the gas receiving chamber and said bell above the liquid, a spring-pressed lock on said vessel and adapted to engage in said displacer for supporting it in its raised position, and means operated by said bell when rising for withdrawing said spring-pressed lock.

6. In an opening and closing apparatus for gas pipes, the combination with a prismatic vessel, of a vertical partition dividing said vessel into two prismatic compartments communicating with one another through an opening at the bottom, a top on said vessel for closing one compartment while leaving open the other compartment, a vertical partition dividing the upper part of the closed compartment into two chambers, two pipes attached to said top and one serving for supplying gas to one chamber and the other for conducting off gas from the other chamber, a sealing liquid partly filling said vessel, a prismatic displacer movable in the open compartment and adapted to displace a part of the sealing liquid for interrupting the communication between the two chambers, means for raising said displacer and thus establishing the communication between the two chambers, a gas-holder, a bell movable in said gas-holder, a liquid partly filling said gas-holder, a bent tube for establishing the communication between the top of the gas receiving chamber and said bell above the liquid, a valve box at the upper end of the arm of said bent tube within said bell, a valve in said valve box and connected with said bell, a frame on said vessel and having a pin, a lever mounted to rock on the pin of said frame and to bear on said bell and having a notch, a horizontal shaft mounted in said frame to rock, an arm on

said horizontal shaft and adapted to engage in the notch of said lever for supporting the latter while being thereby locked, a weighted lever on said horizontal shaft, a spring-pressed lock on said vessel and adapted to engage in said displacer for supporting it in its raised position, and an arm connected with said spring-pressed lock for withdrawing the latter on being operated by said weighted lever.

7. In an opening and closing apparatus for gas pipes, the combination with a prismatic vessel, of a vertical partition dividing said vessel into two prismatic compartments communicating with one another through an opening at the bottom, a top on said vessel for closing one compartment while leaving open the other compartment, a vertical partition dividing the upper part of the closed compartment into two chambers, two pipes attached to said top and one serving for supplying gas to one chamber and the other for conducting off gas from the other chamber, a sealing liquid partly filling said vessel, a prismatic displacer movable in the open compartment and adapted to displace a part of the sealing liquid for interrupting the communication between the two chambers, means for raising said displacer and thus establishing the communication between the two chambers, a gas-holder, a bell movable in said gas-holder, a liquid partly filling said gas-holder, a bent tube for establishing the communication between the top of the gas receiving chamber and said bell above the liquid, a valve box at the upper end of the arm of said bent tube within said bell, a valve in said valve box and connected with said bell, a frame on said vessel and having a pin, a lever mounted to rock on the pin of said frame and to bear on said bell and having a notch, a horizontal shaft mounted in said frame to rock, a locking arm on said horizontal shaft and adapted to engage in the notch of said lever for supporting the latter while being thereby locked, a weighted lever on said horizontal shaft, a spring-pressed lock on said vessel and adapted to engage in said displacer for supporting it in its raised position, an arm connected with said spring-pressed lock for withdrawing the latter on being operated by said weighted lever, an operating arm on said horizontal shaft, and a gripper on said displacer and adapted on the latter being raised to strike and raise said operating arm for moving said locking arm into engagement with the notch of said lever.

KARL HÖFFLER.

Witnesses:
LOUIS VANDORN,
M. KNEPPERS.