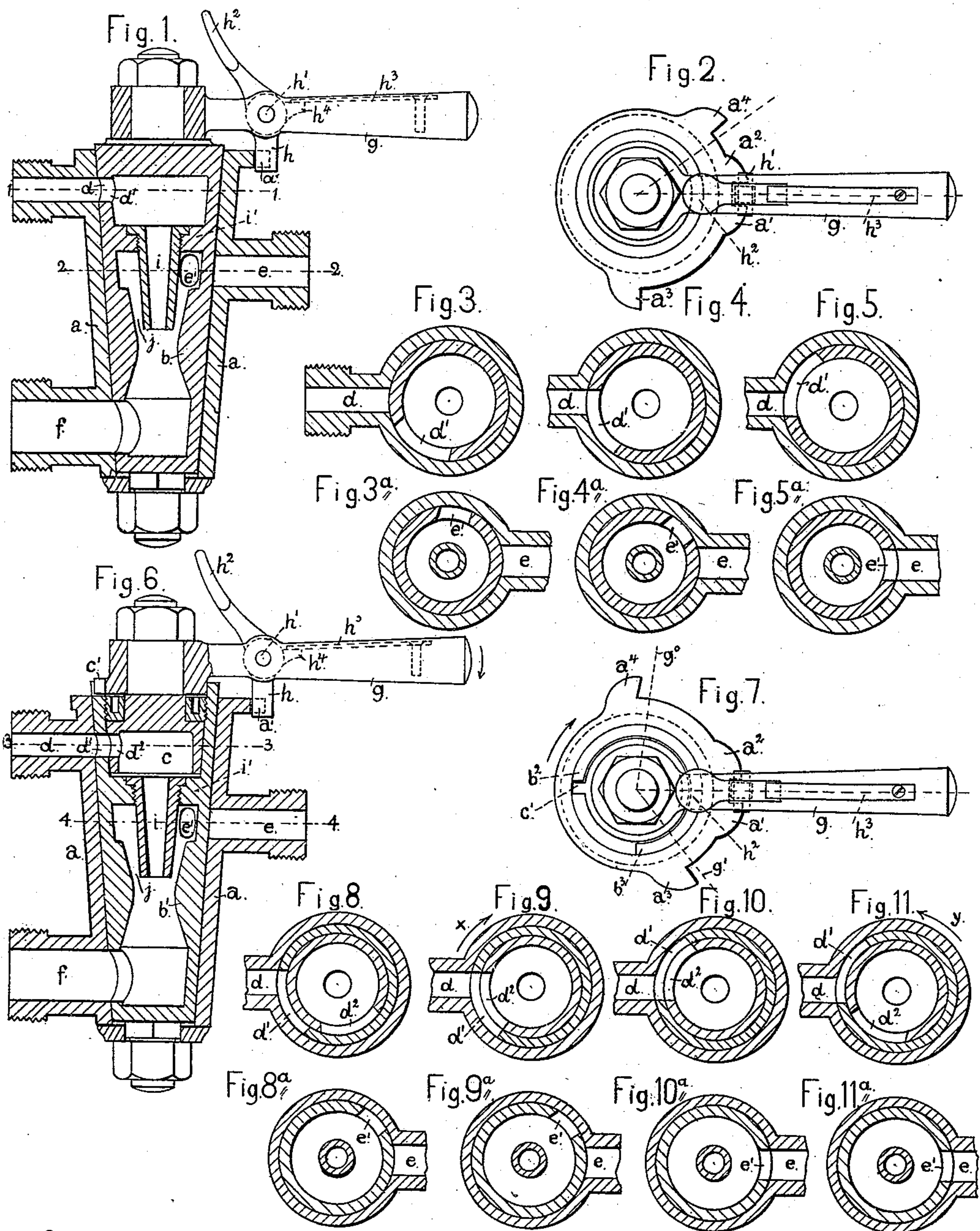


(No Model.)

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COCK FOR MIXING GAS AND AIR.

No. 446,341.

Patented Feb. 10, 1891.



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# UNITED STATES PATENT OFFICE.

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## COCK FOR MIXING GAS AND AIR.

SPECIFICATION forming part of Letters Patent No. 446,341, dated February 10, 1891.

Application filed July 28, 1890. Serial No. 360,138. (No model.)

*To all whom it may concern:*

Be it known that I, RICHARD GOEHDE, a subject of the King of Prussia, residing at Hanover, in the Kingdom of Prussia, Germany, have invented new and useful Improvements in Cocks for Mixing Gas and Air, whereof the following is a specification.

My invention relates to cocks by which a mixture of gas and air (the latter being either compressed or of atmospheric pressure) is produced for feeding burners of heating apparatuses; and its object is to prevent explosions from occurring in the cocks, the burners, and the connections thereof when the mixture issuing from the burners is lighted and when it is turned off. If a mixture of gas and air liable to explode and issuing from a pipe is ignited, the flame will leap into the tube if the speed of the current of mixture is lower than the speed with which combustion is propagated in the mixture. In burners of the said kind there should consequently always be a strong current so long as gas and air pass in mixed state through the cocks and connections, and a throttling of the current of mixture should neither take place when the burner is lighted nor when it is extinguished, as otherwise explosions are inevitable. In order to avoid this throttling of the said current, I construct the cocks of the burners in such manner that when the cock is opened the two fluids—viz., gas and air—will not be turned on simultaneously, but one after the other, and that likewise they will be turned off one after the other when the cock is closed. By these means a strong current of an explosive fluid is produced in the cock and the other parts previous to the formation of mixture when the burner is to be lighted, while, on the other hand, the current of mixture is first replaced by a current of a non-explosive fluid when the burner is to be extinguished. It is ordinarily immaterial which of the two fluids is turned off and on first. If it is the gas, the same may be lighted at once. If it is the air, it is of course necessary to wait for the gas mixing with the air before ignition can take place.

The cocks designed to serve for the purpose set forth have two branches for the separate induction of gas and air and one branch for the eduction of mixture, and the induction-

orifices in the plug are so arranged relatively to the said branches that on turning the plug from its closing position forward the orifice 55 for the admission of one fluid—say for gas—will be brought in register with the corresponding branch first, and that it will remain open thereto while the plug is turned farther for establishing communication between the 60 other induction-orifice and the branch for the admission of air. In this case the gas is admitted first and shut off last, while the air is admitted last and shut off first. If it be desired that both the admission and the shut- 65 ting off of gas take place first, the cock is provided with two plugs inserted one into the other, the inner one being arranged to control the gas-inlet orifice of the outer plug and having a tappet co-operating with shoulders on the latter, so that after the orifice 70 of the inner plug has been brought into or out of register with the gas-inlet orifice of the outer plug both plugs will turn together. For the purpose of securing a full current of 75 one fluid before the other is caused to enter I provide the cock with a disengageable stopping device, whereby the plug is arrested during its rotation when it has arrived in the position in which the fluid to be admitted first 80 is turned on. The party handling the cock is thus required to disengage the said device before the plug can be turned farther, the time necessary therefor being sufficient to allow a full current of the fluid admitted first 85 to be obtained. If this fluid is the gas, the stoppage of the plug may be brought about before the gas-induction branch of the cock has been opened fully. In view of causing the gas and air to mix properly I arrange inside of the plug a nozzle communicating with 90 one of the induction-orifices and forming with the inner wall of the plug an annular channel communicating with the other orifice. This arrangement is a necessity if the air 95 supplied to the cock is of atmospheric pressure, as the same has in such case to be drawn in by the gas-current.

In the annexed drawings, Figure 1 is a sectional elevation of a cock carried out according to my invention and having a single plug. 100 Fig. 2 is a top view thereof. Figs. 3, 4, and 5 are sections on line 1 1, Fig. 1, showing the plug in three different positions. Figs. 3<sup>a</sup>, 4<sup>a</sup>,



and 5<sup>a</sup> are sections on line 2 2, Fig. 1, corresponding, relatively to the positions of the plug, to the respective Figs. 3, 4, and 5. Fig. 6 is a sectional elevation, and Fig. 7 a top view, of a cock with two plugs. Figs. 8, 9, 10, and 11 are sections on line 3 3, Fig. 6; and Figs. 8<sup>a</sup>, 9<sup>a</sup>, 10<sup>a</sup>, and 11<sup>a</sup>, sections on line 4 4, representing the two plugs in different positions, the figures with the same numerals corresponding to each other.

In the cock shown by Fig. 1, the shell *a* has two lateral induction branches *d e* and the eduction branch *f*, while the plug *b* has the induction-orifices *d' e'* and the eduction-orifice *f*, the said orifices being adapted to register with the respective branches. The orifice *d'* has a peripheral width which is greater than the inner width of the branch *d*, and its position relatively to the aperture *e'* is such that the latter may be brought into and out of register with the branch *e* without disturbing the communication between the orifice *d'* and the branch *d*. If the plug thus arranged is in the position shown by Figs. 3 and 3<sup>a</sup>, both orifices *d'* and *e'* are closed. If the plug is turned into the position represented by Figs. 4 and 4<sup>a</sup>, the orifice *d'* is open to the branch *d* and one fluid—say gas—is admitted, whereas orifice *e'* is still closed. If, finally, the plug is moved into the third position, Figs. 5 and 5<sup>a</sup>, the orifice *e'* registers with the branch *e*, and air is admitted in addition to the gas, the branch *d* having remained open to the orifice *d'*. The stoppage of the plug in the second position, Figs. 4 and 4<sup>a</sup> and also Fig. 2, is attained by means of a projection *a'*, formed on the rim of the shell *a*, and the arm *h* of the latch *h h'*, pivoted at *h'* to the handle *g* of the plug and maintained in operative position by the spring *h<sup>3</sup>* acting on an arm *h<sup>4</sup>*.

*h<sup>2</sup>* is a thumb-plate, by means whereof the latch is disengaged. For stopping the plug in the same position when it is turned backward another projection *a<sup>2</sup>* may be added to the projection *a'*.

*a<sup>3</sup>* and *a<sup>4</sup>* are stops for arresting the plug in its extreme positions.

*i* is the nozzle seated within the plug, whereby the mixing of gas and air is promoted, and whereby the gas-current is enabled to draw in air in case uncompressed air is employed, the said nozzle being inserted into the transverse partition-wall *i'* and communicating at its inlet end with the upper cavity of the plug having the orifice *d'*, while it forms with the inner peripheral surface of the lower cavity the annular channel *j*, communicating with the orifice *e'*.

In the cock having two plugs, and shown by Figs. 6 and 7, the outer plug *b'* is in respect to the arrangement of the orifices *d'* and *e'* like to the plug *b* of the described cock. Into its upper part is, however, inserted the plug *c*, having the orifice *d<sup>2</sup>*, which is of the same peripheral width as the orifice *d'*. Moreover, the plug *c* has a tappet *c'*, and the plug *b'* is provided in the path of the said

tappet with two shoulders *b<sup>2</sup>* and *b<sup>3</sup>*, Fig. 7. The handle *g* is fixed to the plug *c*. When the two plugs are in the position shown by Figs. 8 and 8<sup>a</sup>, the plug *c* closes the orifice *d'*, so that, though the latter be in register with the branch *d*, the admission of gas (supposing the same to take place through the branch *d*) is intercepted. The branch *e* is closed by the plug *b'*. If now the plug *c* is turned in the direction of arrow *x*, Fig. 9, orifice *d<sup>2</sup>* will be brought into register with orifice *d'*, gas being consequently admitted while the air-inlet is still closed. If the plug *c* is thereupon turned farther, the tappet *c'*, pressing against the shoulder *b<sup>2</sup>*, will cause the plug *b* to turn along with the plug *c*, and when both plugs have attained the position Fig. 10 the air-inlet through branch *e* is open, as well as the gas-inlet. When the cock is to be closed, the plug *c*, rotated in the direction of arrow *y*, first closes the orifice *d*, as shown by Fig. 11, and then the tappet *c'*, touching against the shoulder *b<sup>3</sup>*, causes the rotation of plug *c* to be transmitted to plug *b*, whereby branch *e* is closed again. Thus by means of this arrangement gas is turned on first and shut off first.

The described effects are obtained whether the plug *c* is stopped in the intermediate positions or whether it is not stopped, provided only that in the latter case it be turned slowly; but, for the purpose hereinbefore stated, it is preferred to provide the double-plug cock with means alike to those described with reference to Figs. 1 and 2 for arresting the plug *c* in the intermediate positions. These means consist, as shown by Figs. 6 and 7, in the two shoulders *a' a<sup>2</sup>*, co-operating with the latch *h*, the shoulder *a'* serving to stop the plug when during its forward motion it has arrived in the position shown by Fig. 9, while the shoulder *a<sup>2</sup>* stops the plug when on being turned backward it has attained the position shown by Fig. 11. *a<sup>3</sup>* and *a<sup>4</sup>* are again the shoulders that cause the stoppage of rotation when the plug *c* is in either of its end positions.

I claim as my invention—

1. A cock consisting of a shell *a* and a plug *b*, the shell having two lateral induction branches *d e* and the plug *b* having two lateral induction-orifices *d' e'*, adapted to register with the respective branches *d e*, the branch *d* and the orifice *d'* having such relative peripheral width and the orifices *d' e'* being so arranged relatively to the branches *d e* that when the plug is turned for opening the cock communication will first be established between the branch *d* and the orifice *d'* while the branch *e* and the orifice *e'* are still out of register with each other, and that on turning the plug farther the orifice *e'* will be put in communication with the branch *e* while orifice *d'* remains open to branch *d*, substantially as described.

2. A cock consisting of a shell *a* and two plugs *b' c*, the shell having two lateral induc-



tion branches  $d\ e$ , the plug  $b'$  having the induction-orifices  $d' e'$ , adapted to register with the respective branches  $d\ e$ , the branch  $d$  and the orifice  $d'$  having such relative peripheral width and the orifices  $d' e'$  being so arranged relatively to the branches  $d\ e$  that the branch  $e$  and orifice  $e'$  may be brought into and out of register with each other without disturbing the communication between the branch  $d$  and orifice  $d'$ , and the plug  $c$  being inserted into the plug  $b'$  and having an orifice  $d^2$ , adapted to register with the orifice  $d'$  and a tappet  $c'$ , while the plug  $b'$  is provided with two shoulders  $b^2\ b^3$ , being in the path of and co-operating with the said tappet, substantially as specified.

3. A cock consisting of a shell  $a$ , having the lateral induction branches  $d\ e$ , and a plug having the induction-orifices  $d' e'$ , the transverse partition-wall  $i'$ , and an inside nozzle  $i$ , seated in the partition-wall, communicating

with the orifice  $d'$ , and forming with the wall of the plug the annular channel  $j$ , which communicates with the orifice  $e'$ , substantially as described.

4. In a cock, the combination, with the shell and a plug, of a disengageable spring-controlled latch connected to one of the said parts and a stop formed on the other part in such position that by the co-operation of the latch and the stop the plug will during its rotation be stopped at a certain point of its course, and that subsequent to the disengagement of the latch it may be turned farther, substantially as specified.

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

RICHARD GOEHDE.

Witnesses:

JULIAN MEYER,  
WM. KESSLER.