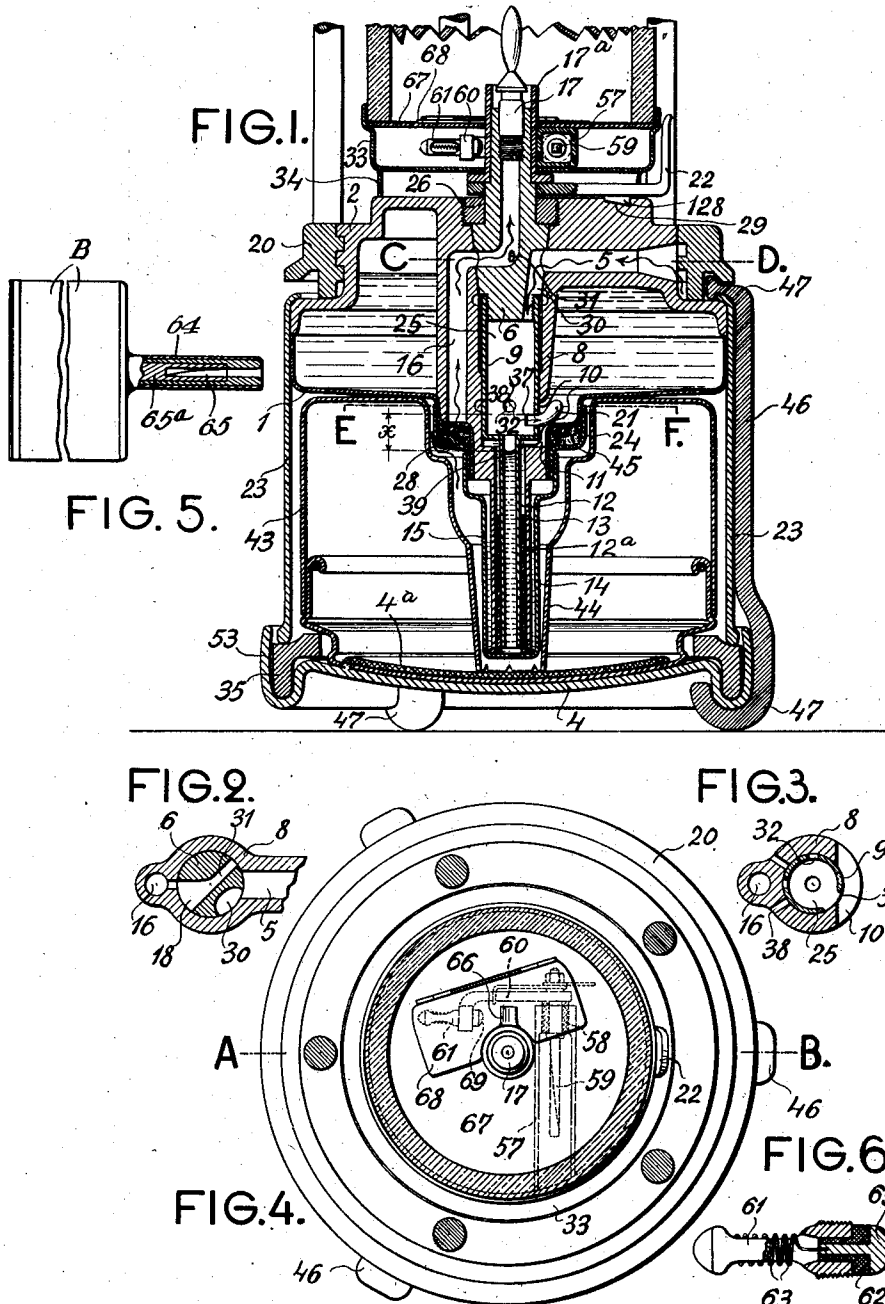


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ACETYLENE LAMP.
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ACETYLENE-LAMP.

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To all whom it may concern:

Be it known that I, PAUL BEST, a citizen of Germany, and residing at Saarbrücken, Germany, have invented new and useful Improvements in Acetylene-Lamps, of which the following is a specification.

This invention relates to an acetylene lamp more particularly adapted for use in mines and comprises novel means for regulating the supply of water into the carbid chamber for replenishing the carbid and water, and for carrying out fire damp tests.

The invention consists in the various features of construction more fully pointed out in the claims.

In the accompanying drawing: Figure 1 is a vertical central section of part of a lamp embodying my invention; Fig. 2 a cross section on line C—D, Fig. 1; Fig. 3 a cross section through the valve casing and sleeve on line E—F, Fig. 1; Fig. 4 a horizontal section above the burner of Fig. 1; Fig. 5 a detail of the current supply device, and Fig. 6 a detail of the igniter.

The lamp body is by a partition 1 divided into an upper water tank closed by a cover 2, and a lower compartment having a removable bottom 4 and adapted to receive an exchangeable carbid receptacle 43. The latter consists of a pair of telescoped vessels, of which the upper vessel is provided with a central water inlet tube 44 extending downwardly to the bottom of the lower vessel which is preferably covered with a layer of felt 4^a. From cover 2 depends a central double seated valve casing 8 adapted to communicate through duct 5 with the atmosphere, said casing inclosing a conical cock or plug 6 and a tubular sleeve 9 screwed to said plug. To the apertured bottom of sleeve 9 is secured a downwardly extending capillary tube 12 while the sleeve is provided with a lateral perforation 37 adapted to register with a somewhat larger opening 10 of casing 8. The bottom of sleeve 9 is arranged at such a height, as to form a passage 11 communicating with opening 10 and adapted to admit liquid into the lower compartment. Tube 12 is snugly embraced by a removable tube 12^a which is in turn inclosed by a tube 13 depending from casing 8 and of such a diameter as to form a minute space between parts 12^a and 13. The tubes are in turn encompassed by a slightly spaced cylindrical case 14 having a closed bottom and secured to a cap 24 of casing 8,

which cap forms an annular closed space below the central depressed portion of partition 1. Case 14 has a minute aperture 15 permitting the passage of water into the carbid receptacle. If air inlet 5 is opened, water will descend from the tank through passage 11 and through the annular spaces formed between tubes 12 and 13 and between tubes 12^a and 13 to then ascend within the annular space between tubes 13, 14 and to be finally discharged through aperture 15, the openings 37, 10 constituting an air inlet for water tank 2 only to permit a compensation for the water withdrawn therefrom, as hereinafter more fully brought out. Diametrically opposite to opening 10, casing 8 is provided with a longitudinal duct 16 which communicates at its lower end with the carbid receptacle through a port 28 of partition 1. To permit an entrance of the gas into the interior of cap 24, the latter is applied to the downwardly projecting central portion of bottom 1 with but such a pressure, as will prevent the formation of a gas-tight joint, so that the gas, owing to its increasing pressure will be forced through the interstices between the cap and bottom. Opposite the upper end of duct 16, plug 6 has a transverse bore provided with a widened end 18 that is adapted to communicate with said duct. In this way duct 16 may by bore 31 either be connected to a central longitudinal bore of the plug and thus to a burner 17, or it may, through duct 5 be connected with the atmosphere. Plug 6 has further a recess by means of which the duct 5 may be connected with the interior 25 of sleeve 9, thereby simultaneously opening vent 10.

Underneath burner 17, there is secured to plug 6 a handle 22 carrying a nose 128 adapted to enter notches 29 of cover 2 which are located corresponding to the various positions of the plug. The latter is confined to its seat by a ring 26 screwed into cover 2. Into the annular space formed between cap 24 and the downwardly projecting central portion of bottom 1 is fitted a ring 45 of felt or similar material, to prevent the entrance of carbid residues into duct 16. Cover 2 further supports by a ring 34, the ignition box 33 and the chimney, ring 34 being partly cut away to accommodate handle 22. At its circumference the cover is threaded for the reception of a frame 20, which maintains the wire net (not shown)

and the chimney in proper position, the distance between the frame posts permitting the proper manipulation of handle 22.

Between the bottom 4 of the carbid receptacle and mantle 23 is interposed a resilient packing ring 35, while the bottom 4 is held to said mantle by clamps 46 which are applied by special tools and cannot be opened by hand. Clamps 46 have hooks 47 at both ends and engage cover 2 and a projecting rim of bottom 4, the lower hooks also constituting the base of the lamp. By lowering frame 20 and locking it in manner hereinafter described, a removal of the clamps 46 is rendered impossible.

The ignition device is constructed as follows: In box 33 is mounted a squared hollow sleeve 57 which is closed at its inner end by an insulating plug 58. Within the latter is rotatable the squared pole 59 provided with an arm 60 which carries the removable igniter 61 with the platinum wire 63 insulated therefrom by insulating nipple 62. Pole 59 is slightly twisted for engagement with a correspondingly twisted square bore or passageway 65 of a first contact member 65^a which is connected to one pole of an electric battery or cell B. Member 65^a is surrounded by a second contact member 64 conductively connected to the other pole of cell B and insulated from member 65^a in suitable manner. When member 64 is inserted into sleeve 57, pole 59 will be rotated through an angle of about 90°, while at the same time metallic connection is established between parts 59, 65^a and between part 64 and the rim 17^a around the burner 17. Pole 59 is conductively connected to arm 60 and igniter 61, which in turn, by wire 63 is connected to a button 69 (Fig. 6). Burner 17 is provided with a contact spring 66 metallically connected to sleeve 57 and engaged by button 69 when igniter 61 is turned. Ignition box 33 is closed by a lid 67 having an opening above arm 60 and igniter 61, said opening being normally closed by a flap 68. When the igniter is swung up, flap 68 is lifted by the latter to permit the engagement of button 69 with spring 66, which causes wire 63 to glow thus igniting the gas while upon the lowering of the igniter, the flap is automatically closed. Igniter 61 is made removable to permit a ready exchange of the platinum wire 63 if necessary.

The operation of the lamp is as follows: During the normal burning of the lamp, a gas pressure will be created within the carbid chamber which slightly exceeds the atmospheric pressure, so that the water contained in tube 12 will rise to a certain level, the height of which depends upon the size of perforation 37 as hereinafter more fully explained, while said height in turn determines the size of the flame. To permit this operation, tube 12 must be in permanent

communication with the atmospheric air, so that the pressure exerted upon the gas emanating from burner 17 is balanced by the air pressure acting upon meniscus 39, thus permitting the latter to assume a position corresponding to the gas pressure within the carbid chamber. For producing a uniform flame, it is necessary to maintain meniscus 39 at a constant height, so that an even quantity of water is admitted through perforation 15 into the carbid chamber thereby insuring a uniform gas generation in said chamber as hereinafter more fully brought out. As soon as a drop of water trickles through aperture 15 into the carbid chamber, the meniscus 39 of the liquid column contained in tube 12 will correspondingly fall. The gas simultaneously generated in said chamber rises through tube 44, the interior of cap 24, port 28, duct 16 and bore 18, 31 of plug 6 to burner 17. Owing to the widening of duct 31 at 18, the gas will always be free to pass to burner 17 irrespective of the degree to which the air port 10 has been opened. When the meniscus 39 falls, the distance between said meniscus and port 10 increases until finally the weight of the liquid column of the height exceeds the adhesion of the water to the walls of port 10, so that an air bubble will enter the water tank, which in turn causes the discharge of a like volume of water through passage 11, through the annular spaces formed between tubes 12, 13, between ring 12^a and tube 13 and between tubes 13 and 14 and through aperture 15.

It may here be added that for producing a uniform flame, it is important that the height of meniscus 39 within tube 12 remain constant, so that like quantities of water are discharged through aperture 15 and that a uniform gas pressure is maintained within the carbid chamber. For this purpose, perforation 37 must have a specific area, as with perforations of different widths the meniscus 39 occupies different heights. The perforation should be so small that the water clings to the walls thereof, owing to adhesion and to the surface tension of the water filling said perforation, so that no air may pass into the water tank. Should the perforation be made too large, meniscus 39 would rise to such a height as to close air passage 37, while if the perforation were too small, the water supply to the carbid would be insufficient for proper gas production. Furthermore a too large perforation would have the disadvantage that the flame could not be regulated, as meniscus 39 would always tend to rise to such a height as to close the perforation. This phenomenon is due to the fact that with a large perforation and a higher meniscus, air may enter through the upper half of the perforation, while a corresponding quantity of water may be discharged through the lower half

thereof, the result being that the meniscus rises to the upper edge of such perforation. With a smaller hole, however, an entering air bubble completely fills the same, to effect a subsequent discharge of a like quantity of water through passage 11, and the smaller the perforation, the greater will be the resistance for the entering air. The passage of air through perforation 37, however small it may be, is insured as the water column of the height inclosed between tubes 12 and 13 exerts a downward pull, to thereby increase the vacuum in the water tank, and thus overcome the adhesion and surface tension of the water closing perforation 37. By properly dimensioning said perforation, a correct intermittent supply of water may be obtained, so that the variations of meniscus 39 become so minute, that the latter may be considered practically constant. The quantity of the water passing aperture 15 and consequently the size of the flame depends upon the height of the water column in tube 12, while this height in turn depends upon the area of perforation 37. By varying this area, larger or smaller flames may be produced, as with a small supply of water to the carbid, less gas will be generated, while when admitting a large quantity of water, a larger quantity of gas having increased pressure, and consequently a larger flame will be obtained.

For ascertaining the presence of fire damp, plug 6 is turned toward the right so that part of the gas generated will escape through ducts 31 and 5 into the atmosphere, thereby reducing the gas pressure at burner 17. By the above partial rotation of plug 6, recess 30 has been closed so that air can no longer enter chamber 25, thereby checking the supply of water to the carbid, while the production of gas is continued for some time by using up the water previously admitted thereto, this amount of gas, however, being sufficient to make the desired test. By properly setting plug 6 the miner may thus make the flame sufficiently small to enable him to clearly observe the blue zone produced around the flame, even if the amount of methane is but one per cent. Not until plug 6 is turned back to reconnect recess 30 with duct 5 can water again reach the carbid. If plug 6 is turned to the right still further, bore 16 is closed and the lamp becomes extinguished. If the bore is sufficiently wide, the extinguishment of the lamp will be effected by completely opening the bore 31 toward duct 5 so that all the gas is discharged through such duct. In this case however recess 30 must be closed so that water cannot enter the latter.

The advantages of the new lamp are that a clogging of the water supply cannot take place, because the use of small tubing is entirely dispensed with. Although the

space between tubes 12, 13 is rather restricted, the concentric tubes offer such a large contact surface for the water and tend to eliminate possibility that when a clogging should take place somewhere, sufficient passage for the water will at all times be maintained. Furthermore obstruction can at all times be removed by turning tube 12 in tube 13 back and forth so that any impurities may be loosened up and removed.

By the coaction of plug 6 with tube 9, the fire damp test may be effected without difficulty. Before opening 31 registers with duct 5 the air supply through recess 30 and port 10 is closed, so that a further discharge of water through aperture 15 is prevented. The operator can thus not fail to remember to close recess 30 and port 10 prior to the opening of bore 31, as could herebefore happen. A fire damp test can also obviously be performed according to the old method, by cutting off the gas by plug 6 to such an extent that but such a small quantity of gas is emitted from the burner as to produce a small flame only. The surplusage of the gas would in that case escape through passages 15, 12, 25, 30 and 5. To extinguish the lamp, the passage 31 is opened to such an extent that all the gas escapes from the lamp, while the port 10 and duct 30 are closed so that no water can reach the carbid.

The means for adjusting the area of port 10 are furnished by tube 9 in connection with the elongated form of ducts 16 and 30. This form permits port 10 and opening 37 to be set to different sizes without interrupting the supply of the gas to the burner through duct 16 and bore 18 or the supply of air through recess 30 to port 10.

By the means described, the same plug permits the filling of the upper tank with water under pressure, so that the replenishing of the tank can take place much more rapidly as when the water flows slowly to the lamp. For this purpose port 10 and the corresponding opening of sleeve 9 are made much larger than required for the regulation of the flame, while nevertheless the size of the opening is readily regulable. If the plug is set for filling, the recess 30 is open to its maximum extent. The filling is effected as follows: After the lamp has been opened, case 14 is removed to expose the opening of tube 13, ring 12^a is withdrawn to increase the area between tubes 12 and 13 and then the lamp is reversed, whereupon the conical outer end of duct 5 is pressed against a correspondingly shaped discharge nozzle for water of about one atmosphere pressure. The water will thus flow along the most available path and will tend to be partly discharged through tube 12, which is prevented by closing said tube in suitable manner. The water will thus pass through port 10 into the water tank during which

operation the air will escape through passage 11. If desired the filling may be effected through the apertures 32, 33 which must be so arranged that they are normally closed and are only opened in their charging position. The described means for filling the lamp possess the further advantage that as soon as the tube is filled with water, the latter will escape through the space between tubes 12, 13, so that such space is cleaned. The filling may be even more quickly effected if the space between the tubes 12, 13 is increased and fitted with a capillary tube upon the withdrawal of which the air can more readily escape, while said tube may be readily cleaned. After the filling operation is completed plug 6 is turned until port 10 is closed so far that a small orifice for forming air bubbles remains open, which position is indicated by suitable markings on box 33 opposite handle 22. The position of the cock is such that it is effectively protected and that neither handle 22 nor the cock itself is liable to become damaged. If the lamp is to be lighted, contact 64 is inserted into sleeve 57 so as to rotate pole 59 and raise arm 60 and igniter 61 up to burner 17. In this way button 65 will contact with spring 66 to close the circuit and cause a glowing of the platinum wire and a consequent ignition of the gases emanating from the burner. After ignition takes place the source of electricity is withdrawn whereby arm 60 with the igniter will automatically fall back into the dust proof ignition box 33.

I claim:

1. An acetylene lamp comprising a water tank, a carbid chamber arranged therebelow, a permanently opened partly capillary water-conveying passage formed between said tank and chamber, a burner, a cock carrying said burner and being provided with first means for admitting air into the water tank, thereby effecting the discharge of a like quantity of water from said tank into the passage, second means in the cock for controlling the conveyance of the gas generated in the carbid chamber to the burner, said second means being adapted to discharge part or the entire quantity of the produced gas into the atmosphere, thereby reducing the size of the burner-flame or entirely extinguishing the same, and an exteriorly accessible handle for operating the cock, said above mentioned air admitting and water conveying means being also adapted for replenishing the said tank with water.

2. An acetylene lamp comprising a water tank, a carbid chamber arranged therebelow, a plurality of concentric tubes forming intervening annular capillary water passages, the outer tube being provided with

a water egress opening, means for permanently connecting said passages to the water tank, a burner, a vertically disposed cock carrying said burner and being provided with means for admitting atmospheric air into the water tank thereby effecting the discharge of a like quantity of water from said tank into said connecting means.

3. An acetylene lamp comprising a water tank, a carbid chamber arranged therebelow, a permanently opened partly capillary water-conveying passage formed between said tank and chamber, a burner, a gas duct communicating with the carbid chamber, a cock carrying said burner and provided with an air channel for admitting air into the water tank and thereby effecting the discharge of a like quantity of water from said tank into said passage, said cock being also provided with a widened transverse duct which is adapted to connect the gas duct with the burner and with the atmosphere.

4. An acetylene lamp comprising a water tank having an air inlet, a carbid chamber arranged below said tank, a permanently opened partly capillary water-conveying passage formed between said tank and chamber, a burner, a gas duct communicating with the carbid chamber, a cock carrying the burner and having a downwardly extending perforated sleeve that controls the inlet of air to the water tank, said cock being also provided with a longitudinal air channel controlling the admission of atmospheric air into said sleeve, said cock being further provided with a widened transverse duct which is adapted to connect the gas duct with the burner and with the atmosphere, and a handle for operating the cock.

5. An acetylene lamp comprising a water tank, a carbid chamber arranged therebelow, a rotatable sleeve controlling the admission of air into the tank, means for connecting the interior of said sleeve with the atmospheric air, a central first tube extending downward from the sleeve into the carbid chamber and communicating with the sleeve, a second tube encircling the first tube, an apertured third tube encircling the second tube, said tubes being so spaced as to form intervening annular capillary passages, and a fourth tube adapted to be removably inserted between the first and second tubes to reduce the space therebetween and prevent the gas from entering said space, while upon the removal of the fourth tube the area of such space may be increased for water replenishing purposes.

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