(No Model.)

J. W. PACKARD.

FLASHING APPARATUS FOR CARBON FILAMENTS.

No. 391,816. Patented Oct. 30, 1888.

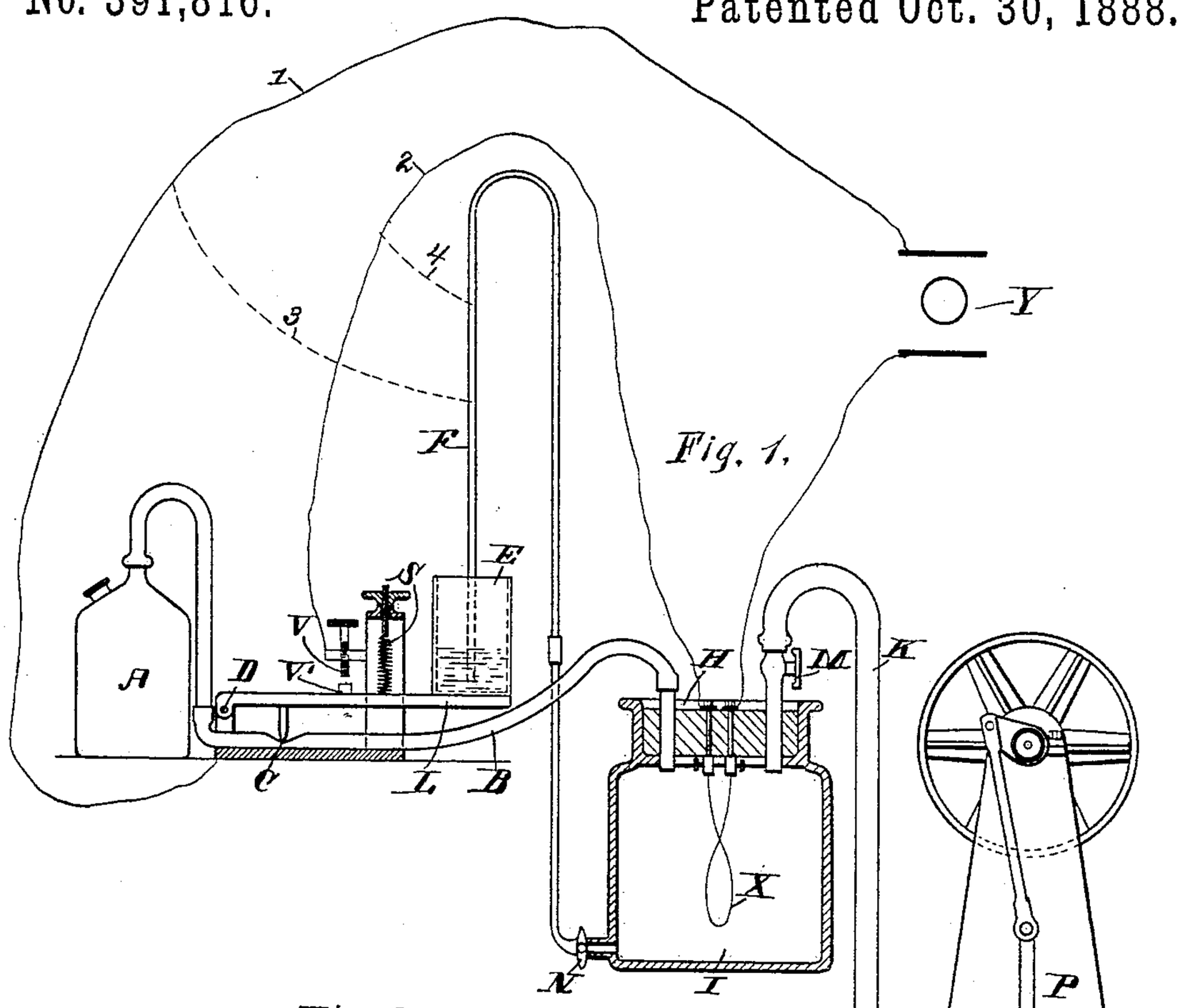

Fig. 1.

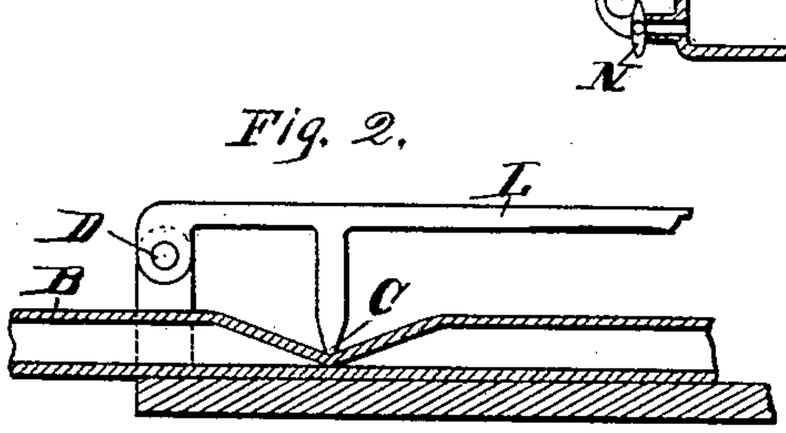

Fig. 2.

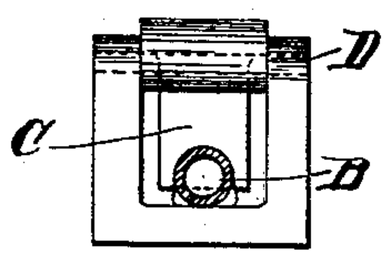

Fig. 3.

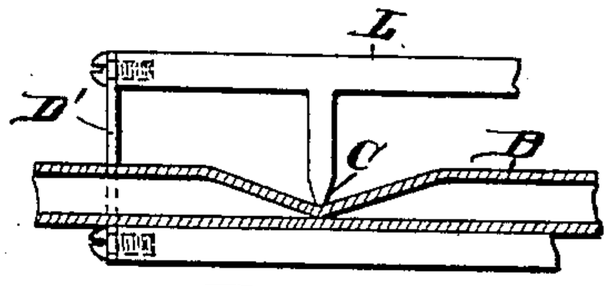

Fig. 4.

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FLASHING APPARATUS FOR CARBON FILAMENTS.

SPECIFICATION forming part of Letters Patent No. 391,816, dated October 30, 1888.

Application filed September 11, 1888. Serial No. 285,126. (No model.)

To all whom it may concern:

Be it known that I, JAMES WARD PACKARD, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Automatically-Operated Valves; 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.

The object of my invention is to produce an apparatus which shall automatically control the flow of vapor or fluid into a chamber from which the air is being exhausted.

In the drawings, Figure 1 represents the general arrangement of such apparatus, some of the parts being shown in section. Fig. 2 is a detail longitudinal section of the pinch-cock employed in the apparatus. Fig. 3 is a cross-section of the tube and end view of the pinch-cock. Fig. 4 shows a modification of the pinch-cock.

In the drawings, P is an air-pump exhausting the air from the receiver I by means of the tube K, which is controlled by the stop-cock M. In the stopper H of the said receiver are certain electrodes and clamps, which latter hold a carbon strip, X, to be used in an incandescent electric lamp. A is a bottle containing naphtha or some other volatile hydrocarbon gas, the vapor from which flows through the tube B into the chamber I more or less swiftly, according to the degree of the vacuum existing in the said receiver.

The especial object of my invention is to still further control the flow of vapor through the tube B. The preferred form of apparatus consists of a lever, L, having a pivot at D, and a knife-edge, C, which pinches or compresses the tube B, as shown in Figs. 1, 2, and 4. The lever L is supported by the spring S, which is adjustable through the agency of a thumb-screw in the well-known manner. Upon the lever L is a cup, E, containing a certain quantity of mercury. A tube, F, (shown in Fig. 1,) has one end immersed in the mercury within the cup E, while the other end opens into the receiver I, from which the air is being exhausted. This end of the tube is controlled by a cock, N.

The preferred form of pinch-cock is that shown in Fig. 4, where the lever L is mounted upon a plate-spring, D′, which is much more sensitive than the form of pivot-bearing shown in the other figures.

It is evident, of course, that any form of valve or stop-cock of the well-known design could be substituted for the pinch-cock here illustrated and controlled in the identical manner above described.

The operation of my device is the following: The stop-cock N is usually left open when the automatic attachment is being used. When the stopper H is removed from the receiver I for the purpose of putting a new strip of carbon in the clamps for treatment, there is an equilibrium of atmospheric pressures and all the mercury runs out of the tube F into the cup E. The weight of this mercury forces the lever L down and the knife-edge C compresses the tube B, as shown in Fig. 2, thereby shutting off all flow of vapor through said tube, and preventing the waste of the volatile liquid in the bottle A. When the stopper H is replaced and the exhaustion of air from the receiver I begun, there is an inequality of pressure on the surfaces of the mercury inside and outside of the tube F. In consequence the mercury rises in the tube F and relieves the lever L of the weight of the amount of mercury so removed from the cup E. The spring S then acts and lifts the lever L, permitting the tube B to open and allowing the flow of vapor through the tube. The spring S is so adjusted that not until a nearly perfect vacuum is established in the receiver I is the knife-edge C so far raised as to permit an unobstructed flow of vapor through the tube B. In this way little or no vapor is drawn off through the pump P and wasted. The quantity used in each operation but little exceeds the capacity of the receiver I.

When the tube F is removed and the automatic attachment dispensed with, the valve N is closed and the receiver used in the ordinary manner.

Another important advantage derived from the use of my invention occurs in its operation as a safety device. It will readily be seen that should an explosion occur in the vacuum-chamber I, or should the apparatus break down in any way, so as to allow in the ordinary construction a large quantity of va-

por to escape into the air, with consequent risk of explosion, my automatic apparatus would instantly shut off all connection with the source of vapor, and, if it did not prevent an explosion, would at least render it impossible for the combustion to travel back into the reservoir where the vapor is generated.

Another and important result from the use of my invention is that it renders the amount of vapor present in the vacuum-chamber I constant for each different operation and for every stage of each particular operation. Consequently the effect upon the carbon strip X which is being treated is the same throughout and the result a uniform product, each carbon strip having the same electrical resistance after treatment.

In addition to the uses already described to which my invention may be put it may also be connected with the circuit-breaker, so that the current will be automatically controlled and not sent through the carbon strip X until the air has been exhausted from the vacuum-chamber I and the necessary quantity of hydrocarbon vapor admitted. This is shown in Fig. 1, where the dynamo Y, supplying the current to the carbon strip X, has its circuit broken and is not thrown into connection with the carbon strip until the rising lever L has permitted the contact-point V′ to touch the adjustable contact-screw V and complete the circuit. The circuit might also be completed by cutting out the portions of the connecting-wires 1 and 2 beyond the dotted branches 3 and 4 and having these branches 3 and 4 terminate in metallic points at suitable distances up the tube F. With this arrangement it is evident that the circuit would not be completed until the mercury had risen in the tube F to a point above the termination of the branch 4, supposing that the tube F were of glass or other non-conducting material. The adjustment in this case would be more delicate but more complicated than with the use of the screw and contact-piece V and V′.

Having therefore described my invention both in essence and detail, what I claim as new, and desire to protect by Letters Patent, is—

1. In a device for automatically controlling the flow of vapor or fluid into a chamber where a vacuum is being created, the combination of the tube which opens into the vacuum-chamber, a valve for checking the flow of vapor or fluid in the tube, the mercury-cup which operates the said valve by gravitation, and a second tube which has one end immersed in the mercury and the other end opening into the vacuum-chamber, substantially as described.

2. In a device for automatically controlling the flow of vapor or fluid into a chamber where a vacuum is being produced, the combination of a tube which opens into the vacuum-chamber, a valve which controls the flow of vapor or fluid in the tube, the lever operating the said valve, the adjusting-spring, the mercury-cup upon the lever, and a second tube which has one end immersed in the mercury and the other end opening into the vacuum-chamber, substantially as described.

3. In a pinch-cock to be automatically operated by the creation of a vacuum, the combination of a flexible tube, a lever provided with a knife edge, which knife-edge rests upon the flexible tube, the adjustable spring which supports the lever, the cup of mercury which is supported by the lever, and a second tube one end of which is immersed in the mercury, while the other opens into the space from which the air is to be exhausted, substantially as described.

4. In a pinch-cock to be automatically operated by the exhaustion of air from a chamber, the combination of a flexible tube, a lever mounted upon a plate-spring and provided with a knife-edge, which knife-edge rests upon the flexible tube, the adjustable spring which supports the lever, the cup of mercury which is supported by the lever, and a second tube one end of which is immersed in the mercury, while the other opens into the chamber from which the air is to be exhausted, substantially as described.

5. In an apparatus for electrically treating strips of carbon in a partial vacuum, the combination of the vacuum-chamber, an electrical circuit including the carbon strip and any suitable source of electricity, a circuit-breaker in said circuit controlled by a quantity of mercury, and a tube which has one end immersed in the mercury and the other opening into the vacuum-chamber, substantially as described.

6. In an apparatus for electrically treating strips of carbon in a partial vacuum, the combination of a vacuum-chamber, an electrical circuit including the carbon strips, a circuit-breaker in said circuit which consists of a spring contact-lever, a cup of mercury mounted on said contact-lever, together with a tube one end of which is immersed in the mercury, while the other end opens into the vacuum-chamber, substantially as described.

7. In an apparatus for electrically treating strips of carbon in a partial vacuum, the combination of the vacuum-chamber, an electrical circuit including the carbon strip, a circuit-breaker in said circuit operated by a quantity of mercury, together with a valve which controls the flow of vapor into the vacuum-chamber and which is controlled through gravitation by the same quantity of mercury, and a tube one end of which is immersed in the mercury, while the other end opens into the vacuum-chamber, substantially as described.

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

JAMES WARD PACKARD.

Witnesses:
A. P. SMITH,
CHAS. H. SONN.