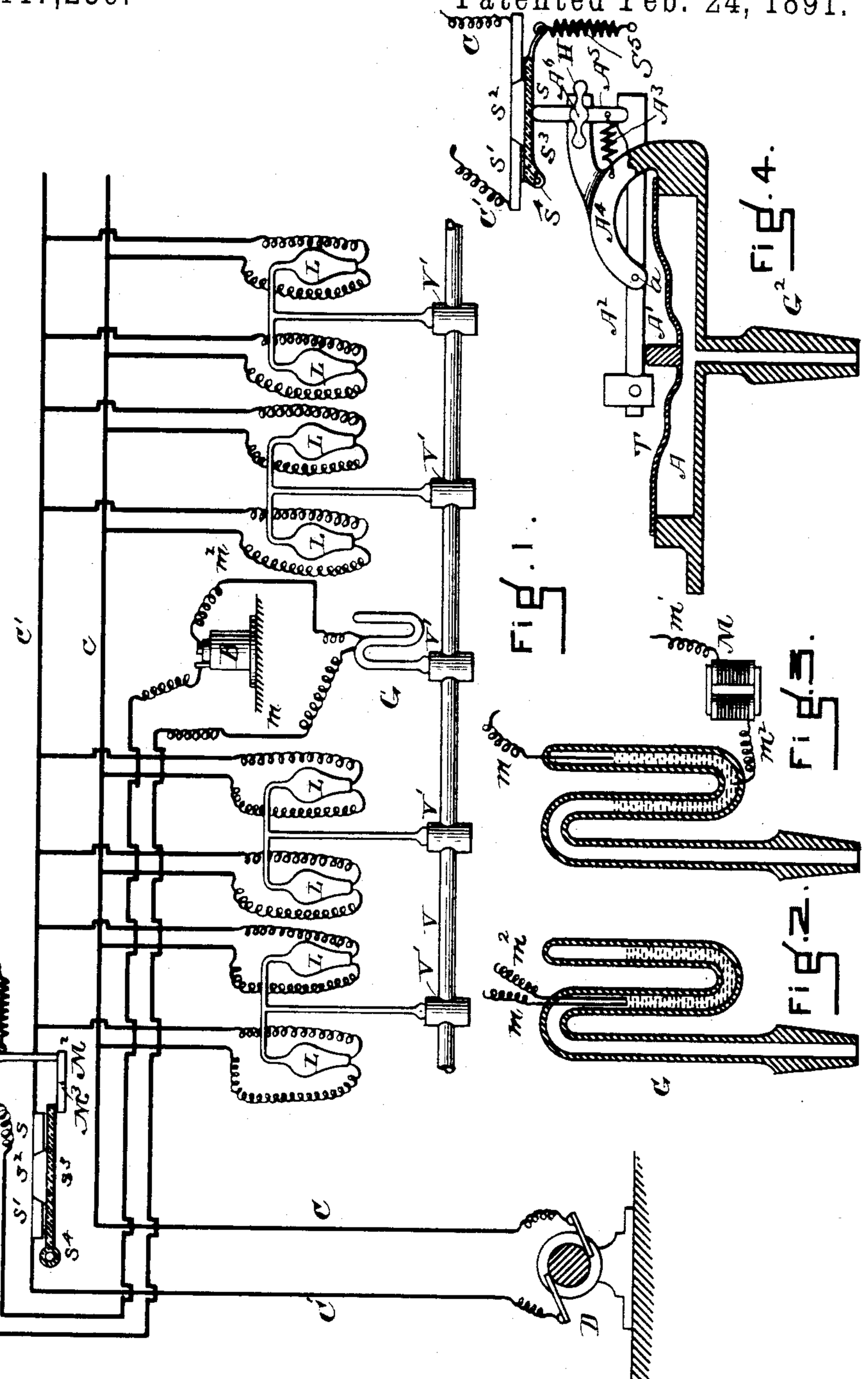
(No Model.)

W. E. NICKERSON & A. BERRENBERG.

APPARATUS FOR FLASHING AND EXHAUSTING INCANDESCENT ELECTRIC LAMPS.

No. 447,256. Patented Feb. 24, 1891.



WITNESSES

Frank G. Parker
William Edson

INVENTORS

William E. Nickerson
Adolph Berrenberg

UNITED STATES PATENT OFFICE.

WILLIAM E. NICKERSON, OF CAMBRIDGE, AND ADOLPH BERRENBERG, OF SOMERVILLE, MASSACHUSETTS, ASSIGNORS TO THE BEACON VACUUM PUMP AND ELECTRICAL COMPANY, OF PORTLAND, MAINE.

APPARATUS FOR FLASHING AND EXHAUSTING INCANDESCENT ELECTRIC LAMPS.

SPECIFICATION forming part of Letters Patent No. 447,256, dated February 24, 1891.

Application filed June 20, 1890. Serial No. 356,105. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM E. NICKERSON, of Cambridge, and ADOLPH BERRENBERG, of Somerville, in the county of Middlesex and State of Massachusetts, have invented new and useful Improvements in Pneumatic Electric Cut-Outs, of which the following, taken in connection with the accompanying drawings, is a specification.

This invention relates to apparatus by which a large number of lamps are exhausted of air at the same time and in which an influx of air into the vacuum system from the breaking of a lamp-globe or other cause would injure the heated filaments.

The object of this invention is to automatically cut out the current of electricity from incandescent lamps that are "running on the pumps" when from any cause air flows into them, as may happen from breaking or from inadvertent manipulation. This object is attained by means of the mechanism shown in the accompanying drawings, in which—

Figure 1 is a drawing, mainly diagrammatical, which serves to illustrate one method of putting this invention in practice. Figs. 2 and 3 are sectional views, enlarged, of a manometer, showing two methods of using an electro-magnet circuit. Fig. 4 is a view in section and elevation, showing a device that may be substituted for the manometer—that is, the aneroid form of barometer is used instead of the mercurial.

In the drawings, Fig. 1, L L represent a number of incandescent lamps connected by forks to the vacuum-pipe V by means of the socket-pieces V′ V′ and put in "multiple-arc" circuit by the line C C′ with the dynamo D.

The device for cutting out the current from the lamps L L consists of two terminals S S′ put into the main line C′ and a switch-piece S^2. This switch-piece S^2 is mounted on a drop-lever S^3, hinged at S^4, and so arranged that when unsupported by the tilting bar M^2, pivoted at M^3, it will drop and break the circuit at S S′, cutting out the lights L L.

The switch device above described may be operated by means of an auxiliary circuit, either from an independent generator—a battery B, for instance—or by a shunt-current taken from the main line. Another way to operate the switch-piece S^2 is to use an aneroid direct, as illustrated in Fig. 4.

For operating the cut-out by an electric current the following described device may be used: An electro-magnet M is connected to the battery B and the manometer G, all in series. Now so long as the mercury in the manometer G stands as indicated in Figs. 1 and 2 (that is, in the position that it will stand when there is very nearly a vacuum in the lamps) the ends of the wires m m^2 will be immersed in the mercury, an electric circuit will be maintained, and the swinging armature M′ will be held in place, which in turn will hold the tilting lever M^2 in place, and through it the switch S^2 in contact with the terminals S S′, thus maintaining the electric current through the lamps.

If air flows into the lamps from any cause, then the mercury in the manometer G falls from the ends of the wires m m^2 and the auxiliary circuit is broken and the armature M′ is drawn away by the spring M^4. This movement of the armature releases the tilting lever M^2, (pivoted at M^3,) and allows the switch-lever S^3 to fall, taking with it the switch-piece S^2, thus cutting out the lamps L L from the main electric current.

The above-described form embodies a closed circuit; but by slightly modifying the armature M′ and the lever M^2 an open circuit may be used, in which case the mercury in the manometer, Fig. 3, makes a contact for the wires m m^2 by flowing up the vacuum branch of the manometer, the wires m m^2 being placed as shown, Fig. 3, the action of the inflowing air being the same as before.

A method of operating the switch-piece S^2 by means of an aneroid is illustrated in Fig. 4. This method consists in holding the switch-piece S^2 in place by means of a lever A^5, pivoted at A^6 to the bracket A^4. This lever A^5 is locked in a vertical position by a notch formed in the weighted lever A^2, pivoted at a. The inner end of the lever A^2 rests on a stud A′, extending from the center of the movable diaphragm T of the aneroid A. The

action is as follows: The aneroid A is connected to the vacuum system by means of the socket-piece G^2 in the same manner that the manometer would be attached. Now if air flows into the vacuum system—that is, into the lamps, and consequently into the chamber of the aneroid A—the diaphragm T will at once, acting through the stud A′, throw the inner end of the lever A^2 upward and the notched end downward, so as to release the holding-lever A^5, which being actuated by the spring A^3 will swing on its axis A^6 and allow the switch-lever S^3 to drop and break the main circuit. The switching-lever A^5 has a handle H, by means of which it may be operated by hand when desired. Two forms of aerostat are shown—the mercurial manometer and the aneroid. Other forms can be used.

It is not intended to confine the invention to any particular mechanical means, as it allows of many variations in construction.

In brief, this invention is for a vacuum-gage in which an increase of pressure of air above a minimum standard operates a device by which the electric current passing through the filaments in the lamps is cut out, thus preventing the filaments in the lamps from injury while running on the pumps.

We use the expression "vacuum system" to designate a series of lamps that are being exhausted and such parts as may be required or used for connecting the said lamps to the exhaust-pump.

We claim—

In combination, one or more electric lamps connected to an exhaust apparatus, a main circuit for flashing the filaments of said lamps, a local circuit including a circuit-closing device operative upon admission of air to the exhaust apparatus, and a cut-out for the main circuit controlled by said local circuit, substantially as and for the purpose set forth.

WILLIAM E. NICKERSON.
ADOLPH BERRENBERG.

Witnesses:
FRANK G. PARKER,
WILLIAM EDSON.