(No Model.)

R. W. WILLSON.

DEVICE FOR MAKING AND BREAKING ELECTRIC CIRCUITS.

No. 271,560. Patented Jan. 30, 1883.

Fig. 1

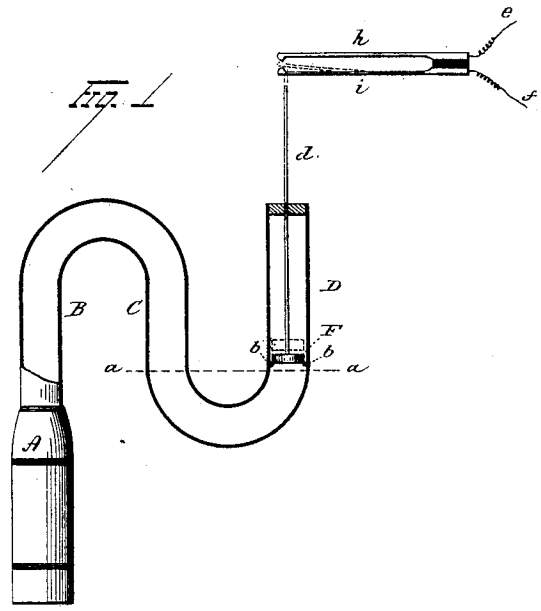
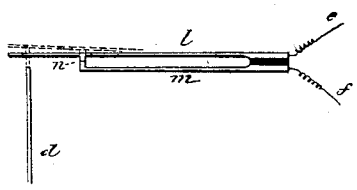


Fig. 2



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UNITED STATES PATENT OFFICE.

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DEVICE FOR MAKING AND BREAKING ELECTRIC CIRCUITS.

SPECIFICATION forming part of Letters Patent No. 271,560, dated January 30, 1883.

Application filed November 17, 1882. (No model.)

To all whom it may concern:

Be it known that I, ROBERT W. WILLSON, of New Haven, in the county of New Haven and State of Connecticut, have invented a new Improvement in Devices for Making and Breaking Electric Circuits; and I do hereby declare the following, when taken in connection with accompanying drawings and the letters of reference marked thereon, to be a full, clear, and exact description of the same, and which said drawings constitute part of this specification, and represent, in—

Figure 1, a vertical section of the device; Fig. 2, a modification.

This invention relates to an improvement in devices for giving a signal at one point from an impulse received at a distant point through a medium inclosed in a tube, with special reference to the employment of common gas mains and branches, or other medium in a similar arrangement of pipes or tubes, the object being to make or break an electrical circuit at or near the point where the signal is to be given, the signaling mechanism being in the said electrical circuit, and with special reference to synchronizing clocks, but applicable to other purposes; and my invention is an improvement upon the invention made by Leonard Waldo, whose application, Serial No. 69,962, was allowed October 11, 1882. The Waldo invention employs mercury or an equivalent fluid in a U-shaped tube, arranged so that the impulse will be received upon the surface of the mercury in one leg of the tube and cause the mercury to rise in the other leg of the tube and make electrical connection between the two wires of a circuit, the connection being made through the mercury or fluid in the tube. That invention, therefore, can only be used for the purpose of closing a circuit, and the fluid used in the tube must be such as to serve as an electrical conductor to close the circuit. A difficulty arises in the Waldo invention from the fact that as the fluid itself closes the circuit when the impulse is given the circuit must remain closed until the power which applied the impulse is removed, so as to permit the fluid to fall away from the points of contact which close the circuit; hence the extent of time of electrical contact is uncertain.

The object of my improvement is to adapt the device of Waldo to making or breaking an electrical circuit, and to avoid the necessity of making electrical connection through the fluid in the tube, and also to overcome the difficulty mentioned as existing in the Waldo invention. To this end my invention consists in a U or equivalent shaped tube filled with any suitable fluid to a level above the bend, one leg in connection with the medium through which the impulse is to be received, the other carrying a follower or piston, which will be raised by the fluid according to the impulse given, and in so rising will operate to bring the two ends of the circuit-wires into electrical contact or separate them to break the circuit, as more fully hereinafter described.

I illustrate the invention as applied to a supply-tube of a gas system in the manner of usually applying gas-burners, A representing the socket, which is attached to the gas-pipe, substantially the same as the gas-burner is applied. Opening from this socket, and consequently from the gas-pipe, is a tube, B, of any suitable material, which extends up a short distance and bent downward, then again upward, forming two vertical parallel legs, C and D, connected by a bend, E. Glycerine or any suitable fluid is introduced into the two legs, say, to a line *a a*.

In the leg D a piston, F, or any suitable follower, is arranged so as to stand upon a rest, *b*, provided for it inside the tube. This is best done by an internal annular rib, as shown. The piston should be of somewhat less diameter than the tube, so as to allow its free play, and also to permit the fluid to pass above it, as hereinafter described. The piston should be of a material of greater specific gravity than that of the fluid in the tube, so that when free it will sink in the tube upon its rest; or a lighter material may be used, and a spring applied of sufficient power to overcome the greater specific gravity of the fluid and force the piston to sink through the fluid. From the piston a rod, *d*, or other suitable device extends to make or break the connection. When the impulse is received through the medium in the pipes it comes directly upon the surface of the fluid in the leg C, forcing the fluid downward and correspondingly up-

ward in the tube D, and against the piston F in that tube D, which will rise with the fluid in proportion to the impulse imparted; but because the piston does not entirely close the tube D, the fluid, after the impulse has been given to the piston, will pass above the piston, permitting the piston to sink to its place of rest, notwithstanding the impulse may be held for a considerable length of time. The extent of time which the piston will be elevated will depend upon the extent of the aperture for the passage of the fluid above the piston and weight of piston, and this may be regulated or varied according to circumstances, so that, not withstanding the power which gives the impulse may be held applied for a considerable length of time, the piston will only stand above its place of rest a limited and predetermined time, and thereby I overcome one of the difficulties existing in the Waldo invention, as before stated.

To illustrate the adaptation of my invention to closing a circuit, I show in Fig. 1 the two wires *e f*, each in connection, respectively, with arms *h* and *i*, the two ends of the arms in a position over the rod *d*, but separated so as to break the circuit, the lower arm, *i*, elastic. When the impulse is given the piston F will rise, as indicated in broken lines, because the aperture for the fluid to pass the piston is so much less than the area of the rising fluid, its rod will strike the lower arm and carry it up into contact with the other arm, as seen in broken lines, and will there hold it until the piston sinks in the fluid sufficient to permit the separation of the two arms.

To illustrate the invention as applied for breaking a circuit, the two wires *e f* are connected respectively to arms *l m*. The two arms, in their normal condition, standing in connection, as at *n*, hold the circuit closed. The rod *d* operates upon the upper arm, *l*, and then when the piston rises, as before described, it will raise the arm *l* and break the circuit, as seen in broken lines, Fig. 2, and hold the circuit so broken until the piston sinks, as before described, and permits the two arms to come together. This illustration of the method of applying the invention to closing and breaking a circuit will be sufficient to enable those skilled in the art to apply other mechanism to be operated upon by the rising piston.

By the term "U-shaped tube" I wish to be understood as including any equivalent shape which will produce the two legs, in one of which the impulse will be received, and that impulse imparted through a medium between that leg and the other leg to a piston inside the other leg.

While I prefer to construct the piston so as to form a passage for the fluid from below, the piston may substantially fill the tube and prevent the fluid from passing above it; but in such case the connection made or impulse imparted by the piston will continue until the fluid raised by the impulse falls, and so as to permit the descent of the piston.

Instead of imparting the impulse received by the piston to make and break an electrical circuit, which is the principal object of my invention, and by such electrical circuit to synchronize clocks or give any signal that may be required, the device may be applied directly to the mechanism of the clock, and so that the movement of the piston by the impulse imparted will operate the mechanism of the clock without electrical connections—as, for illustration, to the clock described in my application for patent, Serial No. 66,500, allowed September 5, 1882. I therefore do not wish to be understood as limiting my invention to making and breaking electrical circuits.

I claim—

1. The herein-described device for imparting an impulse received through gas or similar medium, consisting of a U-shaped tube filled with a fluid to a level in each leg above the bend, one leg in connection with the medium through which the impulse is to be received, a piston arranged in the other leg, and so as to move freely therein, and whereby the impulse received in one leg of the U will cause the said piston to rise in the other leg, combined with mechanism, substantially such as described, to impart the impulse so received by the piston, substantially as specified.

2. The herein-described device for imparting an impulse received through gas or similar medium, consisting of a U-shaped tube filled with a fluid to a level in each leg above the bend, one leg in connection with the medium through which the impulse is to be received, a piston arranged in the other leg, and so as to move freely therein, and whereby the impulse received in one leg of the U will cause the said piston to rise in the other leg, the said piston constructed to form a passage to permit the fluid to flow above it, substantially as described.

3. The herein-described device for imparting an impulse received through gas or similar medium, consisting of a U-shaped tube filled with a fluid to a level in each leg above the bend, one leg in connection with the medium through which the impulse is to be received, a piston arranged in the other leg, and so as to move freely therein, and whereby the impulse received in one leg of the U will cause the said piston to rise in the other leg, the tube constructed with a rest, on which it will be supported, the said piston constructed to form a passage to permit the fluid to flow above it, substantially as described.

4. The herein-described device for automatically breaking and closing an electrical circuit by means of an impulse through gas or similar medium, consisting of a U-shaped tube filled with a fluid to a level in each leg above the bend, one leg in connection with the medium through which the impulse is to be received, a piston arranged in the other leg, and so as to move freely therein, and whereby the impulse received in one leg of the U will cause the said

piston to rise in the other leg, combined with mechanism, substantially such as described, between said piston and the electrical circuit, whereby the rising of the piston will close or break the circuit, as the case may be, substantially as specified.

5. The herein-described device for automatically breaking and closing an electrical circuit by means of an impulse through gas or similar medium, consisting of a U-shaped tube filled with a fluid to a level in each leg above the bend, one leg in connection with the medium through which the impulse is to be received, a piston arranged in the other leg and supported therein, but so as to be freely moved in said leg, and whereby the impulse received in one leg will be imparted through the fluid to cause a corresponding movement of the piston, combined with mechanism, substantially such as described, between the said piston and the electrical circuit, whereby the raising of the piston will close or break the circuit, as the case may be, substantially as described.

6. The herein-described device for automatically breaking and closing an electrical circuit by means of an impulse through gas or similar medium, consisting of a U-shaped tube filled with a fluid to a level in each leg above the bend, one leg in connection with the medium through which the impulse is to be received, a piston arranged in the other leg, and so as to move freely therein, and whereby the impulse received in one leg of the U will cause the said piston to rise in the other leg, the said piston constructed to form a passage to permit the fluid to flow above it, combined with mechanism, substantially such as described, between said piston and the electrical circuit, whereby the raising of the piston will close or break the circuit, as the case may be, substantially as described.

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