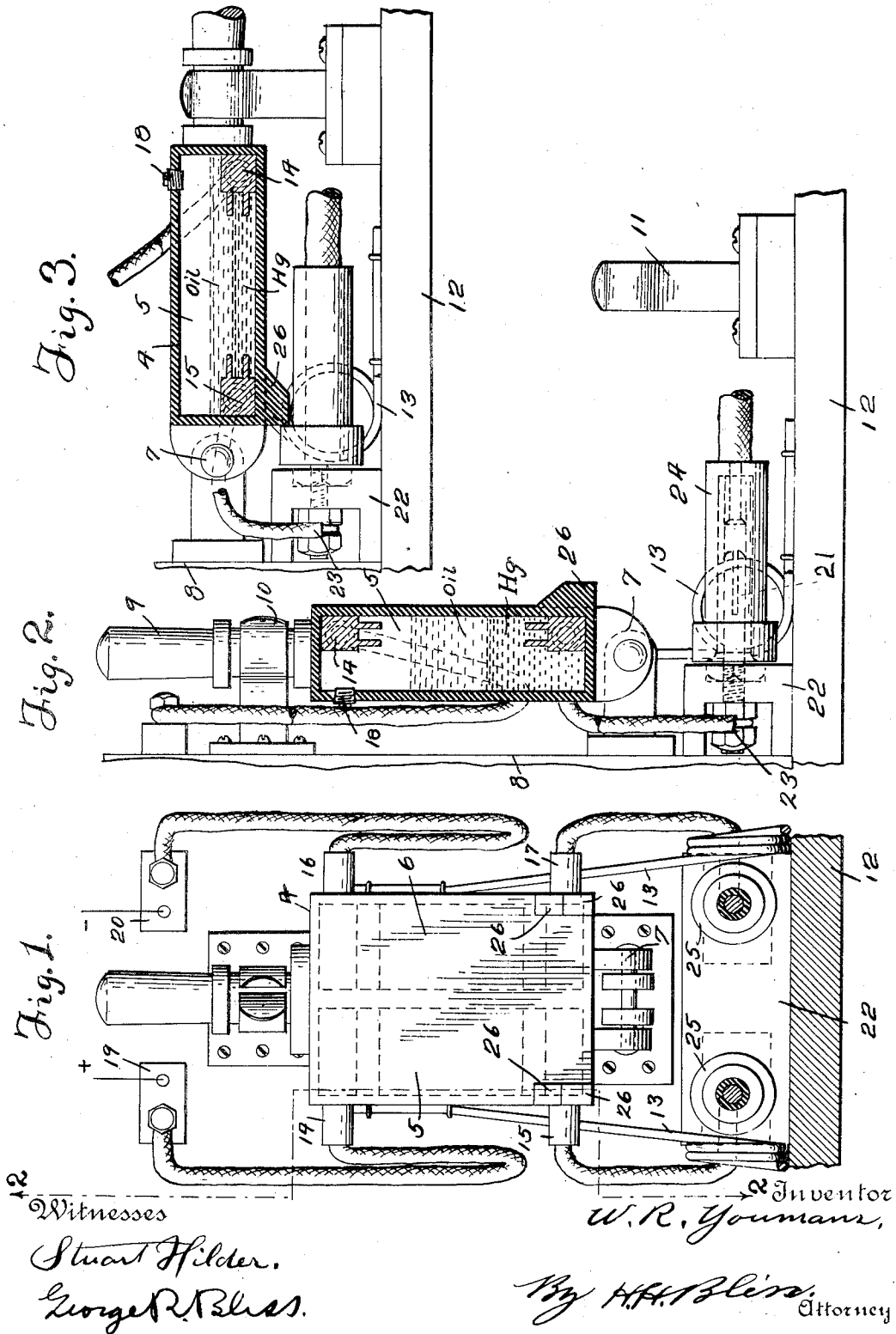


W. R. YOUMANS.
 FLAME PROOF SWITCH.
 APPLICATION FILED FEB. 26, 1910.

1,042,865.

Patented Oct. 29, 1912.



UNITED STATES PATENT OFFICE.

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FLAME-PROOF SWITCH.

1,042,865.

Specification of Letters Patent.

Patented Oct. 29, 1912.

Application filed February 26, 1910. Serial No. 546,171.

To all whom it may concern:

Be it known that I, WILLIAM R. YOU-
MANS, a citizen of the United States, resid-
ing at Columbus, in the county of Franklin
and State of Ohio, have invented certain
new and useful Improvements in Flame-
Proof Switches, of which the following is a
specification, reference being had therein to
the accompanying drawing.

This invention relates to safety devices
for use in connection with electrical systems
and appliances used in mines where danger
from explosive gases exists or may arise.

As is well known to those accustomed to
the use of electrical appliances, the inter-
ruption of a current produces sparking and
sparks or arcs so produced will ignite any
inflammable gas that may be present. It
therefore becomes necessary to guard
against any possible arcing or sparking in
the use of electrical machinery, systems or
appliances in coal mines or in any other
mines or places where explosive gases may
exist or are liable to form. In the opera-
tion of electric drills or electric cutters or
other electrically driven mining machines or
mechanism in coal mines, especial care must
be exercised to prevent sparking, particu-
larly at the power switches, and it is with
switches of this kind that the present inven-
tion is chiefly concerned.

The best possible means for guarding
against the evil effects of arcing or sparking
on the breaking of circuit is to prevent such
arcing or sparking, or at least to reduce it
to the minimum, and then thoroughly shield
the arcing terminals from the presence of
the explosive gases. This may best be ac-
complished by inclosing the circuit ter-
minals in a suitable chamber and using in
connection therewith a preventive or re-
ducer of arcing or sparking. The means de-
vised for this purpose provide for making
and breaking the circuit through the agency
of mercury movable into and out of connec-
tion with the inclosed terminals, and of cov-
ering the mercury by an arc preventing or
minimizing liquid such as oil, the device so
operating that the oil flows in between the
terminals as the mercury recedes. Should,
however, an arc then chance to form, it is
immediately extinguished by the oil and
furthermore it being wholly inclosed from
any gases that may surround the switch it
can do no harm.

The invention therefore consists in the
structure of parts and their combination and
association for the purpose specified sub-
stantially as hereinafter set forth and
claimed.

In the accompanying drawings which
form a part of this specification, Figure 1
represents, in front elevation, a circuit open-
ing and closing switch designed to accom-
plish the purpose of this invention; Fig. 2
represents a transverse section through a
portion of the device seen in Fig. 1, such
section being taken in the plane indicated
by the line 2—2; and Fig. 3 is a similar
view with the movable member of the switch
thrown down into circuit closing position.

The switch illustrated is of the two-pole
type and is designed for use as a mine entry
switch to which the terminals of mining ma-
chine cables may be attached and detached
at will. It is intended to be so mounted or
so fixed in position that the movable part
thereof shall take a vertical or upright posi-
tion when the circuit is open, and that said
part must be moved to a horizontal or re-
clining position to close the circuit. This
movable part of the switch is indicated at 4.
It consists of a box-like receptacle formed
of some suitable insulating material and is
divided into two compartments or cells 5
and 6. This receptacle is hinged at 7 to a
vertical support 8 and is provided with a
handle 9 for moving it from vertical to hor-
izontal position. A spring clip, as 10, is pro-
vided on the vertical support for holding
said receptacle in upright position and a
similar clip 11 is mounted on the horizontal
support 12 for holding the receptacle in re-
clining position. Springs, as 13, are pro-
vided for moving the receptacle to the ver-
tical position when its handle is released
from the clip 11.

In each cell of the receptacle 4 and at the
ends thereof are located circuit terminals.
In cell 5 are the terminals 14 and 15 of the
positive side of the circuit and in cell 6 are
terminals 16 and 17 of the negative side of
the circuit. They are also located against
that side of the receptacle which is lower-
most when the receptacle is in reclining or
horizontal position so that the mercury, Hg,
in each cell may readily connect associated
terminals as indicated in Fig. 3. These ter-
minals may have their contacting surfaces
extended as by ribs or fins as indicated.

The mercury and oil may be put into the cells through stoppered openings as indicated at 18. Obviously, if a switch is designed for one branch only of a circuit, the receptacle 4 would be made with but one cell, therefore the number of cells in the receptacle 4 will be governed by the number of circuits or branches of circuits to be controlled.

The switch may be coupled to the feeders, as at 19 and 20. To provide for coupling mining machines to the switch, any suitable connectors may be used and either part thereof fixed at the switch. In the form illustrated, split fingers, as 21, are fixed in place at the switch, as in the blocks 22, and to these fingers are connected the switch circuits as indicated at 23. The cables leading from the mining machines are then provided with the sockets of the connectors as represented at 24, to be placed upon said fingers. Here is another place where sparking must be guarded against and prevented. The present switch is designed to accomplish this end also. Therefore the sockets 24 are provided with collars 25, and on the outer, lower corners of the receptacle 4 are provided lugs or stops 26, which engage with said collars 25 when the sockets are in place and the switch is in circuit closing position. The sockets cannot be removed while current is on, nor can they be applied to the fingers while current is on, since lugs 26 will prevent either act so long as the handle 9 is in clip 11.

In the operation of the switch, the circuit breaking position is the vertical or upright position of the part 4, Figs. 1 and 2; the mercury being then at the lower end of the cells and the terminals 14 and 16 being completely separated from the terminals 15 and 17. The circuit closing position is the horizontal or reclining position of part 4. Then the mercury has spread to the contacts 14 and 16 and completed both branches of the circuit. The switch has also locked the sockets 24 of the mining machine terminals to the switch terminal plugs 21. To remove the terminals of the mining machine from the switch, as in taking the machine to another gallery or chamber, the handle 9 of the part 4 must be released from the clip 11, when the springs 13 will carry said part upward and handle 9 will enter clip 10. The sockets may then be removed with safety because the circuit is broken. In the breaking of the circuit, as the mercury recedes from the terminals 14 and 16, the oil flows immediately against them, thereby interposing an insulation between the mercurial contact and said terminals, and instantly extinguishing any arc that might possibly form.

Though the invention has been described with specific reference to mines, it is appli-

cable wherever arcing or sparking is to be rendered innocuous at switch terminals and prevented at the connectors or binding posts of the switch.

The invention claimed is:—

1. In an electric switch, the combination with a swinging part for effecting the opening and closing of the circuit through the switch, of connector fingers at the switch, terminal sockets fitted to said fingers and provided with exterior collars, said movable part of the switch being provided with lugs for engaging said collars to prevent separation of the connectors when the switch is in circuit-closing position, means for holding said movable part of the switch in circuit-closing position, and springs for throwing said movable part into circuit-breaking position upon its release from said holding means, thereby insuring the breaking of the circuit by the switch before the connectors can be separated.

2. In an electric switch, the combination of a movably mounted flame proof casing, conductor wires leading to the interior of the casing, an automatically acting circuit making and breaking means inside of the casing, connection between the said conductor wires being broken when the casing is in one position and established when the casing is in another position, a stationary conductor terminal to which one of the said conductor wires is connected, a movable conductor terminal adapted to engage the stationary conductor terminal, and a lug on the said casing for holding the movable terminal in engagement with the stationary terminal when the casing is in position to cause connection to be established between the conductor wires.

3. In an electric switch, the combination of a movably mounted casing, electrical contacts within the casing and separated from each other, conductor wires connected respectively with the said contacts, mercury within the casing serving to electrically connect the contacts when the casing is in one position, the contacts being normally insulated from each other, a stationary conductor terminal connected with one of the said conductor wires, a movable conductor terminal adapted to engage the said stationary terminal, and a lug on the casing adapted to engage the movable terminal to lock it in engagement with the stationary terminal when the casing is in position to cause the mercury to establish connection between the contacts.

4. In an electric switch, the combination of a pivotally mounted element, two conductor wires, circuit making and breaking means serving to make electrical connection between the wires when the element is in one position and to break the connection when the element is in another position, a

stationary terminal connected with one of
the wires and extending in a direction
parallel with the said element when the
latter is in the position in which electrical
5 connection is established between the wires,
and a movable conductor terminal adapted
to telescopically engage the stationary ter-
minal and having a part in position to be
engaged by the pivotally mounted element
10 to hold the terminals in engagement with

each other when the said element is in posi-
tion for the establishment of the electrical
connection.

In testimony whereof I affix my signa-
ture, in presence of two witnesses.

WM. R. YOUMANS.

Witnesses:

ROBERT R. DUNLOP.

N. D. LEVIN.