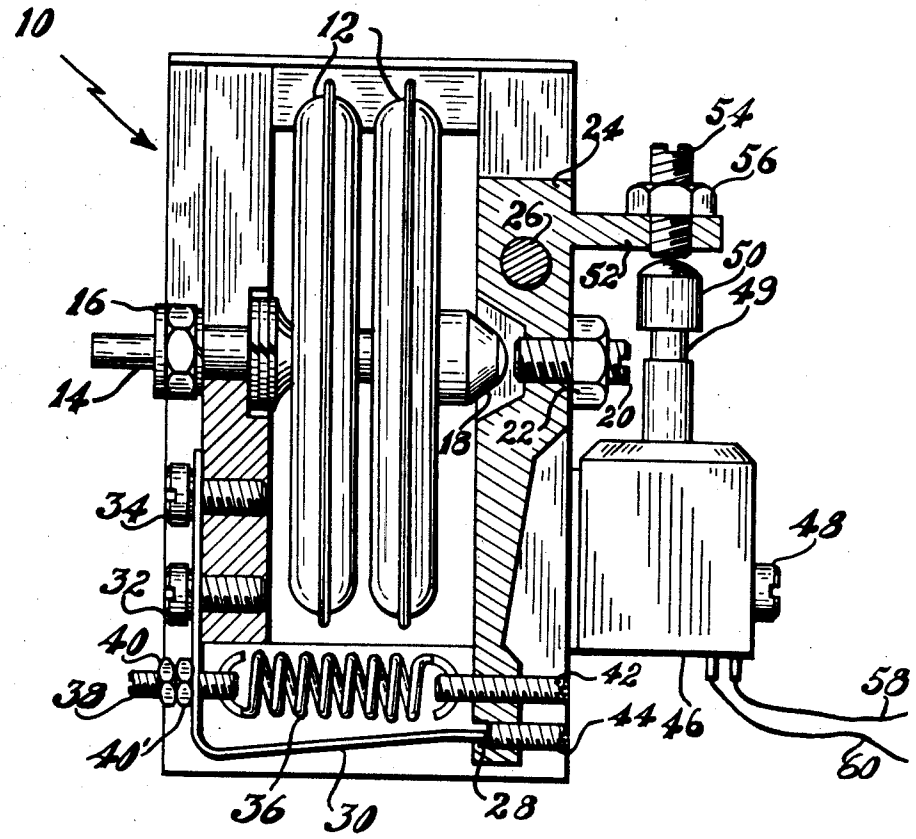
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SAFETY BAROSWITCH

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SAFETY BAROSWITCH

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The invention described herein may be manufactured and used by or for the United States Government for governmental purposes without payment to me of any royalty thereon.

This invention relates to a barometric pressure responsive switch with pressure-controlled means which, as illustrated herein, prevents closure of the switch points until a predetermined altitude has been reached in ascent but permits closing the contacts at a predetermined altitude on descent.

In balloon flights carrying instruments, it is frequently desirable to have the balloon go as high as possible and this invention would be useful in releasing a load, which might well be attached to a parachute, after a balloon has passed a predetermined altitude and on descent again reaches the predetermined level.

It will be particularly useful, where a balloon has burst after passing a predetermined altitude, to release the load on descent and prevent entanglement with the balloon debris.

It is an object of this invention to provide a simple, trouble-free mechanism which complies with a CAA requirement concerning balloon flights.

It is a further object of this invention to provide a self-arming device consisting of a safety latch controlling a switch arm actuated by a barometric responsive bellows which switch arm on release, permits closure of contacts of a micro switch to complete an electrical circuit actuating any one of a number of conventional parachute or load releases.

The drawing is a cross-sectional view of the invention showing the essential elements.

The body or frame **10** can be of any suitable metal such as aluminum. A conventional bellows **12**, which may be partially evacuated, is responsive to barometric pressure as will later become apparent. The bellows **12** is secured in the frame **10** by a threaded stud **14** and locknut **16** and is provided on its free end with an extension **18**. A switch arm **24** is pivoted on a pin **26** and carries opposite the bellows extension **18** an adjustment screw **20** held in adjusted position by a locknut **22**. Near the lower end of switch arm **24** is a slot or notch **28** which receives the free end of a tensioned safety latch spring **30**. The spring **30** is secured to the frame **10** by suitable machine screws **32** and **34** and is provided with an adjustment screw **38** held in place by locknuts **40** and **40'**. A coiled spring **36** is held under tension by adjustment screw **38** and an adjustment screw **42** which is threaded in the lower end of the switch arm **24**. An adjustment screw **44** is threaded in the lower end of the switch arm **24** communicating with the notch **28** to adjust the depth that the end of the safety spring **30** enters said notch **28**. A micro switch **46** is fastened to the frame **10** by a screw **48** and is provided with push button **49** and an extension **50**. An extension **52** of the switch arm **24** has threaded therein an adjustment screw **54** opposed to the micro switch extension **50** and maintained in adjusted position by a locknut **56**. Leads **58** and **60** are provided for connecting the micro switch **46** to a suitable source of electric power.

In operation, the switch arm **24** is held in the safety position shown in the drawing by the tension of the spring **36** against the end of the safety latch spring **30** which rests in the notch **28**. When the device is carried by the balloon to the predetermined altitude, which is set by adjustment screw **20**, the expansion of the barometric bellows **12** forces the bellows extension **18** against the screw **20** to swing the lower end of the switch arm **24** to the right. The free end of the flexed safety latch spring **30** is removed from the notch **28** whence its spring action carries it to a position below the said switch arm. This so conditions the device that the switch arm **24** is free to move to the left whenever the tension of main spring **36** is greater than the expansion force of the bellows **12**. As the device falls to a lower level, the bellows **12** contracts and the main spring **36** pulls the switch arm **24** to the left forcing the adjustment screw **54** against micro switch extension **50** closing the switch contacts and thus activating the releasing apparatus.

This invention has many features which make it invaluable for use in balloon flights. The altitude at which the safety switch can be set is limited only by the capability of the barometric bellows **12**. The mechanical design is such that the invention allows adjustment to any altitude between sea level and excess of 70,000 feet. The safety spring **30**, held in position by the coiled main spring in the notch **28** of the switch arm **24**, insures stability and prevents premature operation of the device by accidental shock or jars in handling and in flight.

Having thus described my invention what I claim as new and desire to secure by Letters Patent of the United States is:

1. A circuit controlling device comprising a supporting frame, a gas-filled bellows fixed to said frame and having a portion movable relatively thereto in response to variations in barometric pressure, an arm pivoted in said frame for movement in response to a predetermined barometric pressure, a spring latch normally preventing movement of said arm toward said bellows, spring means for normally maintaining said arm and said latch in engagement until said arm is swung by said bellows in response to movement of said bellows upon reaching a predetermined barometric pressure, said spring latch being biased in a direction to prevent subsequent reengagement of said latch and arm after movement of said arm in response to movement of said bellows, a circuit controlling switch, and an extension on said arm arranged to actuate said switch when the biasing pressure on said arm from said biasing means exceeds the pressure of said bellows on said arm and upon returning to said predetermined barometric pressure.

2. A pressure-responsive device including a self-arming device consisting of a frame of any suitable metal, a bellows sensitive to barometric pressure secured by one end thereto, an extension on the free end of said bellows, a lever arm pivoted on said frame and having a slot in one end thereof, an adjustable screw secured in said lever arm opposed to said extension on said bellows, a spring latch supported in said slot, a spring biasing said lever arm against said spring latch and opposed to the expansion of said bellows, an extension on said lever arm, and a micro switch with a plunger arm opposed to said extension of said lever arm, said micro switch to be actuated when the device has reached or passed a predetermined altitude and on descent again reaches said altitude.

3. In a switch sensitive to barometric pressure for actuating a device for releasing a load from a balloon after it has reached and passed a predetermined altitude, a

frame, a micro switch secured thereto, a lever arm free to move on a pivot in said frame, an extension on said lever, a main spring biasing said lever to move said extension toward said micro switch, a safety latch spring to hold said lever arm in position away from said micro switch, and an expansion bellows opposed to the tension of said main spring, said bellows being arranged to expand at a predetermined altitude to release said safety

latch spring and to permit the said lever arm to actuate said micro switch on descent to the predetermined level.

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