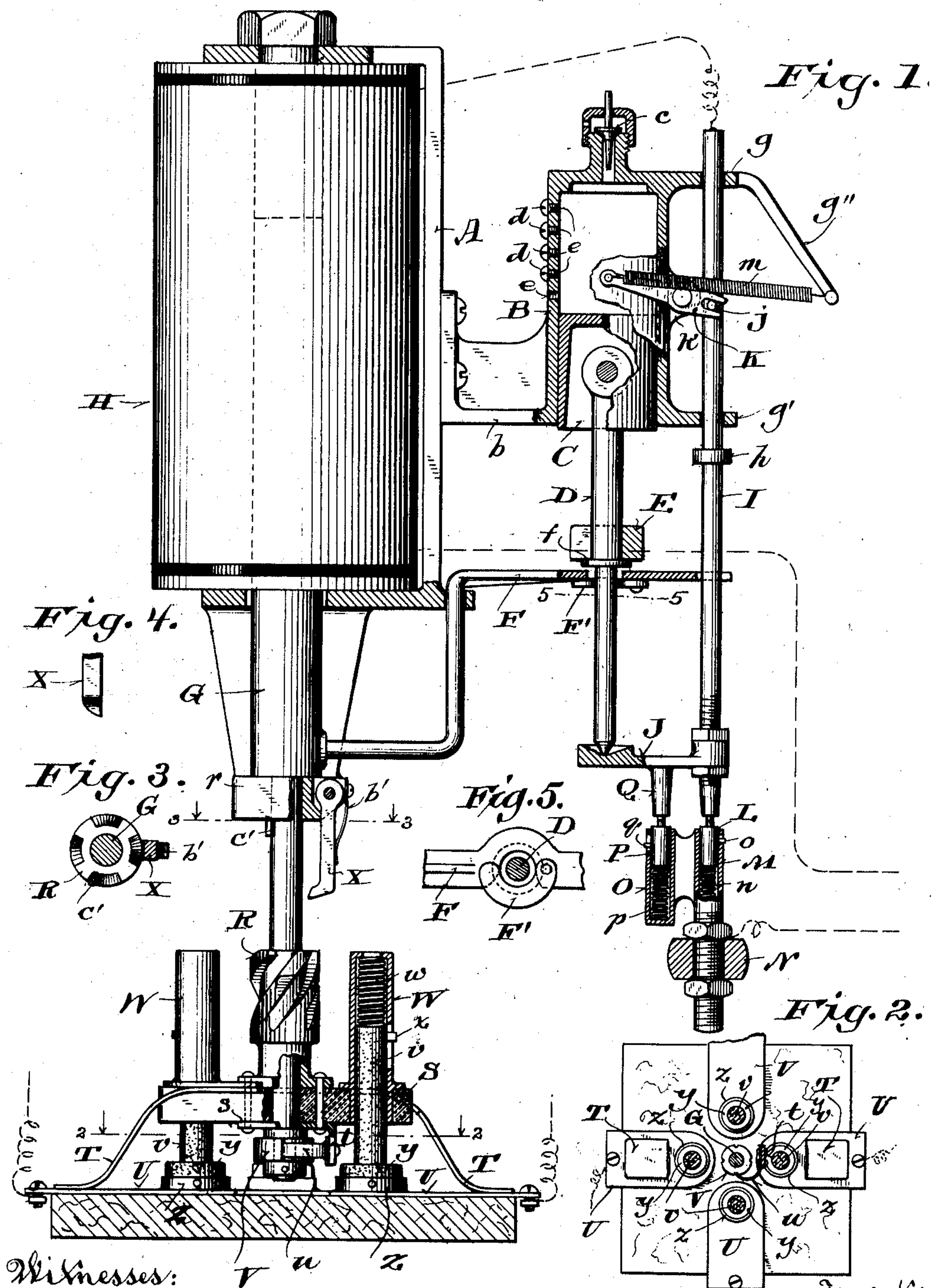


No. 880,617.

PATENTED MAR. 3, 1908.

C. BACH, JR.  
ELECTRIC CIRCUIT CONTROLLER.  
APPLICATION FILED DEC. 13, 1906.



Witnesses:

Wm. Palm

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# UNITED STATES PATENT OFFICE.

CHRISTOPHER BACH, JR., OF MILWAUKEE, WISCONSIN.

## ELECTRIC-CIRCUIT CONTROLLER.

No. 880,617.

Specification of Letters Patent.

Patented March 3, 1908.

Application filed December 13, 1906. Serial No. 347,604.

*To all whom it may concern:*

Be it known that I, CHRISTOPHER BACH, Jr., a citizen of the United States, and resident of Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Electric-Circuit Controllers; and I do hereby declare that the following is a full, clear, and exact description thereof.

My invention consists in what is herein shown, described and claimed; its object being to provide simple, economical and efficient means for automatic opening and closing of an electric-circuit at regular predetermined intervals of time, and the application of a rotary adjustable switch in connection with the means aforesaid for opening and closing other similar circuits, the apparatus being especially designed for the control of flash-light circuits of illuminating display signs and the like.

Figure 1 of the drawings represents an elevation of an apparatus in accordance with my invention having parts thereof partly broken away and in section, Fig. 2, a horizontal section view indicated by lines 2—2 in Fig. 1, Fig. 3, a detail horizontal section view indicated by line 3—3 in Fig. 1, Fig. 4, a view of a fragment of a guide-finger constituting part of the apparatus, and Fig. 5, a horizontal section view indicated by line 5—5 in Fig. 1.

Referring by letter to the drawings, A indicates a bracket attachable to any suitable support, and secured to the bracket is an arm *b* of a vertically disposed cylinder B that may be otherwise supported. The cylinder is provided at its upper end with an air-outlet port controlled by a suitably caged check-valve *c*, the lower end of said cylinder bei *g* open. Fitting the cylinder is a hollow piston C, and the shell of said cylinder is provided with a series of upper apertures at suitable intervals apart in a vertical direction, all but one of these apertures being normally plugged by screws *d* or otherwise. Air is admitted to the cylinder, above the piston, through the open aperture *e*, and said piston has a shouldered stem D in preferably pivotal connection therewith. This pivotal connection of the stem provides for automatic adjustment of the same at all times to true vertical position and prevents cramping of said piston in its cylinder. The shoulder of the piston-stem is extended to form a flange *f*, and a weight E of more or less specific

gravity may be engaged with said stem at rest on the flange of same to hasten descent of the piston. That portion of the piston-stem below the shoulder and flange of same extends through an aperture in the upper horizontal portion of a double right-angle arm F, the vertical portion of this arm being guided in an aperture of the bracket A and its lower horizontal portion attached to a shouldered core G that reciprocates in a solenoid H supported by said bracket. To facilitate the removal of the stem or its attachment to the piston, the arm-aperture engaged by said stem may be provided with a swing-closure F, as is best shown in Fig. 5.

Guided in lugs *g*, *g'*, of the cylinder and loose in the upper horizontal portion of the arm F is a circuit-closing rod I provided with a collar *h* in the ascending path of said arm. The rod is provided with a tappet J in the descending path of the piston-stem D and a lug *j* of said rod engages the slotted or forked end of a lever K in fulcrum connection with a lug *k* of the cylinder. One end of a spiral-spring *m*, under tension, is connected to the end of the lever furthest from its fulcrum, and the other end of this spring is connected to a lug-arm *g''* of the cylinder or otherwise, as found most convenient, said lever being always beyond dead center when at rest to temporarily hold the rod I at extreme throw in opposite direction. The lower contact-end of the rod closes on a contact-plug L supported on a spiral-spring *n* in the upper socket-end of a socket-stem M that is in preferably vertically adjustable engagement with a bracket N, the shank of said stem being shown as exteriorly screw-threaded and having set-nuts run thereon in opposition to said bracket above and below the same. The play of the spring-controlled contact-plug L is limited, by the engagement of a lug *o* of same with a vertical slot of the stem M, and a socket-wing O of this stem contains another contact-plug P supported on a spiral-spring *p*, play of the latter plug being limited, by the engagement of a lug *q* of same with a vertical slot in said wing. The slot in the wing O is of greater length than the one in the stem M to permit ascent of the spring-controlled contact-plug P after the ascent of the other contact-plug L, and a contact-point Q depending from the tappet J opposes the plug P aforesaid.

The descent of the core G is limited by a foot *r* of the bracket A in the downward path



of the core-shoulder, and loose on the lower reduced portion of said core is a spirally-grooved hub R and an insulating-block S of a rotary-adjustable electric-switch, the opposite spring blades T of which switch close on contact-plates U of electric-circuit terminals, these contact-plates being supported on a suitable insulating-base. Depending from a hub-plate s of the switch is an arm t to which a spring-detent u is connected, and this detent engages a ratchet-hub V fast on the core aforesaid to lock the switch in adjusted position, said switch being supported on said ratchet-hub. The insulation-block S of the switch is provided with upwardly extending holders w for carbons v and spiral-springs w under tension against the same, these carbons being guided and held against rotary motions, by lugs x in engagement with vertical slots in said holders. Opposing the carbons v are other carbons y for which seats z are provided on the contact-plates U aforesaid, said carbons serving to prevent sparking in the switch.

In depending pivotal connection with the foot r of the bracket A is a finger X yieldingly held in normal vertical position by a spring b, and the lower end of said finger is inwardly offset to be engaged by some one of the several vertically disposed spiral-grooves in the switch-hub R when the core G is elevated, as a result of energization of the solenoid H aforesaid, and thus a rotary adjustment of the switch is effected. A stop-pin c', depending from the bracket-foot r is caught in another of the spiral-grooves of the hub R to prevent overrunning of the rotary adjustable switch. The solenoid, reciprocating circuit-closing rod, and stem M aforesaid are in the same electric-circuit independent of those having the contact-plates aforesaid for their terminals, the wiring of the several circuits being indicated by dotted lines.

Fig. 1 represents the apparatus at the instant of closing of the solenoid-circuit, and as a result of the energization of the solenoid, the core G will be run up rapidly causing the arm F therewith to lift the piston C, and at about the time said piston completes its upstroke said arm operates to lift the rod I to break said circuit. In the meantime, the rotary adjustable switch has been lifted to break one circuit and adjusted to subsequently close another circuit. The spring-controlled contact-plugs L, P, follow the rod I and its tappet J on their ascent, the contact of the plug P with the point Q being longer than the contact of the plug L with the lower contact-end of said rod, and thus sparking is confined to the auxiliary contacts. The solenoid-circuit having been broken, the core G and rotary adjustable switch therewith have immediate gravity descent, but the descent of the piston C is retarded by the partial vacuum occurring in the cylinder B until

such time as it uncovers an unplugged aperture in said cylinder, at which time its descent is accelerated to cause forcible impact of its stem D on the tappet J and a then sudden closing of the aforesaid solenoid-circuit the above described operations being repeated indefinitely at regularly recurring intervals of time, the interval between the breaking and closing of the solenoid-circuit being more or less rapid according to which one of said cylinder apertures is left unplugged.

I claim:

1. The combination of a vertically disposed solenoid, a vertically movable contact-rod by which the solenoid-circuit is made and broken, guides for the rod, means for holding said rod temporarily at extreme throw in opposite directions, a vertical cylinder open at the bottom, a piston having independent retarded gravity descent in the cylinder and provided with a depending stem, a tappet extending from the aforesaid rod in the descending path of the piston-stem, a core movable in the solenoid, and a stem-and-rod lifting arm in connection with the core to have reciprocation therewith, the lift of the rod being concurrent with the completion of an upstroke of the piston.

2. The combination of a vertically disposed solenoid, a vertically movable contact-rod by which the solenoid circuit is made and broken, guides for the rod, means for holding said rod temporarily at extreme throw in opposite directions, a vertical cylinder open at the bottom, a piston having temporarily retarded gravity descent but thereafter free to suddenly complete its downstroke, a stem depending from the piston, a tappet extending from the aforesaid rod in the descending path of the piston-stem, a core movable in the solenoid, and a stem-and-rod lifting arm in connection with the core to have reciprocation therewith, the lift of the rod being concurrent with the completion of an upstroke of the piston.

3. The combination in an automatic electric-circuit controller of a vertical cylinder open at the bottom and provided with a series of upper apertures at suitable intervals apart in a vertical direction, removable stoppers closing all but a predetermined one of said apertures, a piston having retarded descent in the cylinder until such time as it uncovers the open aperture of same, and circuit make-and-break mechanism controlled by the movement of the piston.

In testimony that I claim the foregoing I have hereunto set my hand at Milwaukee in the county of Milwaukee and State of Wisconsin in the presence of two witnesses.

CHRISTOPHER BACH, JR.

Witnesses:

N. E. OLIPHANT,  
GEORGE FELBER.