June 24, 1941. W. H. FRANK ET AL 2,247,194

CIRCUIT BREAKER

Filed Feb. 21, 1940

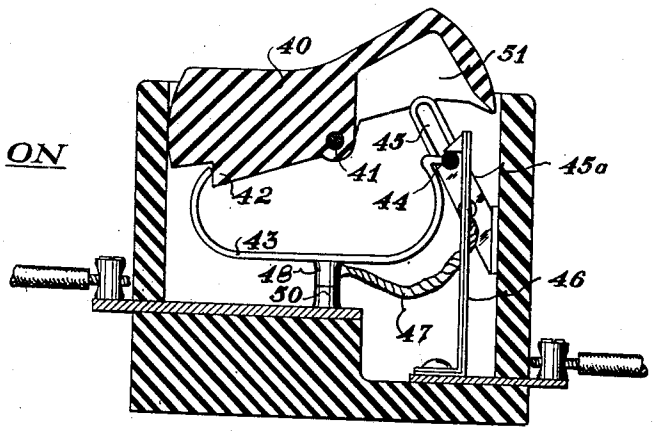
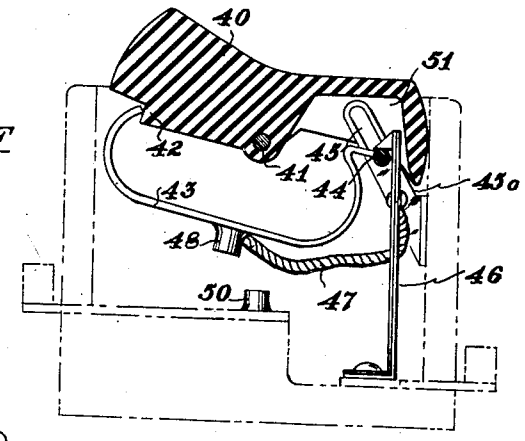


Fig. 1



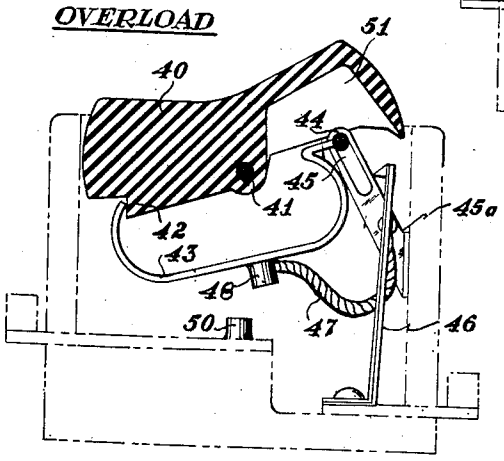


Fig. 2

Fig. 3

INVENTORS
William H. Frank
Elwood J. Platz
Daniel G. Cullen

BY

ATTORNEY.

Patented June 24, 1941 2,247,194

UNITED STATES PATENT OFFICE

2,247,194

CIRCUIT BREAKER

William H. Frank and Elwood T. Platz,
Detroit, Mich.

Application February 21, 1940, Serial No. 320,116

18 Claims. (Cl. 200—116)

This application relates to manually operable switches or circuit breakers.

The object of the invention is to produce a breaker operating like that disclosed in a prior application, Serial No. 217,632, filed July 5, 1938, but of far simpler construction, as may best be understood on reference to the appended drawing, in which—

Figs. 1–3 show the switch parts in closed circuit, open circuit, and overload released positions, respectively.

Referring to the drawing, it will be seen that this shows a handle **40** pivoted at **41** to a casing and connected at **42** to one end of a leaf spring **43** whose other end is connected to a cross piece **44** arranged to have its ends ride in slots **45** formed in brackets **45***a* mounted on a side of the casing and adapted to be held by a circuit responsive bimetal latch **46** connected through a flexible connection **47** to a movable contact **48** suitably mounted on the spring **43**, with the movable contact mating with a stationary contact **50** for butt contact. The handle is formed with resetting portions **51** arranged to straddle the spring **43** and brackets **45***a* and engage the ends of cross piece **44** outside the brackets.

When the handle is in the closed circuit position (Fig. 1) the spring **44** is stressed lengthwise; one end is held by the engagement of cross piece **44** with the tip of latch **46** and the other end is held at the handle connection **42** by the reaction of the contact pressure of butt contacts **48—50**.

When the handle is moved to the open circuit position (Fig. 2) the spring is stressed and moves, lifting the contact **48** from the contact **50** with the final part of such movement of contact **48** being a snap movement, the latch connection and **44** of the spring remaining held by the latch.

On circuit closing operating, movement of the handle from the open circuit position, Fig. 2, to the closed circuit position, Fig. 1, will cause contact **48** to engage contact **50** with a snap action.

When the latch releases due to overload (Fig. 3) the latch connection end of the spring is released and the spring snaps about end **42** as a pivot, and the cross piece **44** rides upwardly in the slots **45** with a snap action, lifting the contact **40** off the contact **50**.

For resetting, the handle is moved towards the open circuit position (Fig. 2) so that resetting parts **51** of the handle push the cross pieces **44** down under the latch tips of the latch **46** which has cooled and returned and reset the parts in open circuit position of Fig. 2.

It will be observed that during reset, the movable contact does not pass through its circuit closing position, since as the latch connection end of the spring moves towards its circuit closing position the handle connection end thereof moves away from its circuit closing position.

The switch or circuit breaker hereof may be seen to operate generally similar to those shown in application Serial No 217,632. For example, the spring provides contact pressure when the circuit is closed, biases the contacts separated when the latch releases or when the handle is moved to the open circuit position, biases the contact into closed circuit position when the handle is moved to closed circuit position, and is arranged to give snap action to the final part of each movement of the contact when the contact is moved by the handle; the contacts are of the butt contact pressure type and the spring establishes butt contact pressure.

It will be observed, however, that the switch or breaker herein disclosed is far simpler of construction than the switches or breakers of the aforesaid application, principally due to the fact that a leaf spring **43** is utilized instead of a coiled tension spring or a link mounted compression spring.

In addition, the leaf spring provides a firmer and better support for the movable contact than do the springs of the aforesaid application.

Now having described the device herein shown, reference will be had to the claims which follow for a determination of the protection sought herein.

I claim:

1. A manually operable switch and circuit breaker including a bowed leaf spring, a contact thereon and moved thereby, a handle directly connected to the spring so as to provide for manipulation thereof, a circuit current responsive latch directly connected to said spring, the handle and the latch providing direct connected separate holding means for the spring, the relation between the spring, the latch, and the handle being such that on release of the latch the spring biases the contact to open circuit position by moving around the handle connection thereto as a pivot without requiring movement of the handle, and on movement of the handle the spring moves the contact to open circuit position by moving around the latch connection thereto as a pivot without moving the

latch, the points of connection between the handle and spring and between the latch and spring being spaced from each other, the spring normally biasing the contact into closed circuit position.

2. A manually operable switch and circuit breaker including a bowed leaf spring, a contact thereon and moved thereby, a handle directly connected to the spring so as to provide for manipulation thereof, a circuit current responsive latch directly connected to said spring, the handle and the latch providing direct connected separated holding means for the spring, the relation between the spring, the latch and the handle being such that on release of the latch the spring biases the contact to open circuit position by moving around the handle connection thereto as a pivot without requiring movement of the handle, and on movement of the handle the spring moves the contact to open circuit position by moving around the latch connection thereto as a pivot without moving the latch, the points of connection between the handle and spring and between the latch and spring being spaced from each other, the spring normally biasing the contact into closed circuit position, the handle being pivotally mounted and the spring being arranged to move with a snap action when the handle moves the spring to give snap action to the final parts of the handle actuated movements of the contact.

3. A manually operable switch and circuit breaker including a bowed leaf spring, a contact thereon and moved thereby, a handle and a circuit condition responsive latch, the spring connecting the handle and the latch and for this purpose having its ends connected directly to the handle and the latch, the latch-spring connection being releasable on latch movement due to circuit abnormality so that the spring moves the contact to open circuit position, the handle being actuable to move the spring, and thus the contact, to and from open and closed circuit positions.

4. A manually operable switch and circuit breaker including a bowed leaf spring, a contact thereon and moved thereby, a handle, and a circuit condition responsive latch, the spring connecting the handle and the latch and for this purpose having its ends connected directly to the handle and the latch, the latch-spring connection being releasaole on latch movement due to circuit abnormality so that the spring moves the contact to open circuit position, the handle being actuable to move the spring, and thus the contact, to and from open and closed circuit positions, the spring, in closed circuit position of the parts, biasing the contact to such closed position for establishing contact pressure and also biasing the contact in such a direction that the contact will move to open circuit position in the event of latch release, with movement of the handle from open circuit position to closed circuit position moving the spring to a position wherein it biases the contact to closed circuit position with contact pressure.

5. A manually operable switch and circuit breaker including a bowed leaf spring, a contact thereon and moved thereby, a handle, and a circuit condition responsive latch, the spring connecting the handle and the latch and for this purpose having its ends connected directly to the handle and the latch, the latch-spring connection being releasable on latch movement due to circuit abnormality so that the spring moves the contact to open circuit position, the handle being actuable to move the spring, and thus the contact, to and from open and closed circuit positions, the handle being pivotally mounted and the spring being arranged to move with a snap action on handle actuated movement of the spring whereby the final part of each handle actuated movement of the spring and contact is a snap movement.

6. A manually operable switch and circuit breaker including a bowed leaf spring, contact thereon and moved thereby, a handle, and a circuit condition responsive latch, the spring connecting the handle and the latch and for this purpose having its ends connected directly to the handle and the latch, the latch-spring connection being releasable on latch movement due to circuit abnormality so that the spring moves the contact to open circuit position, the handle being actuable to move the spring, and thus the contact, to and from open and closed circuit positions, the spring, in closed circuit position of the parts, biasing the contact to such closed position for establishing contact pressure and also biasing the contact in such a direction that the contact will move to open circuit position in the event of latch release, with movement of the handle from open circuit position to closed circuit position moving the spring to a position wherein it biases the contact to closed circuit position with contact pressure, the handle being pivotally mounted and the spring being arranged to move with a snap action on handle actuated movement of the spring whereby the final part of each handle actuated movement of the spring and contact is a snap movement

7. A manually operable switch and circuit breaker including a spring, a contact moved thereby, a handle directly connected to the spring so as to provide for manipulation thereof, a circuit current responsive latch directly connected to said spring, the handle and the latch providing direct connected separate holding means for the spring, the relation between the spring, the latch, and the handle being such that on release of the latch the spring biases the contact to open circuit position by moving around the handle connection thereto as a pivot without requiring movement of the handle, and on movement of the handle the spring moves the contact to open circuit position by moving around the latch connection thereto as a pivot without moving the latch, the points of connection between the handle and spring and between the latch and spring being spaced from each other, the spring normally biasing the contact into closed circuit position, the spring comprising a bowed leaf spring between the latch and the handle, and on which the movable contact is supported.

8. A manually operable switch and circuit breaker including a spring, a contact operatively connected thereto so as to be moved thereby, a handle directly connected to the spring so as to provide for manipulation thereof, a circuit current responsive latch directly connected to said spring, the handle and the latch providing direct connected separated holding means for the spring, the relation between the spring, the latch, and the handle being such that on release of the latch the spring biases the contact to open circuit position by moving around the handle connection thereto as a pivot without requiring movement of the handle, and on movement of the handle the spring moves the contact to open cir-

cuit position by moving around the latch connection thereto as a pivot without moving the latch, the points of connection between the handle and spring and between the latch and spring being spaced from each other, the spring normally biasing the contact into closed circuit position, the handle being pivotally mounted and the spring being arranged to cross the pivot of the handle when the handle moves the spring to give snap action to the final parts of the handle actuated movements of the contact, the spring comprising a bowed leaf spring between the latch and the handle, and on which the movable contact is supported.

9. A manually operable switch and circuit breaker including a spring a contact operatively connected thereto so as to be moved thereby, a handle, and a circuit condition responsive latch, the spring connecting the handle and the latch and for this purpose having its ends connected directly to the handle and the latch, the latch-spring connection being releasable on latch movement due to circuit abnormality so that the spring moves the contact to open circuit position, the handle being actuable to move the spring, and thus the contact, to and from open and closed circuit positions, the spring comprising a bowed leaf spring between the latch and the handle, and on which the movable contact is supported.

10. A manually operable switch and circuit breaker including a spring, a contact operatively connected thereto so as to be moved thereby, a handle, and a circuit condition responsive latch, the spring connecting the handle and the latch and for this purpose having its ends connected directly to the handle and the latch, the latch-spring connection being releasable on latch movement due to circuit abnormality so that the spring moves the contact to open circuit position, the handle being actuable to move the spring, and thus the contact, to and from open and closed circuit positions, the spring, in closed circuit position of the parts, biasing the contact to such closed position for establishing contact pressure and also biasing the contact in such a direction that the contact will move to open circuit position in the event of latch release, with movement of the handle from open circuit position to closed circuit position moving the spring to a position wherein it biases the contact to closed circuit position with contact pressure, the spring comprising a bowed leaf spring between the latch and the handle, and on which the movable contact is supported.

11. A manually operable switch and circuit breaker including a spring, a contact operatively connected thereto so as to be moved thereby, a handle, and a circuit condition responsive latch, the spring connecting the handle and the latch and for this purpose having its ends connected directly to the handle and the latch, the latch-spring connection being releasable on latch movement due to circuit abnormality so that the spring moves the contact to open circuit position, the handle being actuable to move the spring, and thus the contact, to and from open and closed circuit positions, the handle being pivotally mounted and the spring being arranged to cross the handle pivot on handle actuated movement of the spring whereby the final part of each handle actuated movement of the spring and contact is snap movement, the spring comprising a bowed leaf spring between the latch and the handle, and on which the movable contact is supported.

12. A manually operable switch and circuit breaker including a spring, a contact operatively connected connected thereto so as to be moved thereby, a handle, and a circuit condition responsive latch, the spring connecting the handle and the latch and for this purpose having its ends connected directly to the handle and the latch, the latch-spring connection being releasable on latch movement due to circuit abnormality so that the spring moves the contact to open circuit position, the handle being actuable to move the spring, and thus the contact, to and from open and closed circuit positions, the spring, in closed circuit position of the parts, biasing the contact to such closed position for establishing contact pressure and also biasing the contact in such a direction that the contact will move to open circuit position in the event of latch release, with movement of the handle from open circuit position to closed circuit position moving the spring to a position wherein it biases the contact to closed circuit position with contact pressure, the handle being pivotally mounted and the spring being arranged to cross the handle pivot on handle actuated movement of the spring whereby the final part of each handle actuated movement of the spring and contact is a snap movement, the spring comprising a bowed leaf spring between the latch and the handle, and on which the movable contact is supported.

13. A butt pressure contact circuit breaker including a movable butt contact, a stationary contact, a handle, and a circuit responsive latch, and a single bowed leaf spring for butt pressing the movable contact against the stationary contact when the parts are in circuit closed position, and for biasing the movable contact away from the stationary contact in the event of a release by the latch, and for producing a snap movement of the movable contact into circuit closing position following movement of the handle out of circuit open position, the spring having an end connected to the handle and an end connected to the latch.

14. A butt pressure contact circuit breaker including a movable butt contact, a stationary contact, a handle, and a circuit responsive latch, and a single spring for butt pressing the movable contact against the stationary contact when the parts are in circuit closed positions, and for biasing the movable contact away from the stationary contact in the event of a release by the latch, and for producing a snap movement of the movable contact into circuit closing position following movement of the handle out of circuit open position, the spring being a bowed leaf spring having an end connected to the handle and an end connected to the latch, and on which the movable contact is supported.

15. A circuit breaker including a stationary contact, a bowed leaf spring means, a movable contact operatively connected thereto so as to be moved thereby, a handle directly connected thereto so as to provide for manipulation thereof, a circuit responsive latch directly connected to said spring means, the handle and the latch providing separate direct acting holding means for the spring means, the relation between the spring means, the latch, and the handle being such that on release of the latch the spring means moves around the handle connection thereto as a pivot without requiring movement of the han-

dle so as to bias the contact to open circuit position, and on movement of the handle the spring means moves around the latch connection thereto as a pivot without moving the latch, so as to bias the contact to open circuit position, the points of connection between the handle and spring means and between the latch and spring means being spaced from each other, the movable contact connected to the spring means being formed to butt against the stationary contact, with the spring means biasing the movable contact against the stationary contact when the circuit is closed and the handle and latch hold the spring means.

16. A circuit breaker including a stationary contact, a spring means, a movable contact operatively connected thereto so as to be moved thereby, a handle directly connected thereto so as to provide for manipulation thereof, a circuit responsive latch directly connected to said spring means, the handle and the latch providing separate direct acting holding means for the spring means, the relation between the spring means, the latch, and the handle being such that on release of the latch the spring means moves around the handle connection thereto as a pivot without requiring movement of the handle so as to bias the contact to open circuit position, and on movement of the handle the spring means moves around the latch connection thereto as a pivot without moving the latch, so as to bias the contact to open circuit position, the points of connection between the handle and spring means and between the latch and spring means being spaced from each other, the movable contact connected to the spring means being formed to butt against the stationary contact, with the spring means biasing the movable contact against the stationary contact when the circuit is closed and the handle and latch hold the spring means, the spring being a bowed leaf spring having its ends connected to the handle and latch respectively.

17. In a circuit breaker controlling mechanism, a stationary contact, a movable contact arranged to butt against the stationary contact, a bowed leaf spring means operatively connected to the movable contact and arranged to bias it against the stationary contact when the spring means is in normal stressed position, a circuit responsive latch directly connected to the spring means for holding a circuit responsive latch directly connected to the spring means for holding it under stress in normal contact biasing position, a rotatably mounted handle directly connected to the spring means and manipulable by rotary movement out of its normal position to stress the spring means and move it bodily out of its normal position and towards the center of rotation of the handle so that when the handle is released after such movement the spring means will tend to relieve itself of its stress with a snap action, the relative arrangement of the parts being such that on such stress relieving movement of the spring means following such handle movement, and subsequent release, the spring means will move bodily beyond the center of rotation of the handle and about the connection between the spring means and latch as a pivot, to move the movable contact away from the stationary contact, and also being such that on release of the latch, when the handle and spring means are in normal position, the spring means will tend to relieve itself of its stress with a snap action and in so doing will move bodily about its connection to the handle as a pivot and move the movable contact away from the stationary contact.

18. In a circuit breaker controlling mechanism, a stationary contact, a movable contact arranged to butt against the stationary contact, a spring means operatively connected to the movable contacts and arranged to bias it against the stationary contact when the spring means is in normal stressed position, a circuit responsive latch directly connected to the spring means for holding it under stress in normal contact biasing position, a rotatably mounted handle directly connected to the spring means and manipulable by rotary movement out of its normal position to stress the spring means and move it bodily out of its normal position and towards the center of rotation of the handle so that when the handle is released after such movement the spring means will tend to relieve itself of its stress with a snap action, the relative arrangement of the parts being such that on such stress relieving movement of the spring means following such handle movement and subsequent release, the spring means will move bodily beyond the center of rotation of the handle and about the connection between the spring means and latch as a pivot, to move the movable contact away from the stationary contact, and also being such that on release of the latch, when the handle and spring means are in normal position, the spring means will tend to relieve itself of its stress with a snap action and in so doing will move bodily about its connection to the handle as a pivot, and move the movable contact away from the stationary contact, the spring being a bowed leaf spring having its ends connected to the handle and latch respectively.

WILLIAM H. FRANK.
ELWOOD T. PLATZ.