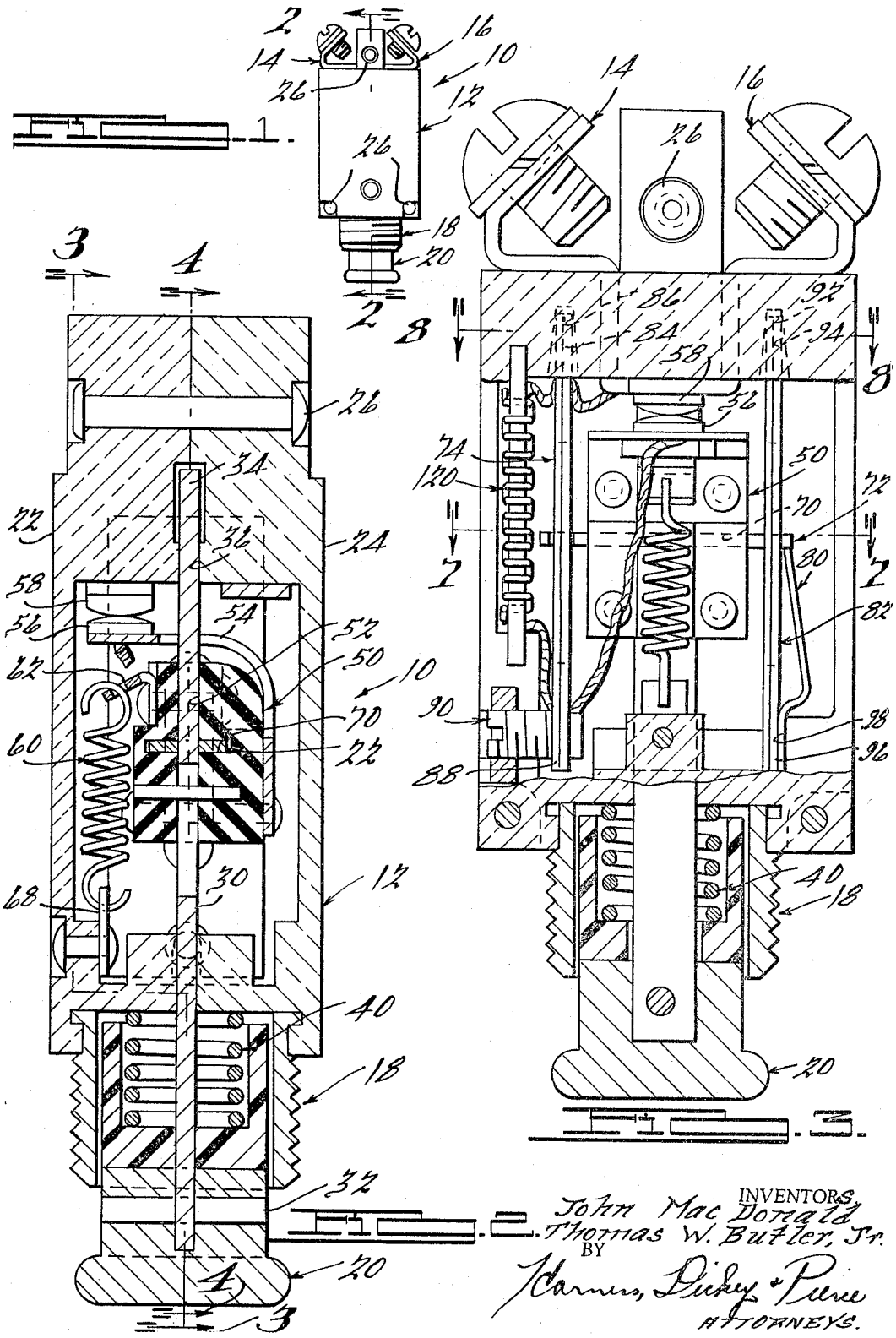
Nov. 22, 1966 J. MacDONALD ETAL 3,287,523

PUSH BUTTON TYPE CIRCUIT BREAKER WITH CROSS-SLIDE

Filed Nov. 30, 1965 3 Sheets-Sheet 1

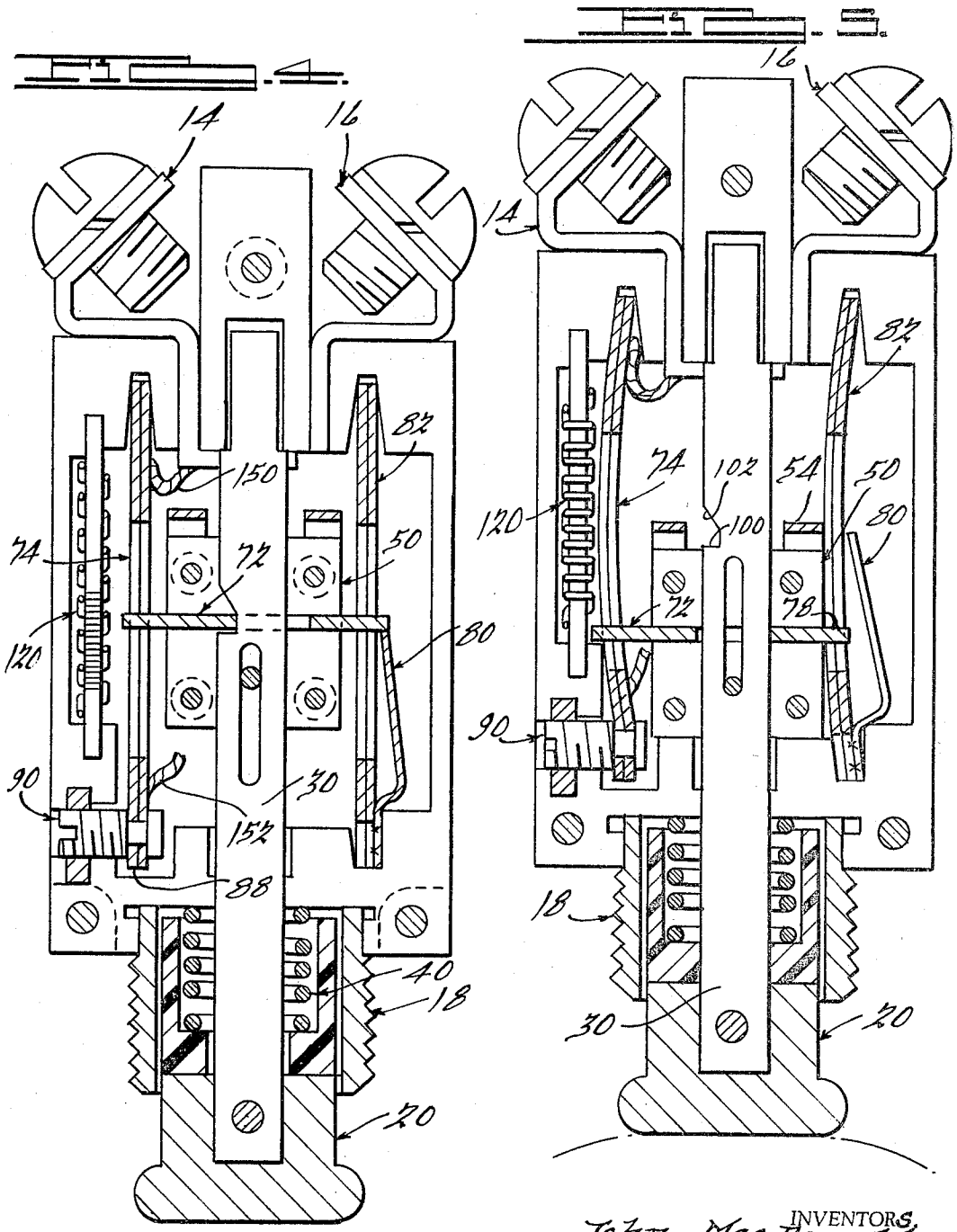


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PUSH BUTTON TYPE CIRCUIT BREAKER WITH CROSS-SLIDE

Filed Nov. 30, 1965 3 Sheets-Sheet 2

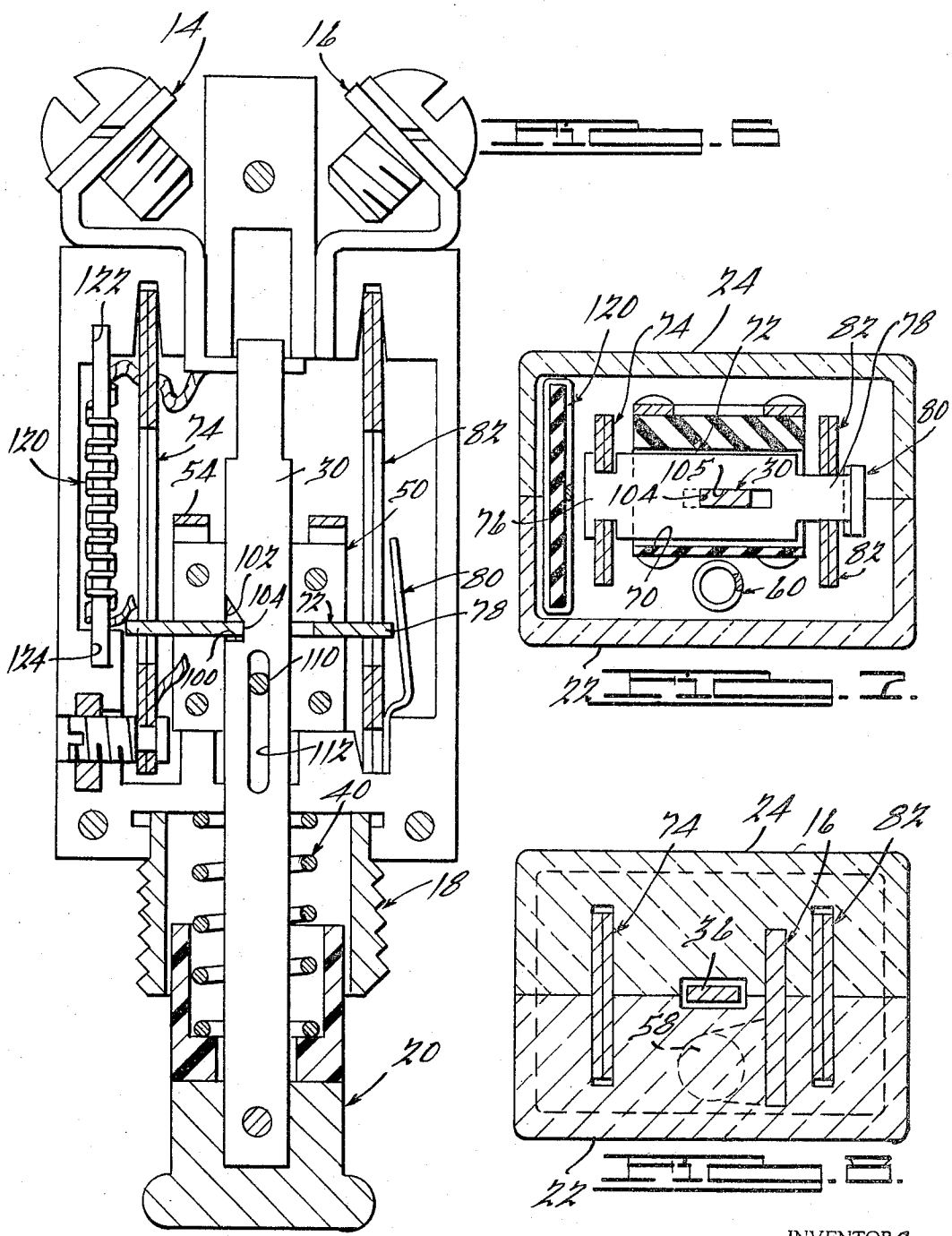


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PUSH BUTTON TYPE CIRCUIT BREAKER WITH CROSS-SLIDE

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PUSH BUTTON TYPE CIRCUIT BREAKER WITH CROSS-SLIDE

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5 Claims. (Cl. 200—116)

This application relates generally to circuit breakers and more particularly to a novel trip free ambient temperature compensated aircraft circuit breaker.

Aircraft circuit breakers are required to be as small and light as possible. It is also generally required that aircraft circuit breakers be of "trip free" construction. Further, it is desirable that such circuit breakers be compensated for variations in ambient temperature. However, trip free and ambient compensating mechanisms heretofore known and used have been relatively large and heavy.

The circuit breaker of the instant invention utilizes a new component geometry featuring a novel cross slide arrangement that achieves trip free operation.

Ambient temperature compensation is achieved by using a compensating bimetallic element virtually identical to a current responsive bimetallic element and orientating the ambient and current responsive bimetallic elements in parallel relationship.

Accordingly, one object of the instant invention is an improved aircraft circuit breaker.

Another object is an improved ambient temperature compensating circuit breaker.

Another object is an improved trip free aircraft circuit breaker.

Other objects and advantages of the instant invention will be apparent from the following description, claims and drawings, wherein:

FIGURE 1 is a side elevational view of an improved circuit breaker in accordance with the instant invention;

FIG. 2 is a cross sectional view taken substantially along the line 2—2 of FIGURE 1;

FIG. 3 is a cross sectional view taken substantially along the line 3—3 of FIG. 2;

FIG. 4 is a cross sectional view taken substantially along the line 4—4 of FIG. 2;

FIG. 5 is a view similar to FIG. 4 showing the current responsive and ambient temperature responsive bimetallic blades in the flexed condition;

FIG. 6 is a view similar to FIG. 5 showing a circuit breaker after manual operation;

FIG. 7 is a view taken substantially along the line 7—7 of FIG. 3; and

FIG. 8 is a cross sectional view taken substantially along the line 8—8 of FIG. 3.

As best seen in FIGURE 1, a circuit breaker **10**, in accordance with an exemplary constructed embodiment of the instant invention, comprises an enclosure **12** having a pair of terminals **14** and **16** thereon. A threaded ferrule **18** extends exteriorly of the enclosure **12** for the support of a manual operator **20**.

As best seen in FIGURE 2 of the drawings, the enclosure **12** comprises housing portions **22** and **24** that are held together by a plurality of rivets **26**. The ferrule **18** is interlocked with the housing portions **22** and **24** to provide a mounting means for the circuit breaker **10** on a panelboard (not shown).

The manual operator **20** has an internal stem portion **30** secured thereto as by a pin **32**. The stem **30** extends centrally of the circuit breaker **10**, an upper end portion **34** thereof extending into a complementary slot **36** between the housing portions **22** and **24**. A spring **40** normally biases the manual operator **20** downwardly as seen in FIG. 2 of the drawings.

A plunger **50** has a central slot **52** therein for the slidable acceptance of the stem portion **30** of the manual operator **20**. The plunger **50** has a resilient contact carrier **54** secured thereto which in turn supports a movable contact **56**. The movable contact **56** is engageable with a fixed contact **58** to complete a circuit through the circuit breaker **10** as will be described.

A helical tension spring **60** is secured to a complementary bracket **62** on the plunger **50** and to a bracket **68** on the housing portion **22** so as to normally bias the plunger **50** downwardly relative to the housing **12** as seen in FIG. 2.

As best seen in FIG. 3 of the drawings the plunger **50** has a laterally extending slot **70** therein for the acceptance of a slide **72**. The slide **72** is movable internally of the plunger **50** under the influence of a current responsive bimetal **74**. As best seen in FIG. 7 of the drawings the current responsive bimetal **74** is interlocked with an end portion **76** of the slide **72** to control lateral movement thereof.

An end portion **78** of the slide **72** is normally seated on a latch **80** which in turn is secured to an ambient temperature compensated bimetal **82** so as to be controlled thereby. It is to be noted that the current responsive bimetal **74** has one end portion **84** seated in a complementary seat **86** in the housing **12** and an opposite end portion **88** that is positioned by a calibration screw **90**. Similarly, one end portion **92** of the ambient compensated bimetal **82** is seated in a complementary seat **94** of the housing **12** and an opposite end portion **96** is seated in a complementary seat **98**.

As best seen in FIGURES 4, 5, and 6 the stem portion **30** of the manual operator **20** is provided with a notch **100** having an angular cam portion **102** that is engageable with an edge portion **104** of a complemetary slot **105** in the slide **72** so as to bias the slide **72** to the left, upon downward movement of the manual operator **20**, as seen in the drawings, to effect manual opening of the circuit breaker **10**.

The stem portion **30** of the manual operator **20** is interlocked with the plunger **50** by a pin **110** that is carried by the plunger **50** and is received in a complementary slot **112** in the stem **30**.

As best seen in FIGS. 3 through 6, the circuit breaker **10** is provided with a heater **120** that is supported in complementary seats **122** and **124** in the housing **12**. The heater **120** is disposed in closely spaced heat transfer relationship to current responsive bimetals of low current rating **74** to speed up the response thereof to an overload condition. The heater **120** can be connected in series or parallel relationship to the bimetal **74** or eliminated as required by the rating of the circuit breaker.

Closure of the circuit breaker from the condition shown in FIG. 6 of the drawings to the condition shown in FIGS. 2, 3, and 4 of the drawings is effected by upward pressure on the manual operator **20** until the latch **80** snaps under the end portion **78** of the slide **72**.

Upon the occurrence of an overload condition the current responsive bimetal **74** flexes as shown in FIG. 5 of the drawings to draw the slide **72** to the left disengaging the end portion **78** thereof from the latch **80**. When the slide **72** is disengaged from the latch **80** the plunger **50** is free to move downwardly relative to the housing **12** of the circuit breaker **10** and stem **30** of the manual operator **20** under the bias of the spring **60**. It is to be noted that, as seen in FIG. 5, the circuit breaker is trip free in operation since the manual operator **20** can be held in the closed position without effecting the ability

of the circuit breaker **10** to trip due to an overload condition.

It is also to be noted that deflection of the current responsive bimetal **74** due to a high ambient temperature condition is compensated by a similar flexure of the ambient compensating bimetal **82** which in turn moves the latch **80** to a compensating position.

Electrical continuity through the circuit breaker is established from the terminal **14** to the current responsive bimetal **74** via a pigtail **150**. A pigtail **152** connects the opposite end **88** of the current responsive bimetal to the movable contact **56** (FIG. 2) which in turn is electrically engageable with the fixed contact **58**. The fixed contact **58** is electrically connected to the terminal **16**.

It is to be understood that the specific construction of the improved circuit breaker herein disclosed and described is presented for the purpose of explanation and illustration and is not intended to indicate limits of the invention the scope of which is defined by the following claims.

What is claimed is:

1. An electrical circuit breaker comprising

an insulating housing,

a pair of terminals extending exteriorly of said housing,

a fixed contact connected to one of said terminals,

an elongated current responsive bimetallic element in said housing having its end supported thereby, one end of said current responsive bimetal being electrically connected to the other of said terminals,

a latch supported by said housing,

a plunger having a movable electrical contact thereon engageable with said fixed contact and electrically connected to the other end of said current responsive bimetal to complete an electrical circuit through said circuit breaker,

a slide carried by said plunger and extending generally normally to said current responsive element, said slide having one end engaged with an intermediate portion of said current responsive bimetal and the other end engaged with said latch, means supporting said slide for movement upon deflection of said current responsive bimetal thereby to affect effecting disengagement of said slide from said latch permitting said plunger to move to the contacts open condition, and a manual operator engageable with said plunger to bias said plunger and movable contact to the contacts closed condition, said manual operator having means engageable with said slide to effect movement thereof relative to said latch to effect manual opening of said contacts.

2. A circuit breaker in accordance with claim **1** including an ambient temperature compensating bimetal disposed in spaced parallel relation to said current responsive bimetal and operative to move said latch to compensate said circuit breaker for changes in ambient temperature.

3. A circuit breaker in accordance with claim **2** including an ambient temperature compensating bimetal disposed in spaced parallel relation to said current responsive bimetal and of like configuration thereof, said compensating bimetal being operative to move said latch to compensate said circuit breaker for changes in ambient temperature.

4. A circuit breaker in accordance with claim **1** wherein said manual operator extends through said plunger so as to be engageable with said slide.

5. A circuit breaker in accordance with claim **1** wherein said current responsive bimetal has a slot therein for the acceptance of an end portion of said slide whereby lateral movement of said bimetal effects like movement of said slide.

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