March 19, 1968 F. BOULD 3,374,332

ARC CHUTE FOR A CIRCUIT BREAKER

Filed July 16, 1965 2 Sheets-Sheet 1

Fig. 1.

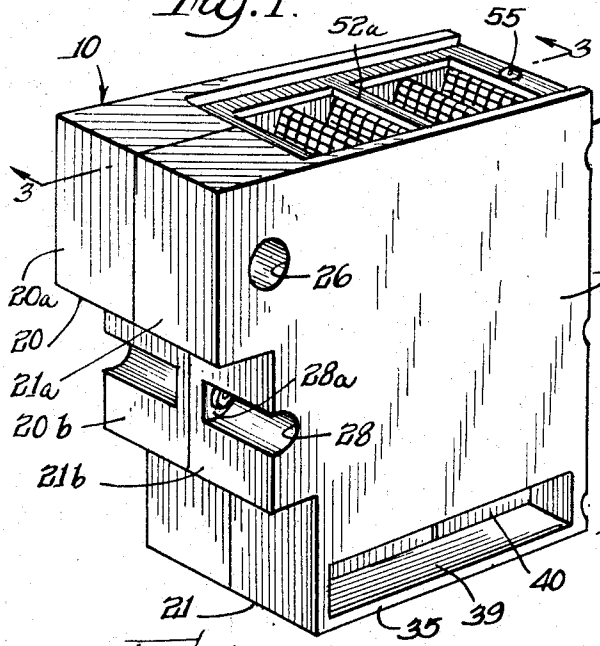



Fig. 2.

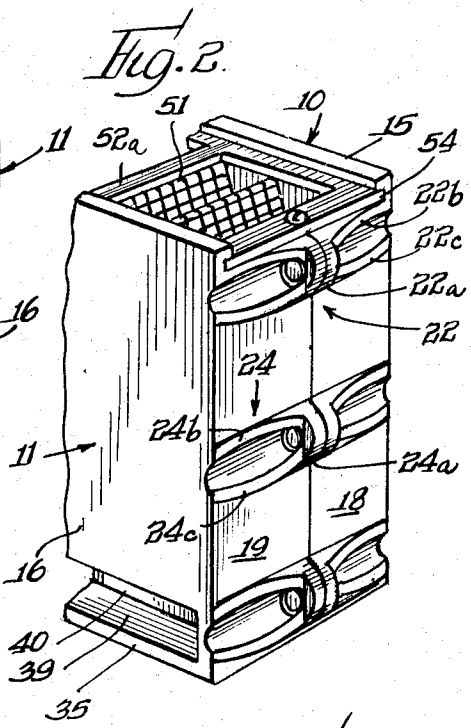



Fig. 3.

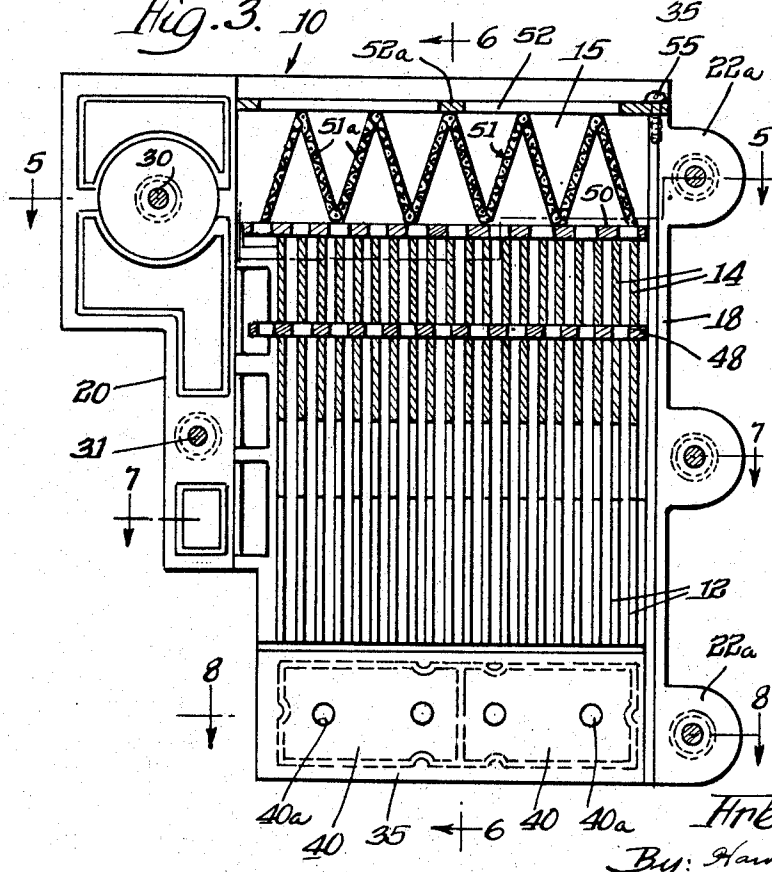
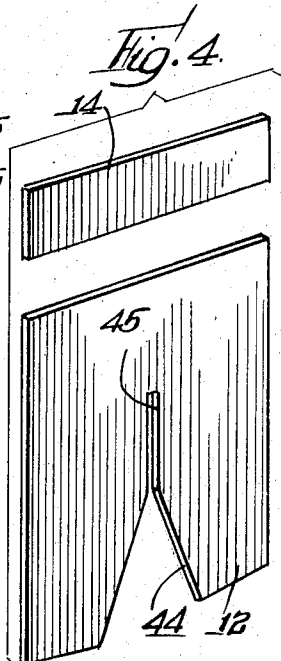



Fig. 4.




Inventor
Fred Bould
By: Harold J. Rathbun
Atty

March 19, 1968 F. BOULD 3,374,332

ARC CHUTE FOR A CIRCUIT BREAKER

Filed July 16, 1965 2 Sheets-Sheet 2

Fig. 5

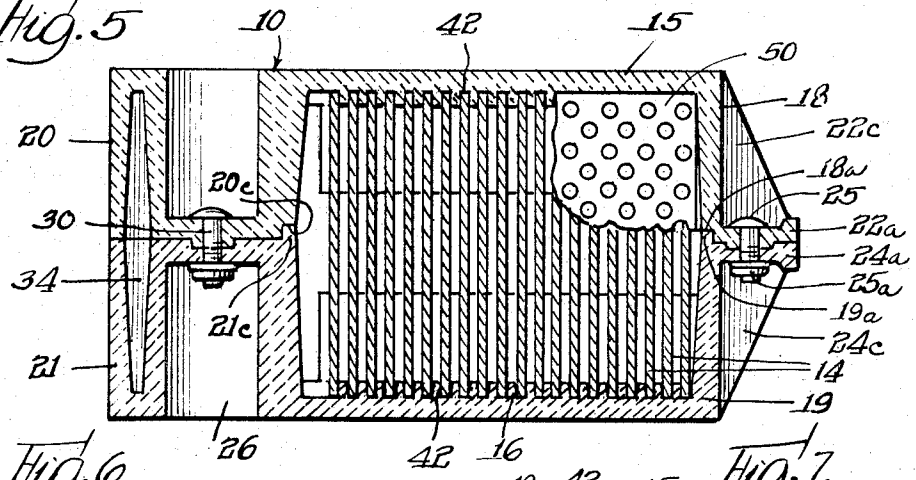



Fig. 6.

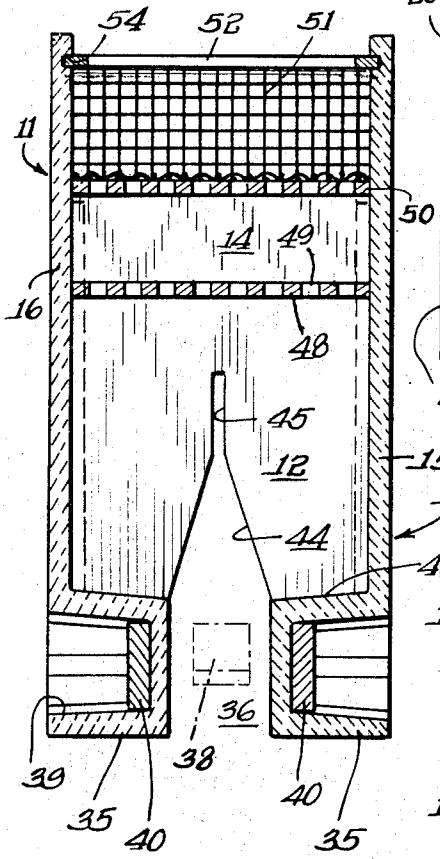



Fig. 7.

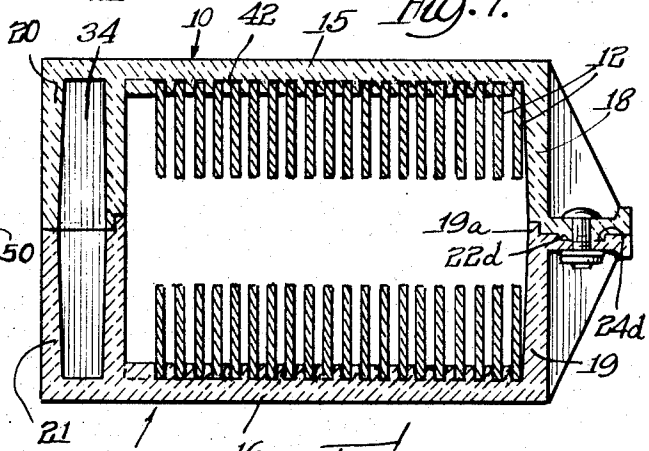
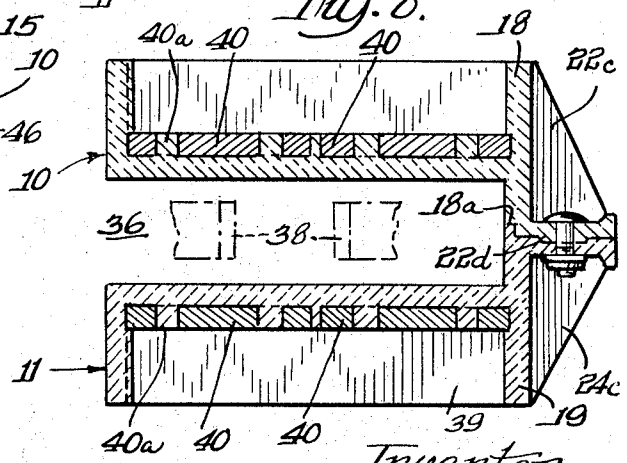



Fig. 8.




Inventor
Fred Bould

By: Harold J. Rathbun
Atty.

United States Patent Office 3,374,332
Patented Mar. 19, 1968



3,374,332

# ARC CHUTE FOR A CIRCUIT BREAKER

Fred Bould, Pittsburgh, Pa., assignor to Square D Company, Park Ridge, Ill., a corporation of Michigan

Filed July 16, 1965, Ser. No. 472,427
6 Claims. (Cl. 200—144)

This invention relates to arc chutes for circuit breakers, and more particularly to such an arc chute having self-contained field-distorting means for assisting the movement of an arc from separable contacts into an arcing chamber containing an improved arrangement of deionizing or cooling means.

In prior arc chutes for circuit breakers, magnetizable material has been located adjacent the separable contacts to distort the magnetic field produced by the arc current thereby to force an arc formed between the contacts into the slots of a plurality of spaced conducting and magnetizable plates disposed in an arcing chamber. In some instances, the arcing chamber has also contained a plurality of insulating plates and baffles, and metal screen has been used to cover an opening or openings in the arc chute through which the arc gases are exhausted. The combining of all of these components to form an arc chute has heretofore resulted in complex structures which occupy considerable unnecessary space and which are difficult to assemble.

The foregoing disadvantages are overcome in accordance with the present invention by molding the field-distorting plates into walls defining the arcing chambers which receive from the top, in order, a plurality of magnetizable plates, a lower perforated baffle plate, a plurality of insulating plates, an upper perforated baffle plate, a metal gas-cooling screen, and a retainer. All of these parts are of simple construction and are formed to interfit or interlock with each other to facilitate assembly with few fastening means.

It is an object of this invention to provide an improved arc chute for a circuit breaker.

Another object is to provide an arc chute having improved means for holding the various parts of the arc chute in assembled relation.

A detailed object is to provide, in an arc chute having a pair of wall portions, field-distorting means, a plurality of magnetizable plates, a plurality of insulating plates, a pair of perforated baffles, and a sinuous gas-cooling screen, improved means for holding the parts in assembled relation comprising flanged portions along the lower margin of the respective wall portions extending inwardly toward each other with the field-distorting means in the form of magnetizable plate means molded therein, a plurality of longitudinally-spaced grooves in the inner face of each of said wall members extending upwardly from the lower flanged portion thereof for reception, at the lower portions thereof, of the marginal edges of the magnetizable plates and at the upper portions thereof, of the marginal edges of the insulating plates, the perforated baffles resting on the metal and fiber plates, respectively, and the gas-cooling screen resting on the upper one of the baffles with the axes of its convolutions extending transversely between the wall members, and locking means slidable in opposing horizontal grooves in the wall members.

Further objects and advantages will become apparent from the following description wherein reference is made to the drawings, in which:

FIGURE 1 is a rearward perspective view of an arc chute in accordance with this invention;

FIGURE 2 is a frontward perspective view showing a portion of the arc chute of FIGURE 1;

FIGURE 3 is a sectional view taken generally as indicated by the arrows 3—3 in FIGURE 1;



FIGURE 4 is a perspective view of cooling plates used in the arc chute of FIGURES 1, 2, and 3; and

FIGURES 5, 6, 7, and 8 are sectional views taken generally as indicated by the arrows 5—5, 6—6, 7—7, and 8—8, respectively, of FIGURE 3.

Referring to the drawings, an arc chute in accordance with this invention comprises a pair of wall members **10** and **11** molded of arc-resisting insulating material, such as a polyester glass, and receiving therebetween a plurality of conductive and magnetizable plates **12**, preferably made of steel, and a plurality of insulating plates **14**, preferably made of fiber. The wall members **10** and **11** are substantially identical except that they are respectively left and right hand so that they can be secured together to define an arcing chamber.

The wall members **10** and **11** have respective side wall portions **15** and **16**, respective relatively thin front wall portions **18** and **19**, and respective rear wall portions **20** and **21**. Vertically spaced along the outer face of the front wall portion **18** are a plurality of lugs **22** each comprising a generally semi-cylindrical bolt-receiving portion **22***a* and upper and lower strengthening rib portions **22***b* and **22***c* tapering inwardly from the portion **22***a* to the outer edge of the wall portions **18**. As shown in FIGURES 5, 7, and 8, the exposed edge face of the wall portion **18** is notched at **18***a* and each of the lugs **22** has a central boss **22***d*.

Vertically-spaced along the outer face of the front wall portion **19** are a plurality of lugs **24** each comprising a generally semi-cylindrical bolt-receiving portion **24***a* and upper and lower strengthening rib portions **24***b* and **24***c* like the rib portions **22***b* and **22***c*. The exposed edge face of the wall portion **19** has a flange **19***a* complementary to the notch **18***a* and each of the lugs **24** has a central recess **24***d*. When the wall members **10** and **11** are assembled in position, the flange **19***a* is received in the notch **18***a* and the respective bosses are received in the recesses **24***d*. A plurality of bolts **25** received in aligned apertures in the bolt-receiving portions **22***a* and **24***a* of the respective pairs of juxtaposed lugs **22** and **24** are threaded into respective nuts **25***a* to hold the wall members **10** and **11** together at the front thereof.

The rear wall portions **20** and **21** have respective upper thickened portions **20***a* and **21***a* provided with respective deeply counterbored apertures **26** and respective intermediate stepped portions **20***b* and **21***b* having respective semi-cylindrical slots **28** terminating at their inner ends in apertured walls **28***a*. When the wall members **10** and **11** are assembled together, the pairs of apertures **26** and the apertures in the walls **28***a* are aligned and receive respective bolts **30** and **31** for holding the wall members **10** and **11** together at the rear thereof. To facilitate alignment of the wall members **10** and **11** and to restrict the emission of arc gases, the exposed edge face of the wall portion **21** preferably has a flange **21***c* (FIG. 5) received in a complementary notch **20***c* in the exposed edge face of the wall member **20**.

The rear wall portions **20** and **21** may have suitable recesses **34** opening from their juxtaposed faces to save material and reduce the weight.

Each of the wall members **10** and **11** has a lower relatively thick flange portion **35** which, when the wall members **10** and **11** are assembled together, are directed inwardly toward each other but are spaced apart to define a space **36** (FIGURES 6 and 8) for a pair of separable contacts **38**. Each of the flange portions **35** has molded therein at the inner end of an outwardly opening recess **39** a magnetizable plate means in the form of a pair of steel plates **40** which, in conjunction with the plates **12**, cause arcs formed between the contacts **38** to move upwardly. Molded material forming the wall mem-

bers 10 and 11 enters suitable openings 40*a* in the plates 40 to assist in holding the plates 40 in position.

The inner faces of each of the side wall portions 15 and 16 of the wall members 10 and 11 are provided with a plurality of vertically-directed, horizontally-spaced grooves 42 which extend upwardly from the respective flange portions 35 and terminate substantially below the upper edge of the respective side wall portions 15 and 16. The prooves 42 in the wall member 10 are aligned with the grooves 42 in the wall portion 11, respectively, to define pairs of aligned grooves.

As shown best in FIGURES 4 and 6, each of the plates 12 preferably has a triangular-shaped slot 44 extending inwardly from a lower edge and communicating with a narrow rectangular slot 45 which continues inwardly a substantial distance from the apex of the slot 44. The outer marginal portions of the plates 12 are received respectively in the grooves 42, with one of the plates 12 for each pair of aligned grooves, and their lower edge portions are tapered to rest snugly on sloping upper surfaces 46 of the flange portions 35.

A lower baffle plate 48 preferably formed of fiber and provided over its entire area with a plurality of perforations 49 rests on the upper edge faces of the plates 12 and the fiber plates 14 have their marginal edges received in the grooves 42 and rest on the upper surface of the lower baffle plate 48. An upper baffle plate 50 like the plate 48 rests on the upper edge faces of the plates 14.

Resting upon the upper baffle plate 50 is a sinuous copper screen 51 having a plurality of angularly disposed portions 51*a*, arranged in saw-tooth fashion transversely between the wall portions 15 and 16. It is apparent that, after the wall members 10 and 11 are secured together to define an arcing chamber, the arc-cooling means, that is the plates 12, the lower baffle plate 48, the plate 14, the upper baffle plate 50, and the screen 51, are merely inserted in proper order through the upper opening of the arcing chamber. The complete assembly of plates 12 and 14, baffle plates 48 and 50, and screen 51 is held in place by a fiber frame 52 having a central leg 52*a* and received its marginal portions within aligned horizontal grooves 54 formed in the respective side wall portions 15 and 16 of the members 10 and 11. The frame 52 may be held in assembled position by a screw 55 received through an opening in the frame and threaded into an opening formed in the front walls 18 and 19 at their junction.

I claim:

1. An arc chute for confining and extinguishing an arc formed between separable electric contacts, said arc chute comprising a wall structure having front and rear walls and a pair of side walls defining an arcing chamber, said side walls having respective inwardly-directed flange portions along their lower margins extending inwardly toward each other, a pair of recesses in said inwardly-directed flange portions, respectively, a pair of magnetizable plate means disposed in said recesses, respectively, a plurality of conductive magnetizable plates, each of said side walls having a plurality of horizontally-spaced grooves in its inner face extending upwardly from said inwardly-directed flange portion thereof toward the top edge thereof, said magnetizable plates respectively having their side edge portions received, respectively, in aligned pairs of said grooves at the lower portions thereof, a lower perforated baffle plate resting on the top of said magnetizable plates, a plurality of insulating plates, said insulating plates respectively having their side edge partions received respectively in aligned pairs of said grooves above said lower baffle plate and being supported by said lower baffle plate, an upper performated baffle plate resting on the top of said insulating plates, a sinuous metal screen resting on said upper baffle plate, a retaining frame, a pair of horizontally disposed grooves in said side wall portions adjacent the upper edges thereof, respectively, and said retaining frame being slidably received in said horizontal grooves and overlying an edge portion of said metal screen.

2. An arc chute in accordance with claim 1 characterized in that said magnetizable plates and said insulating plates are loosely received, respectively, in said aligned pairs of grooves.

3. An arc chute in accordance with claim 1 characterized in that at least some of said magnetizable plates have respective slots opening at the lower edge thereof.

4. An arc chute in accordance with claim 1 characterized in that said magnetizable plates rest upon and are supported by said inwardly-directed flange portions.

5. An arc chute for confining and extinguishing an arc formed between separable electric contacts, said arc chute comprising a pair of wall members each having side, front, and rear wall portions and juxtaposed to define an arcing chamber therebetween, means securing said wall members in said juxtaposed relation, each of said side wall portions having a flange portion along their lower margin extending inwardly toward the lower flange portion of the other side wall portion, magnetizable plate means disposed in said flange portions, respectively, a plurality of conductive magnetizable plates, each of said wall members having a plurality of horizontally-spaced grooves in its inner face extending upwardly from its flange portion, said magnetizable plates respectively having their side edge portions received, respectively, in aligned pairs of said grooves at the lower portion thereof, a lower perforated baffle plate resting on the top of said magnetizable plates, a plurality of insulating plates, said insulating plates respectively having their side edge portions received, respectively, in aligned pairs of said grooves above said lower baffle plate, an upper perforated baffle plate resting on the top of said insulating plates, a sinuous metal screen resting on said upper baffle plate, a retaining frame, a pair of horizontally disposed grooves in said side wall portions adjacent the upper edges thereof, respectively, and said retaining frame being slidably received in said horizontal grooves and overlying an edge portion of said metal screen.

6. An arc chute in accordance with claim 5 characterized in that said flange portions have respective outwardly-opening recesses and said magnetizable plates are received in said recesses.


**References Cited**

UNITED STATES PATENTS

| | | | |
|---|---|---|---|
| 3,031,552 | 4/1962 | Stewart | 200—144 |
| 3,155,801 | 11/1964 | Pokorny | 200—147 |

FOREIGN PATENTS

| | | |
|---|---|---|
| 763,510 | 12/1956 | Great Britain. |
| 732,196 | 6/1955 | Great Britain. |


ROBERT S. MACON, *Primary Examiner.*