

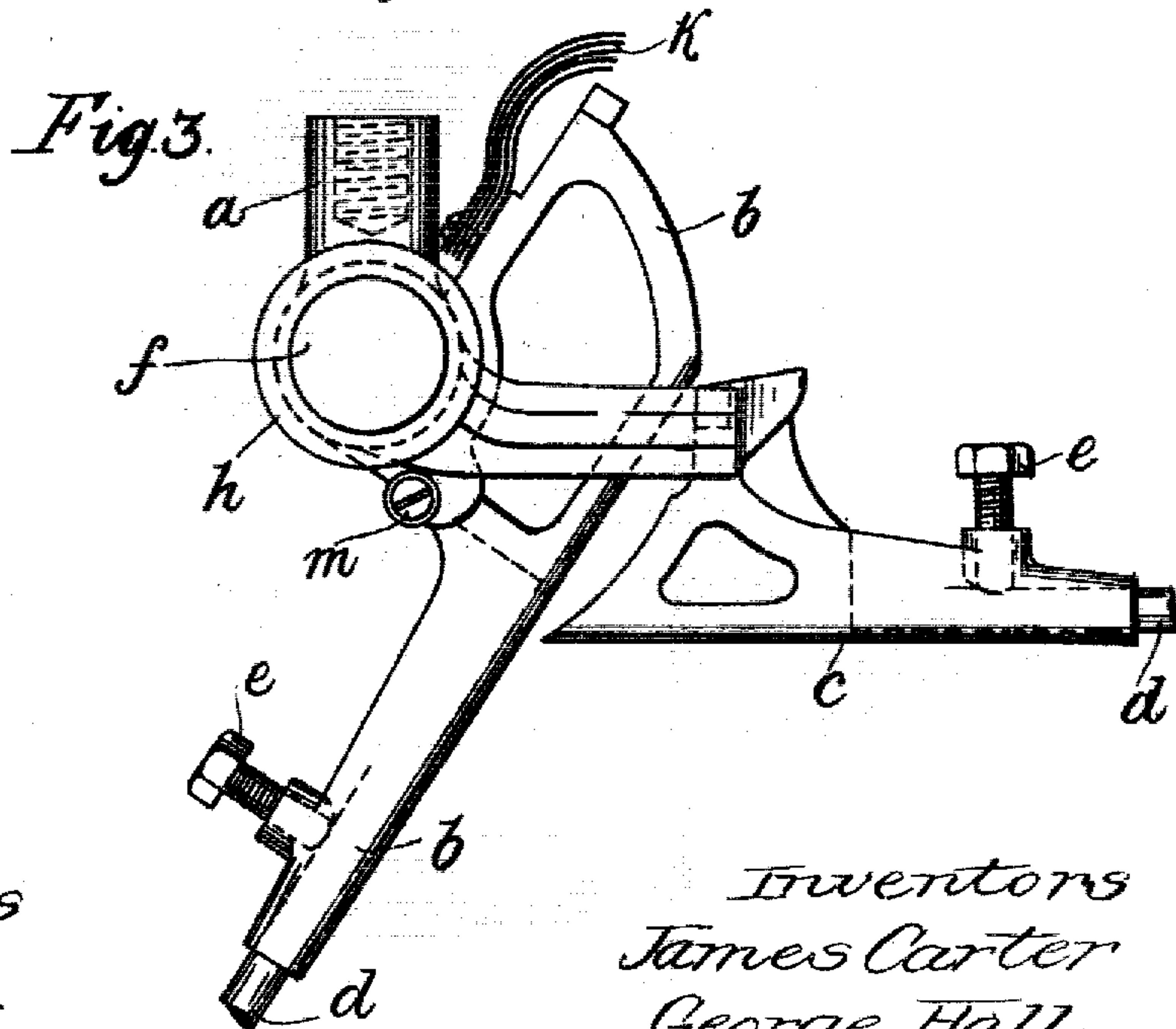
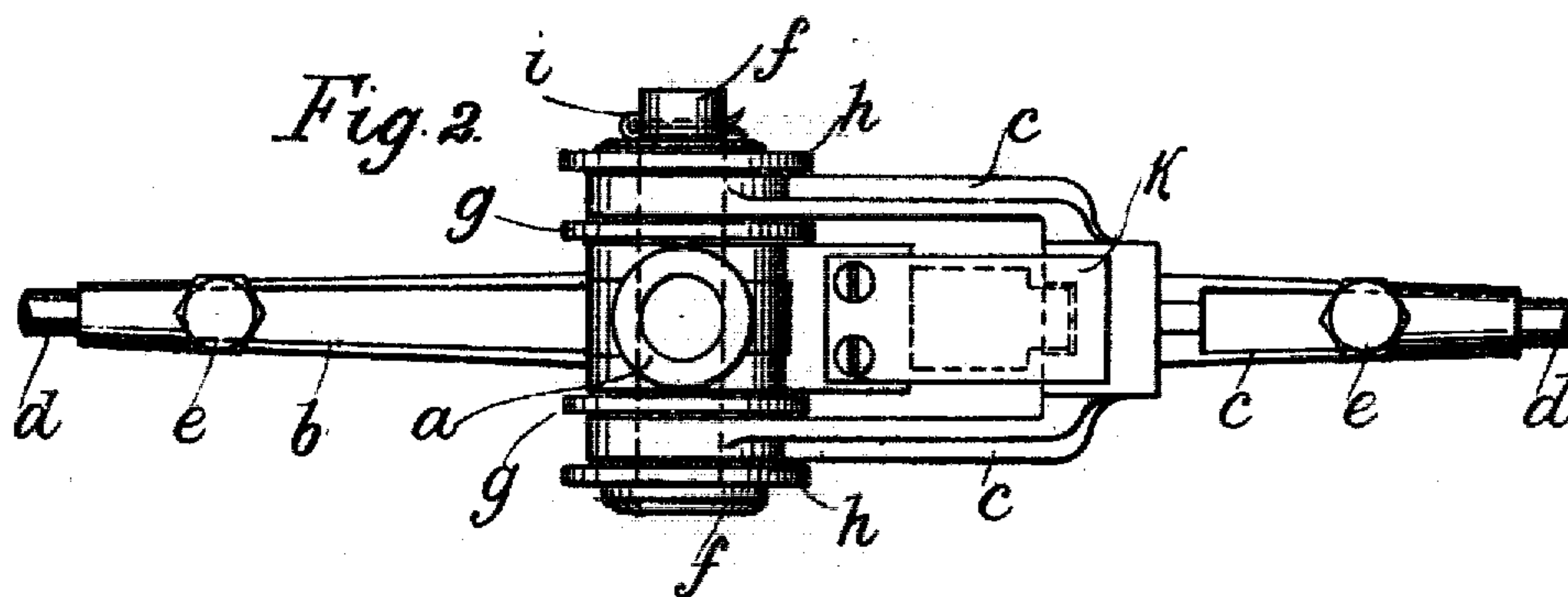
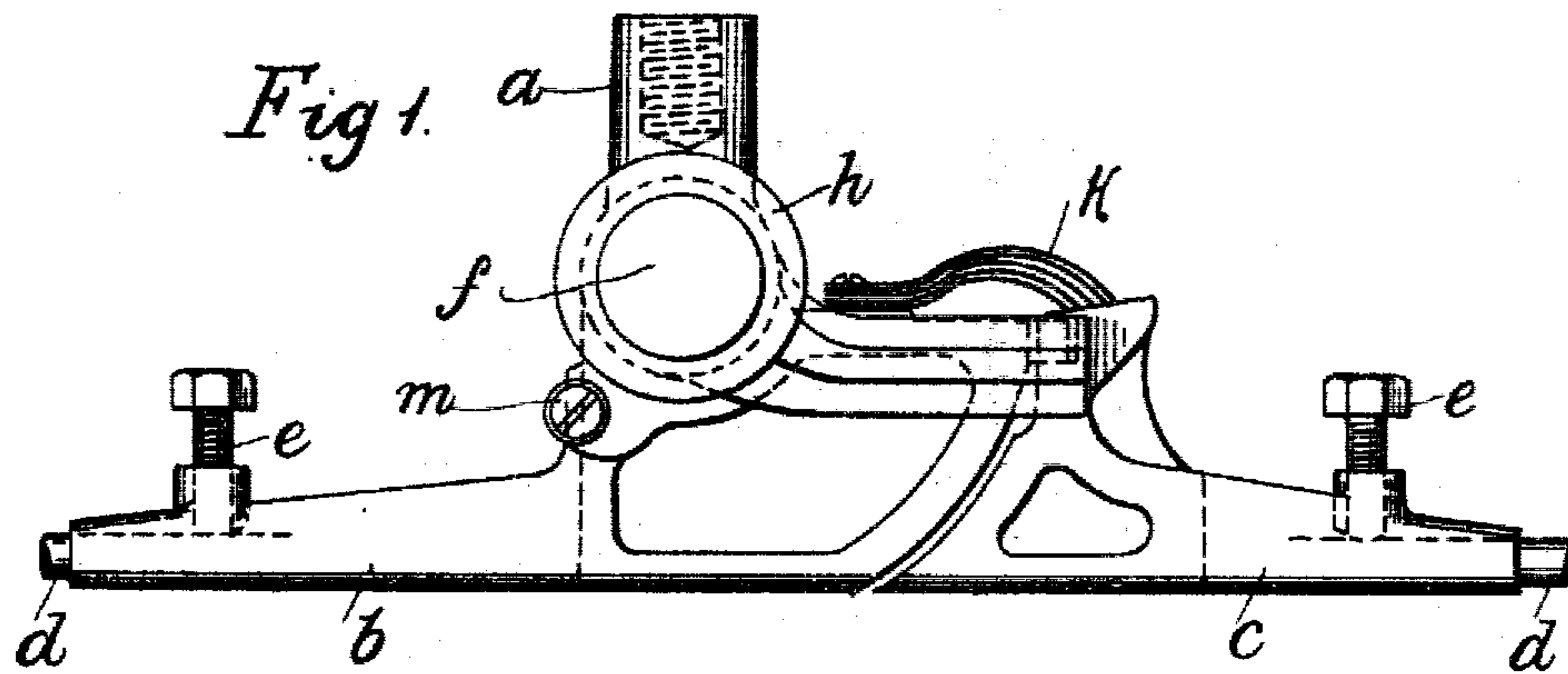
No. 811,822

PATENTED FEB. 6, 1906.

J. CARTER, G. HALL & A. PARSONS.  
AUTOMATIC CIRCUIT BREAKING SAFETY APPLIANCE FOR USE IN TROLLEY  
WIRE SYSTEMS FOR ELECTRIC TRACTION.

APPLICATION FILED OCT. 29, 1904.

2 SHEETS—SHEET 1



Witnesses  
H. M. Kuehn  
John A. Percival

Inventors  
James Carter  
George Hall  
Arthur Parsons  
BY Richard D. H. ATTORNEYS

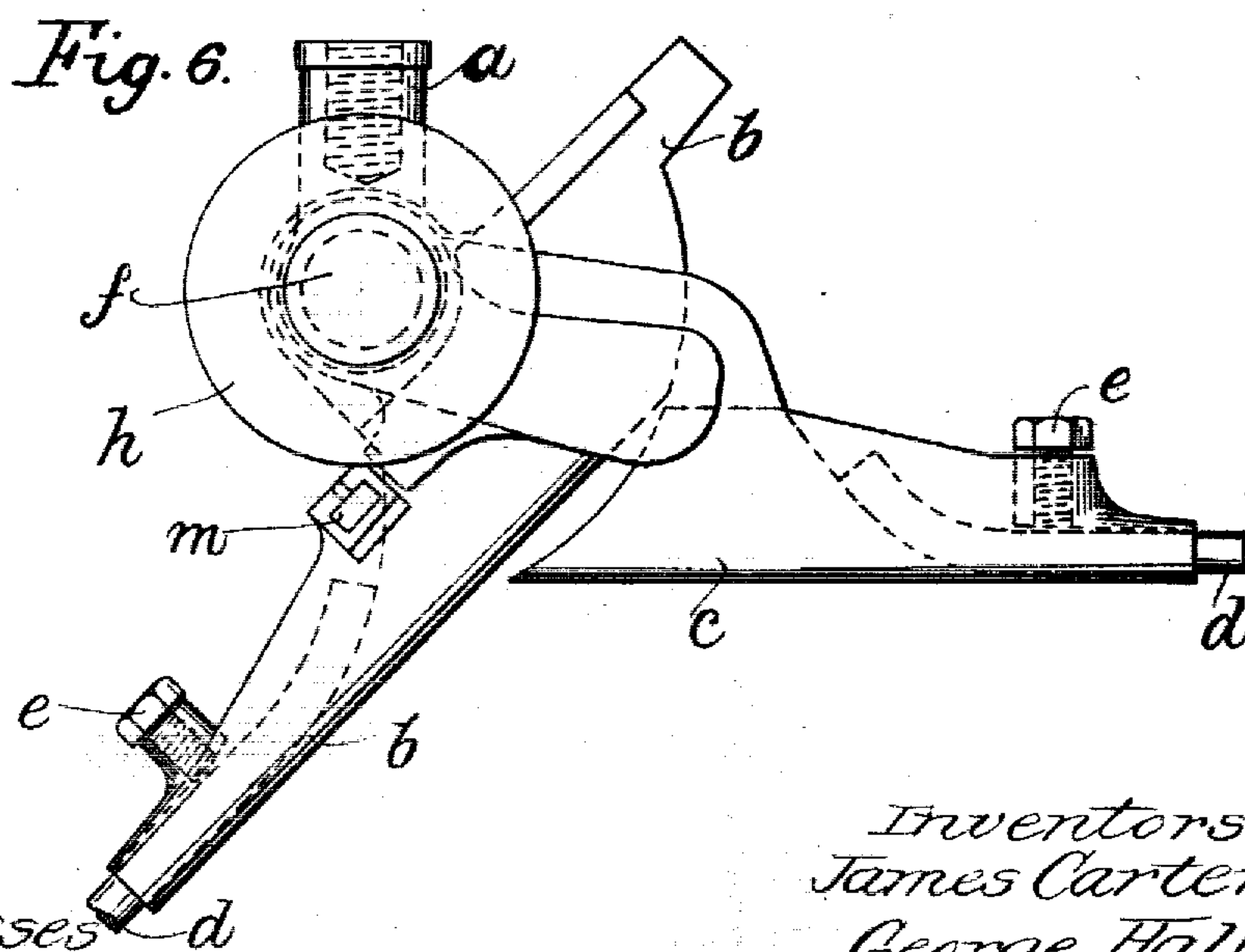
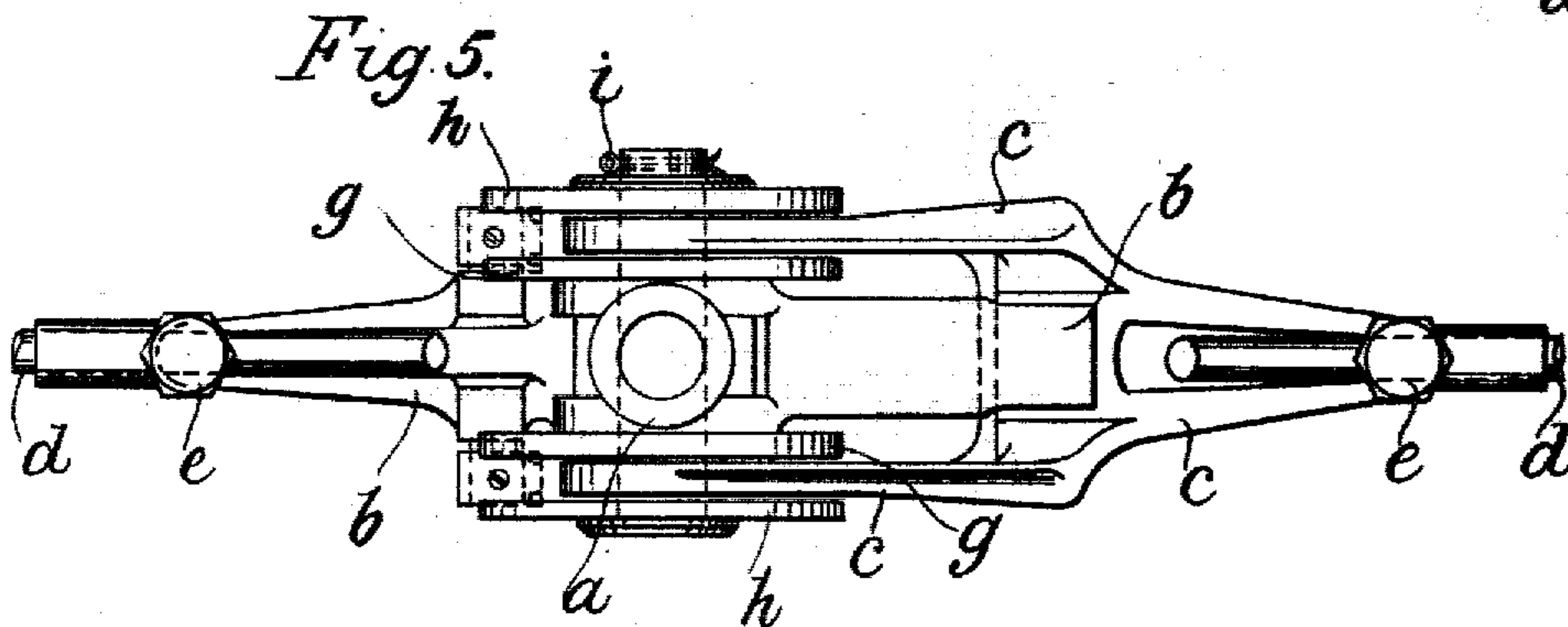
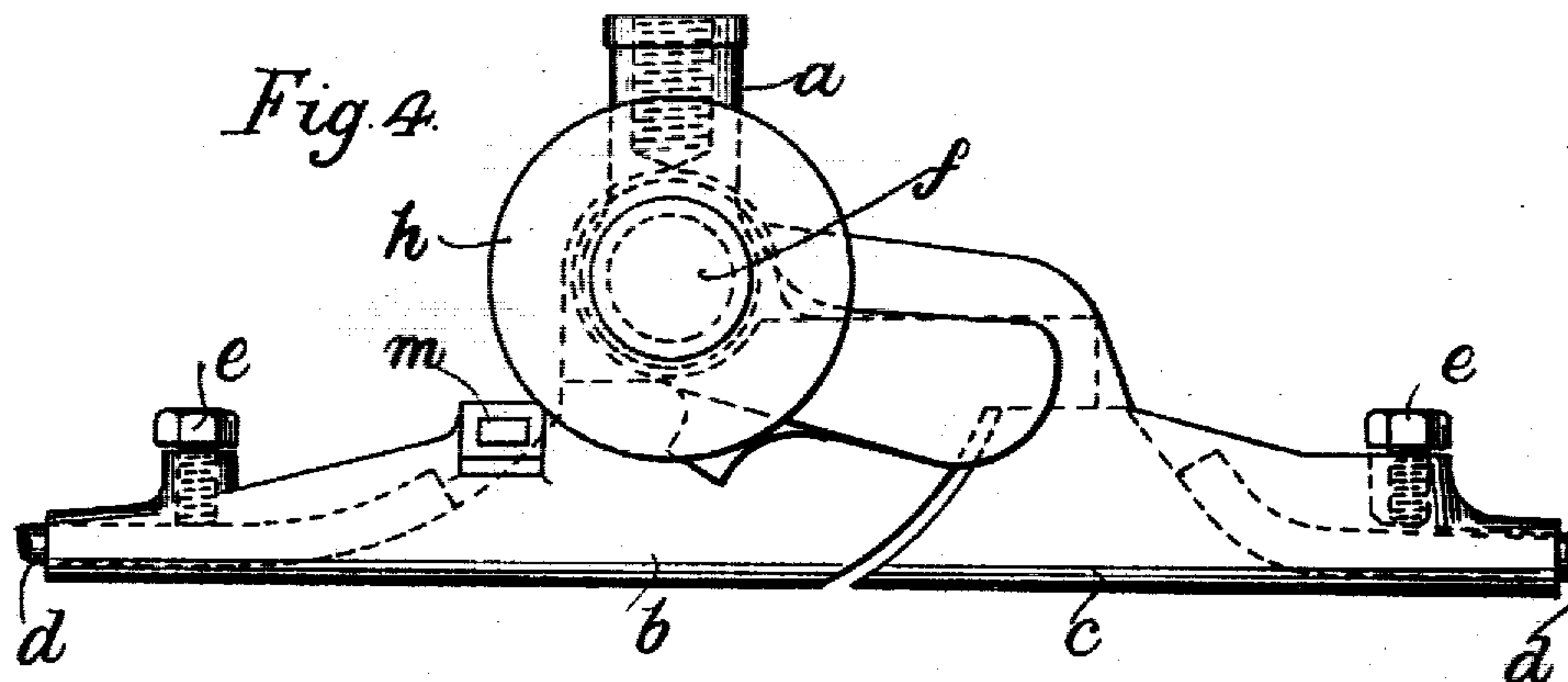
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# UNITED STATES PATENT OFFICE.

JAMES CARTER, OF STALYBRIDGE, GEORGE HALL, OF MANCHESTER,  
AND ARTHUR PARSONS, OF LEEDS, ENGLAND.

AUTOMATIC CIRCUIT-BREAKING SAFETY APPLIANCE FOR USE IN TROLLEY-WIRE SYSTEMS FOR  
ELECTRIC TRACTION.

No. 811,822.

Specification of Letters Patent.

Patented Feb. 6, 1906.

Application filed October 29, 1904. Serial No. 230,555.

*To all whom it may concern:*

Be it known that we, JAMES CARTER, engineer, of the firm of James Carter and Sons, of Atlas Works, Stalybridge, in the county of Chester, GEORGE HALL, engineer, of 385 Rochdale road, Manchester in the county of Lancaster, and ARTHUR PARSONS, boot-manufacturer, of Clifton Works, Leeds, in the county of York, England, have invented certain new and useful Improvements in Automatic Circuit-Breaking Safety Appliances for Use in Trolley-Wire Systems for Electric Traction, of which the following is a specification.

Our invention relates to improvements in automatic circuit-breaking safety appliances for use in trolley-wire systems for electric traction; and the object of our invention is to simplify, cheapen, and improve the construction of the hanger cut-outs in such manner as to insure good metallic contact and electrical conductivity so long as the line-wire or cross-wire remains unbroken, but which will on the fracture of a wire instantly break the electric circuit and cut out the broken ends, which thus fall harmless.

In automatic circuit-breaking safety appliances or hanger cut-outs as hitherto constructed it has been customary to have an ear or central portion secured rigidly to its support and to pivot two elbow levers or arms to such ear or body and connect the line-wires to the free ends of the elbow levers or arms. In such construction the electric circuit has been closed by spring-plungers and other sliding contacts, or by horns or projecting portions on one part coming into metallic contact with the other, or by a knife-switch arrangement, and our first improvement consists in the arrangement, use, and application of spring-brush contacts for closing the electric circuit when the hanger cut-out is in its normal working position. The form of brush which we prefer consists of a series of thin spring-metal plates laminated and secured to each elbow lever or arm and with the free ends of the laminæ beveled off to an inclination corresponding to that of an inclined surface on the ear or central portion. The brush may be composed of any desired number of laminæ, which may be of brass, copper, or other suitable metal.

Our second improvement consists of a simplification in the construction of the hanger

cut-out, whereby we are enabled to dispense with one of the two usual contacts and to employ only one contact, which is preferably the form of brush-switch above described, but may be any other suitable form of contact. In our improved construction we make the hanger cut-out in three principal parts—namely, two metal arms or levers and a supporting-swivel into which the ordinary insulating-bolt is screwed or secured. All these three parts are pivoted upon one stud, which thus forms their common center of movement, the parts being insulated where necessary by insulating-bushes and washers or equivalents. One of the metal arms or levers has a laminated spring-brush secured to it when we employ the brush-switch, and the other arm or lever has formed upon it the inclined surface corresponding to the beveled end of the brush, and the sections of the line-wire are secured in the usual way to the free ends of the two pivoted arms or levers. In the event of a fracture of either section of the connected line-wire its arm turning on the central stud will break the electric circuit by taking the brush off the incline or the incline from under the brush or otherwise breaking the metallic contact, and so allowing the section of wire to drop harmless.

We may employ both our improvements in combination to form our improved and preferred construction of automatic circuit-breaking safety appliance or hanger cut-out, or we may apply either improvement separately.

In the accompanying two sheets of drawings, Figure 1 is an elevation, and Fig. 2 a plan, of a hanger cut-out made according to our invention and embodying both our improvements; and Fig. 3 is an elevation showing the relative positions the parts occupy when one of the line-wires has broken and fallen. Fig. 4, 5, and 6 are similar views to Figs. 1, 2, and 3, respectively, of a like hanger cut-out, but made with a plain contact instead of our special brush switch or contact.

Similar letters refer to similar parts throughout the several views.

In both constructions the letters *a b c* designate the three principal parts of the hanger cut-out, *a* being the supporting-swivel, into which the ordinary insulating-bolt is screwed or secured, and *b c* the two



metal arms or levers to which the line-wires *d* are secured in any well-known way—as, for example, by the pinching-screws *e*. The three parts *a b c* are all pivoted on the stud *f*, which thus forms their common center of movement, and they are insulated from one another and from the stud *f*, where required, by flanged insulating-bushes *g* and washers *h*, the parts being held together by a cotter or split pin *i*. As shown by the drawings, an arm *b* is swiveled to the support *a* intermediate of its ends and the arm *c* is forked at its swiveled end, the forks thereof inclosing the short end of the arm *b*.

In the first construction the electric circuit is closed when the parts are in their normal working positions, as shown in Figs. 1 and 2, by the spring-brush contact *k*, which consists of a series of thin spring-metal plates laminated and secured to the metal arm *b* and with their free ends beveled off and bearing upon a corresponding incline on the metal arm *c*. When a line-wire breaks and falls, the metal arm to which it is connected—i. e., the arm *b* as illustrated in Fig. 3—is moved by its own weight and the weight of the connected wire into the position shown and is prevented from falling too far by the insulated stop *m*. The arm *b* thus takes the spring-brush *k* off the inclined surface on the arm *c* and instantly breaks the electric circuit, so that the broken wire falls dead, and consequently harmless.

The fact that the three principal parts *a b c*, which compose the hanger cut-out, are all free to swivel on their common center of movement—the stud *f*—greatly prolongs the life of the wires by obviating or reducing their tendency to crystallization. If the wire be

held rigidly at any one point and its free end oscillated, the wire in course of time will crystallize and break off near the point where its movements are restricted, and it is this defect which is overcome by having three principal parts *a b c* of the hanger cut-out all free to move upon their common center, the stud *f*.

In the second construction, Figs. 4, 5, and 6, a plain metal surface on the arm *b* comes into contact with another plain metal surface on the arm *c* and closes the electric circuit when the line-wires *d* are stretched; but the circuit is instantly broken when either wire breaks, and falls dead and harmless with its connected arm.

What we claim, and desire to secure by Letters Patent of the United States, is—

A hanger cut-out comprising a support *a*, an arm *b* swiveled intermediate of its ends to said support, the distance from said swivel to one end of said arm being greater than the distance from the swivel to the other arm, so that the one end is heavier than the other, a second arm having a forked end swiveled to said support *a*, the forks thereof inclosing the small end of the other arm, a contact carried by the short end of the first arm, said contact being adapted to engage with the second arm and means for securing line-wires to the free ends of the arms, substantially as described.

In witness whereof we have hereunto set our hands in the presence of two witnesses.

JAS. CARTER.  
GEORGE HALL.  
ARTHUR PARSONS.

Witnesses:

H. B. BARLOW,  
HERBERT ROWLAND ABBEY.