

J. DALZIEL.  
 REVERSING SWITCH.  
 APPLICATION FILED APR. 6, 1907.

915,053.

Patented Mar. 9, 1909.  
 2 SHEETS—SHEET 1.

Fig. 1.

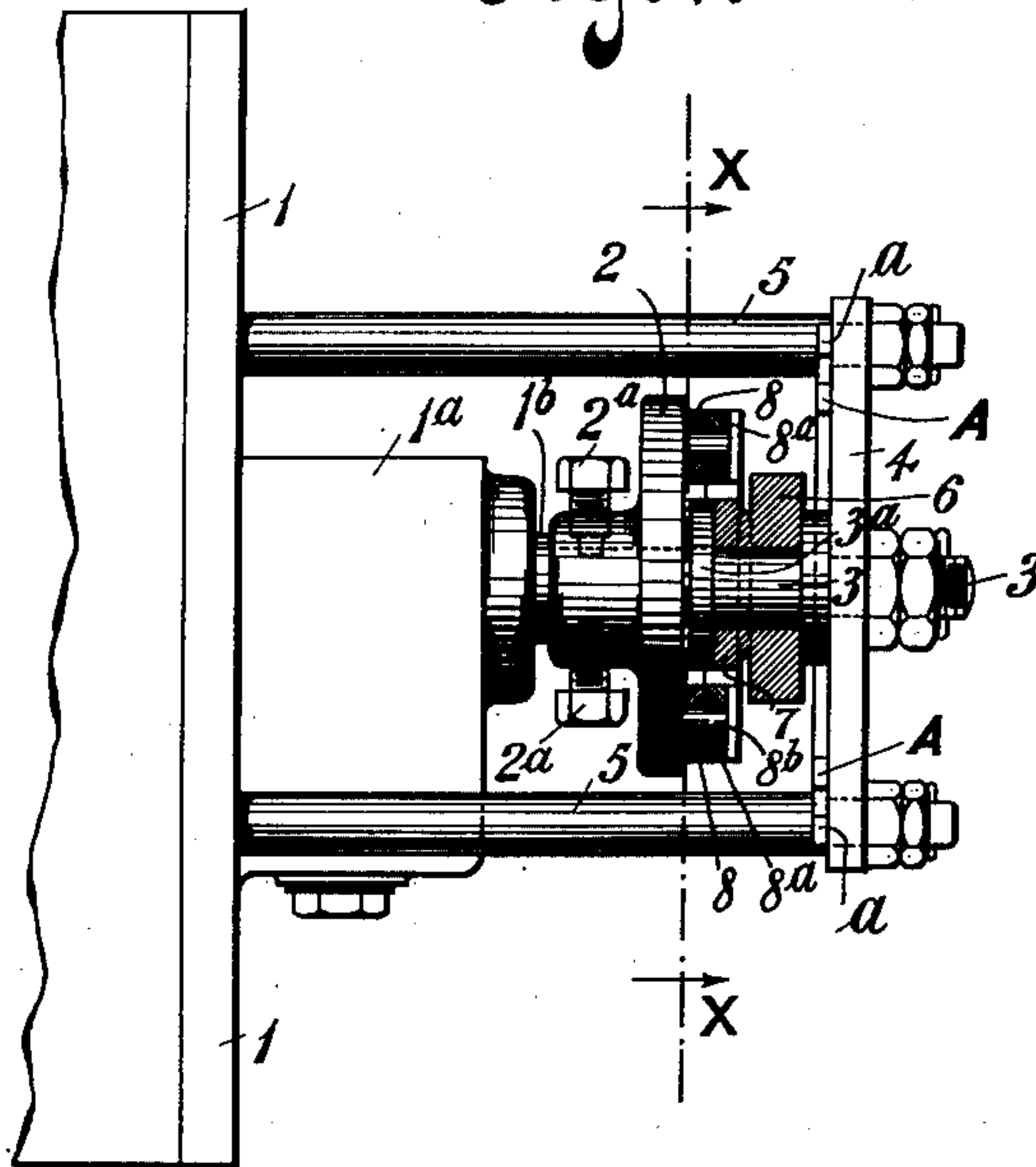
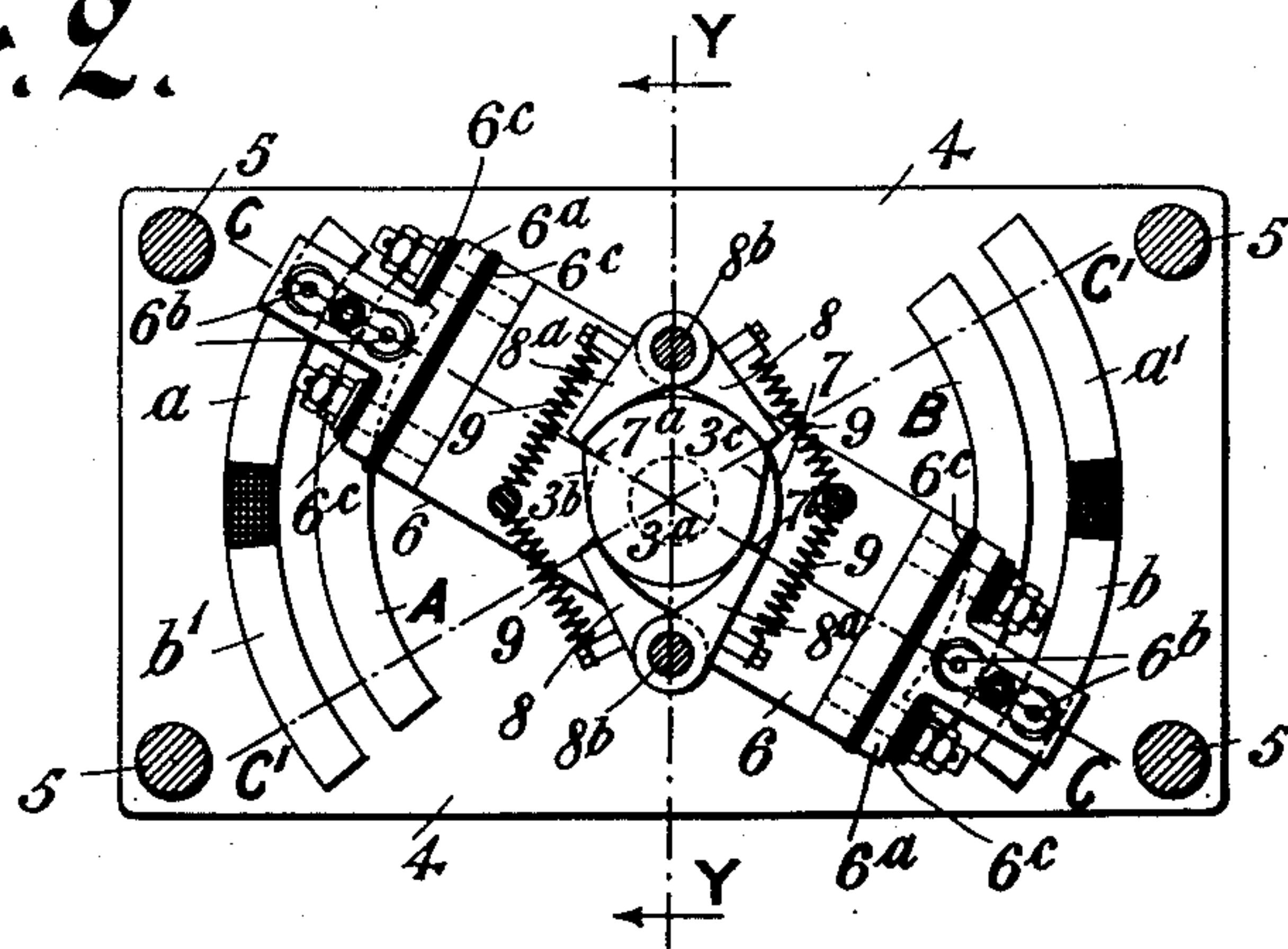


Fig. 2.



Witnesses:

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*James Dalziel*  
 by *W. M. Fairfax*  
 attorney

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2 SHEETS—SHEET 2.

FIG. 3.

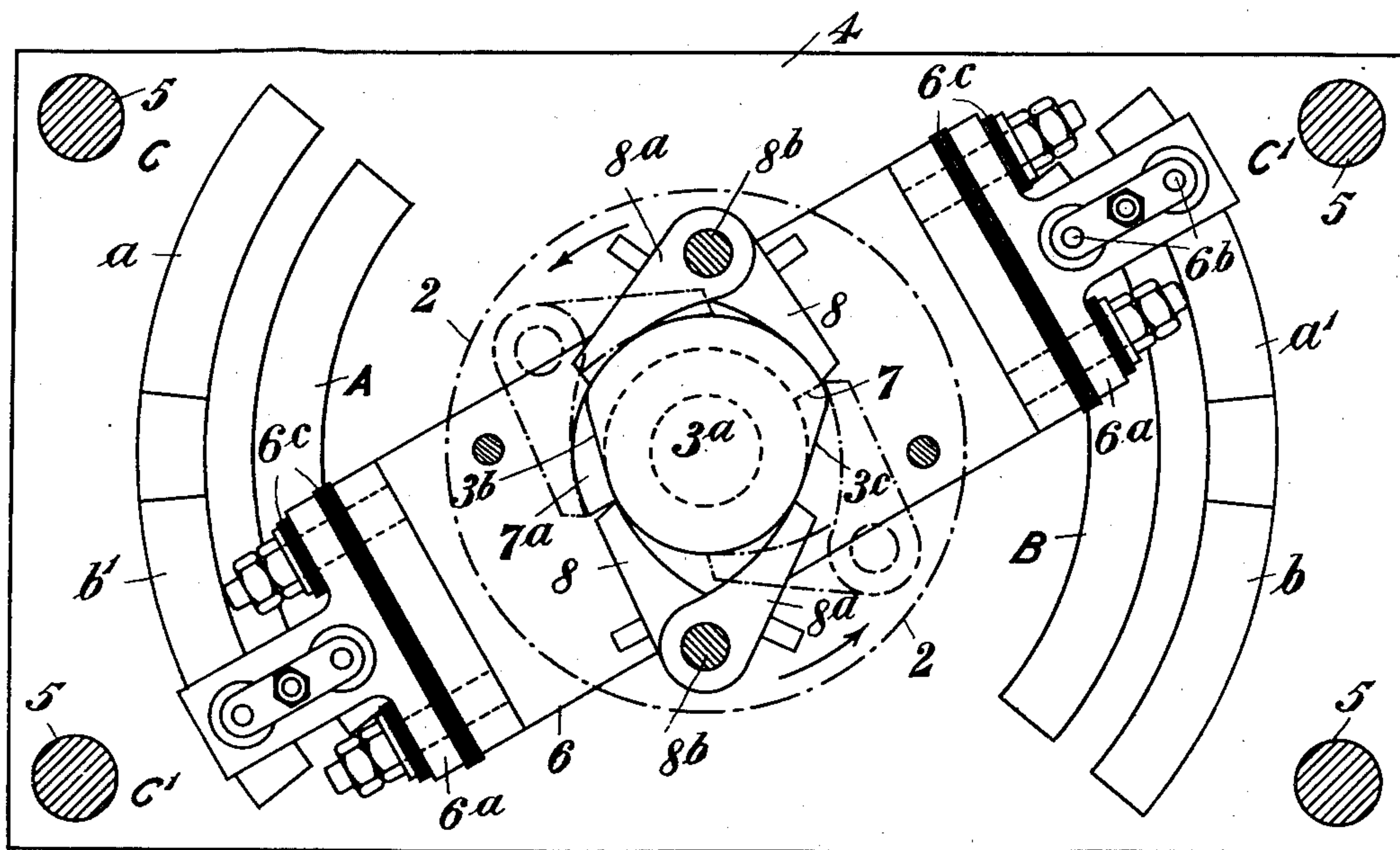
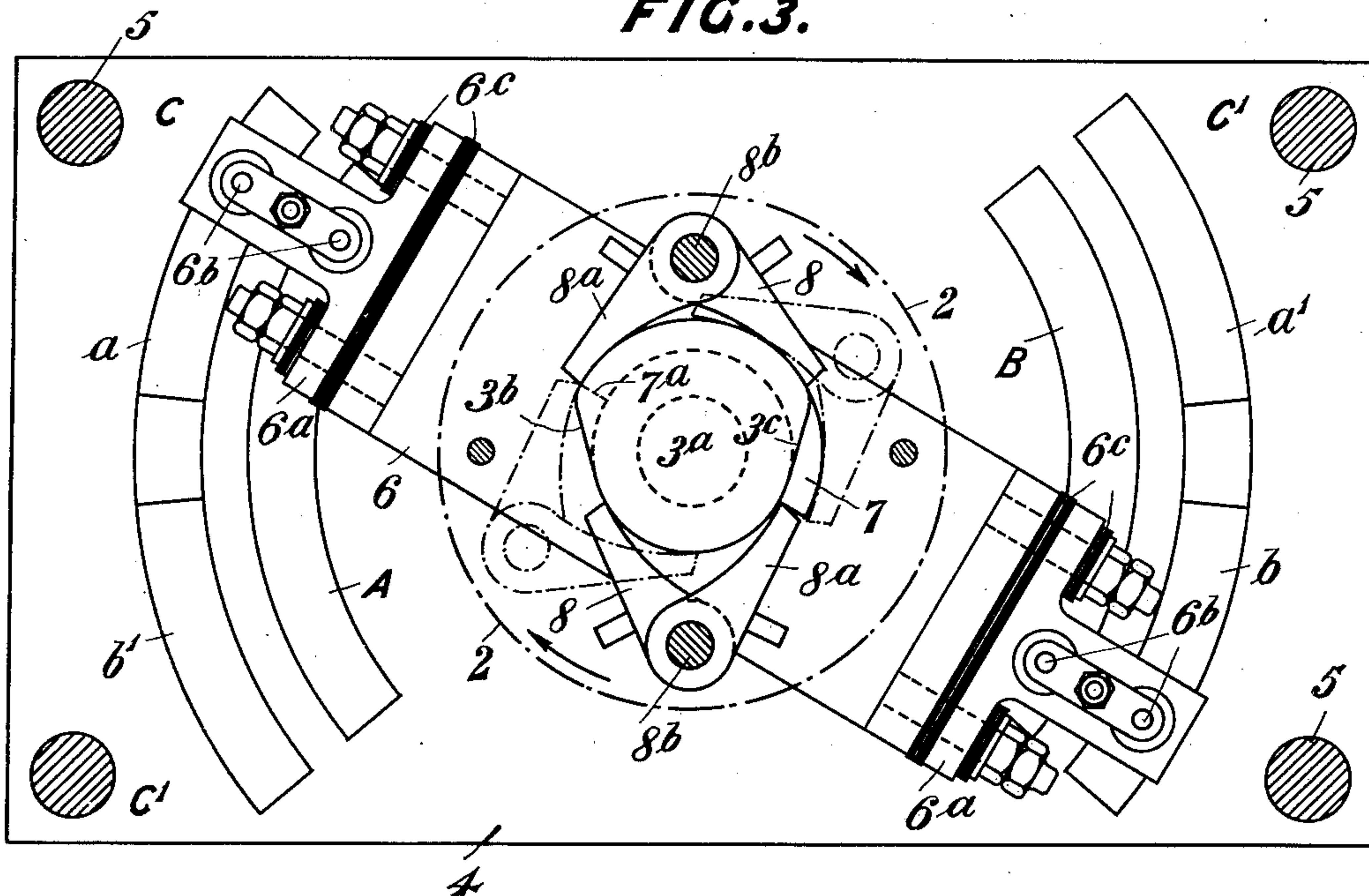


FIG. 4.

Witnesses:

*John H. Tucker*  
*W. L. Rockwell*

*James Dalziel*  
*by M. M. Fairfax*  
*his attorney*



# UNITED STATES PATENT OFFICE.

JAMES DALZIEL, OF DERBY, ENGLAND.

## REVERSING-SWITCH.

No. 915,053.

Specification of Letters Patent.

Patented March 9, 1909.

Application filed April 6, 1907. Serial No. 366,742.

*To all whom it may concern:*

Be it known that I, JAMES DALZIEL, a subject of the King of Great Britain, and residing at Derby, in the county of Derby, England, have invented certain new and useful Improvements in Reversing-Switches, of which the following is a specification.

This invention relates to electric switches and actuating means therefor operated in accordance with the direction of motion of a moving part, and is particularly applicable to reversing switches for dynamos used in train lighting which are driven from the carriage axle, and the connections for which require to be reversed each time the direction of rotation of the axle is reversed.

It has been proposed in reversing switches of this type, to employ the well known arrangement of a single pawl and masked ratchet, the ratchet being connected to the switch by means of a connecting rod, in which case the single pawl has to effect the movement in both directions, the movement so obtained being transmitted to the switch by the connecting rod.

According to my invention I improve the construction by so arranging matters that each pawl and its corresponding ratchet tooth are employed to effect movement in the one direction only, and the movement so obtained is transmitted directly to the switch arm without the use of a connecting rod or the like; in this way I provide a simple, strong, and effective construction in which there is a minimum risk of derangement of the working parts.

I will describe my invention as applied to a dynamo reversing switch for train lighting and this application is illustrated, by way of example, in the drawings; it is to be understood, however, that the arrangement may be modified within the limits of my invention so as to adapt it for use generally in those cases in which a switch has to be controlled by the direction of movement of a moving part.

In the accompanying drawings, Figure 1 is a side elevation, partly in section on the line Y. Y., of Fig. 2, and Fig. 2 is an end elevation in section on the line X. X., of Fig. 1. Fig. 3 is a view to a larger scale showing the position of the arm when the pawl carrier disk is rotating clockwise, the pawls being shown in dotted lines when in that position in which they are prevented by the mask

from engaging with the ratchet teeth; and Fig. 4 is a view similar to Fig. 3 showing the position of the switch arm when the pawl carrier disk is rotating in a counter-clockwise direction, the pawls being shown by dotted lines when in that position in which they are prevented by the mask from engaging with the ratchet teeth.

In Fig. 1, those portions of the switch arm 6, including the piece 6<sup>a</sup> and the spring contacts 6<sup>b</sup>, which are behind the plane of section, are for the sake of clearness omitted.

Throughout the drawings the same parts are indicated by the same reference characters, and the direction in which the respective sections are viewed is indicated by the small arrows placed adjacent to the letters denoting the plane of section.

1 is the end plate, and 1<sup>a</sup> one of the bearings of the dynamo; the projecting end of the dynamo shaft 1<sup>b</sup> has fixed to it a pawl carrier disk 2, and the shaft 1<sup>b</sup> terminates at this disk. A stud 3 is carried, concentrically with the shaft 1<sup>b</sup>, from an end plate 4, and the latter is supported by means of four studs 5 from the end plate 1.

The plate 4 carries the following contact pieces which are insulated from each other:—A and B connected to the dynamo terminals, a and a<sup>1</sup> each connected to the positive lead of the train lighting system, and b and b<sup>1</sup> each connected to the negative lead of the train lighting system. The switch arm 6 is mounted on the stud 3 on which it can move angularly between the limits C, C, and C<sup>1</sup>, C<sup>1</sup>; the end pieces 6<sup>a</sup>, insulated from the arm by strips 6<sup>c</sup>, carry suitable spring contacts 6<sup>b</sup> which, when the arm is in the position C, C, shown in Fig. 2, connect the contact pieces A to a and B to b, and which when the arm is in the position C<sup>1</sup>, C<sup>1</sup>, connect A to b<sup>1</sup> and B to a<sup>1</sup>.

As stated, the insulated end of the arm 6 and the spring contacts behind the plane of section are omitted from Fig. 1; their construction, however, will be readily understood from Fig. 2. The mode of making the electrical connections indicated in the drawings is that found to be convenient in practice, but obviously other suitable and well known means may be employed to effect the desired connections.

The position C, C, is that which corresponds with the direction of rotation of the dynamo which makes A positive and B



negative, while the position  $C^1$ ,  $C^1$ , corresponds with the direction of rotation of the dynamo which makes A negative and B positive; and it will be seen that notwithstanding the corresponding change of polarity of A and B, the positive and negative leads of the lighting circuit are in each position connected respectively to the then positive and negative terminals of the dynamo.

10 In order to insure that the arm shall, on a reversal of rotation, move promptly to the position corresponding with the reversed polarity, I provide a ratchet 7 attached to or made integral with the switch arm 6

15 and I pivot on studs  $8^b$  attached to the carrier disk 2, two pairs of reversely set pawls 8 and  $8^a$  each pressed normally into contact with the ratchet 7 by the springs 9; the ratchet 7 has two teeth  $7^a$  and  $7^b$  which,

20 as shown, are reversely set, and the head  $3^a$  of the stud 3 is so shaped as to always mask in the limiting positions either one or other of these two teeth.

The pawl carrier disk 2 which is attached to

25 the dynamo shaft  $1^b$  by the set screws  $2^a$  or by other suitable means rotates with the said shaft and carries with it the pawls 8 and  $8^a$ ; in the drawing the shaft  $1^b$  and the carrier and pawls are represented as rotating clock

30 wise; one of the two pawls 8 has engaged with the tooth  $7^a$  and as a consequence moved the arm 6 forwardly to the position C, C, and although the pawls continue to move clock-wise with the dynamo shaft,

35 further movement of the arm 6 is stopped by the detachment of the pawl 8 as the arm reaches its limiting position, by the fixed inclined surface  $3^b$  of the mask. Should the direction of rotation of the dynamo be re-

40 versed, one of the pawls  $8^a$  will engage with the tooth  $7^b$ , which is now unmasked, whereupon the arm 6 will be moved backwardly to the position  $C^1$ ,  $C^1$ , and upon reaching this limiting position the inclined surface  $3^c$  of

45 the mask will cause the detachment of the pawl  $8^a$ .

One pair of reversely set pawls would suffice to give the desired action, but the two pairs are fitted to insure prompt and certain

50 action.

Obviously the pawls may be carried from the switch arm and the ratchet formed on

the disk 2; or otherwise connected to the dynamo shaft.

Having now fully described my invention, I declare that what I claim, and desire to secure by Letters Patent is;—

1. The improved reversing switch comprising a switch with a movable arm adapted in its respective extreme positions to make 60 reversed connections, which arm is connected to the controlling moving part by means of reversely set pawls and a ratchet with reversely set teeth, the said switch arm being arranged concentrically with the ratchet 65 and pawls, so as to be adapted to be directly moved a limited amount in a direction corresponding with the direction of movement of the moving part, the said movement of the arm being limited by the action 70 of a fixed mask which when the arm is in either of its limiting positions, engages with a pawl and prevents the latter from engaging with the ratchet teeth; substantially as described. 75

2. The improved reversing switch consisting of the switch contacts, the switch arm connected to a ratchet having reversely set teeth, the dynamo shaft connected to reversely set pawls adapted to alternatively 80 engage with the teeth, and the fixed mask which when the arm is in either of its limiting positions, engages with a pawl and prevents the latter from engaging with the ratchet teeth; substantially as described. 85

3. In combination, a reversing switch adapted in extreme positions, to make reversed connections; a rotating part the direction of rotation of which determines the switch connections; and means interposed 90 between the switch and the said rotating part, comprising reversely set pawls, a ratchet with reversely set teeth, and a fixed mask which when the arm is in either of its limiting positions, engages with a pawl and prevents the latter from engaging with the ratchet teeth; substantially as described. 95

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

JAMES DALZIEL.

Witnesses:

J. E. LLOYD BARNES,  
JOSEPH E. HIRST.