

No. 803,442.

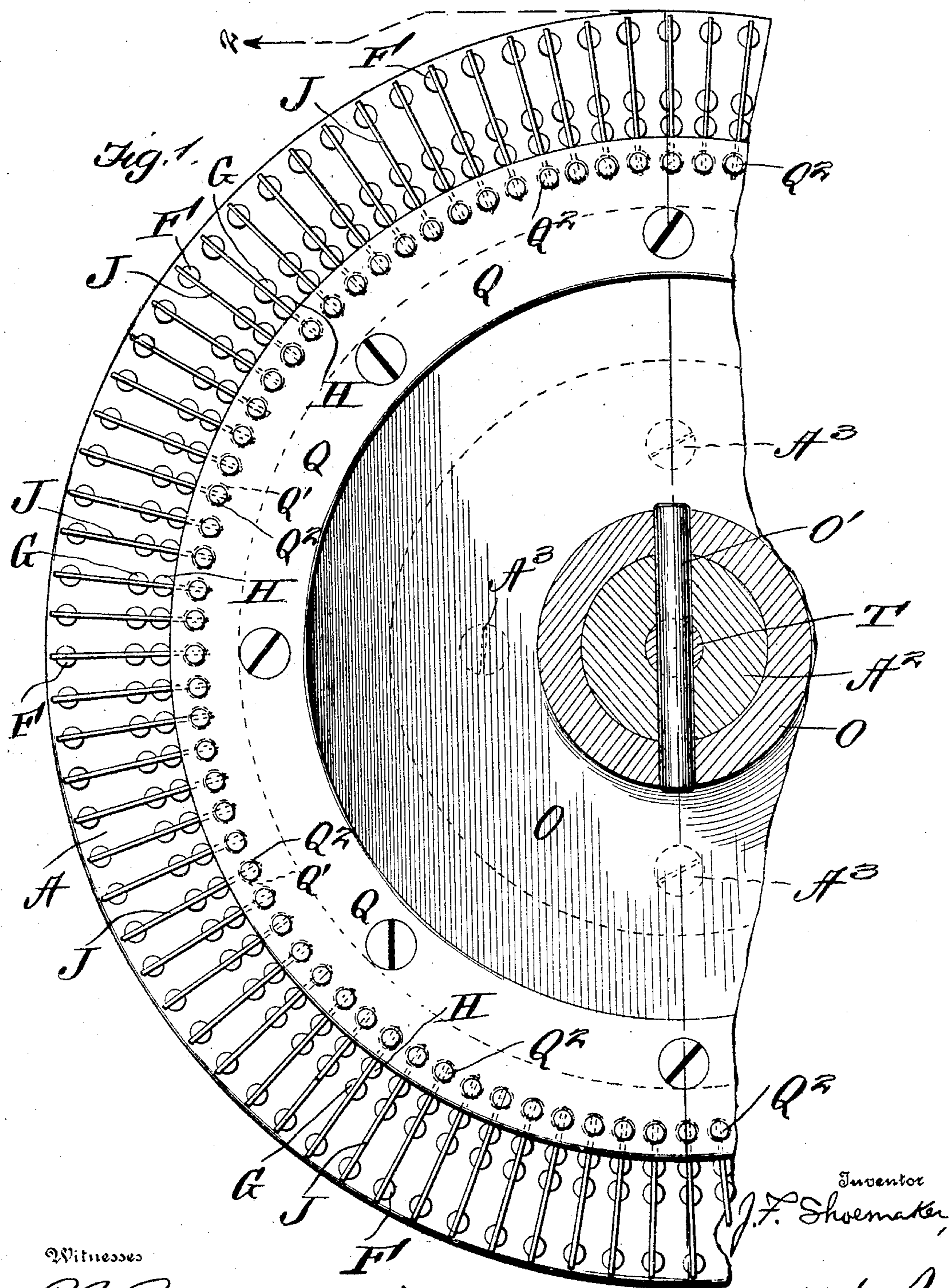
PATENTED OCT. 31, 1905.

J. F. SHOEMAKER.

APPARATUS FOR SHORT CIRCUITING TURNS IN ARMATURE COILS.

APPLICATION FILED APR. 13, 1906.

2 SHEETS—SHEET 1.



Witnesses

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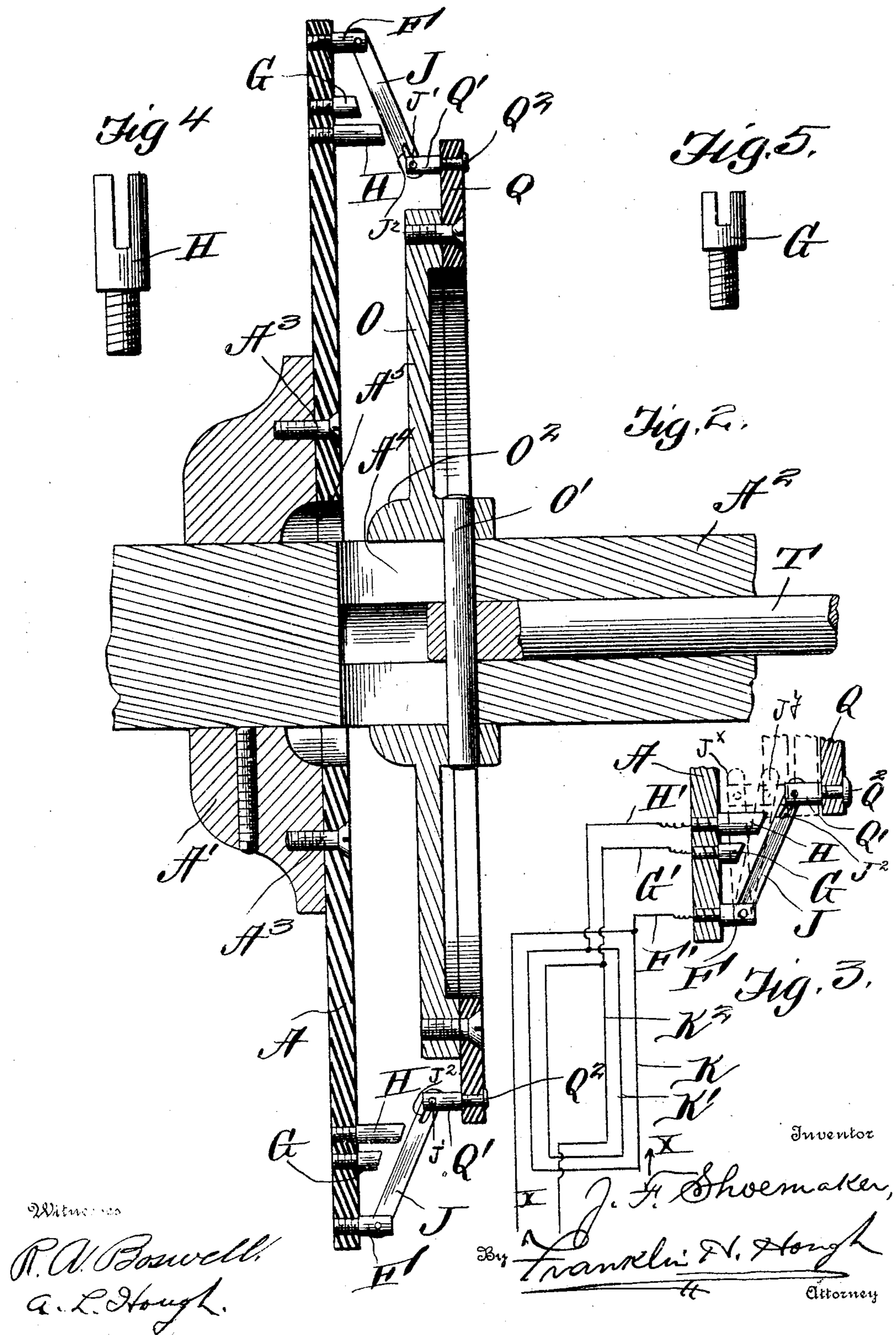
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# UNITED STATES PATENT OFFICE.

JOHN FRANKLIN SHOEMAKER, OF MADISON, WISCONSIN.

## APPARATUS FOR SHORT-CIRCUITING TURNS IN ARMATURE-COILS.

No. 803,442.

Specification of Letters Patent.

Patented Oct. 31, 1905.

Application filed April 13, 1905. Serial No. 255,413.

*To all whom it may concern:*

Be it known that I, JOHN FRANKLIN SHOEMAKER, a citizen of the United States, residing at Madison, in the county of Dane and State of Wisconsin, have invented certain new and useful Improvements in Apparatus for Short-Circuiting Turns in Armature-Coils; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to new and useful improvements in apparatus for cutting out or short-circuiting turns in armature-coils, and it is especially designed for use on direct-current two-wire motor; and the object of the invention is to produce means whereby any practical range of speed may be obtained with a reduced size of motor per given output, per given range in speed, and by which apparatus it is possible to use a greater length of wire upon the armature, than is possible with the existing two-wire variable-speed motors with field control, and in which is made possible the use of an average weaker field, and in the high speeds instead of introducing resistance in the field circuit parts of the turns in each armature-coil may be cut out or short-circuited and the armature reaction will be less instead of greater and armature resistance less, also field distortion is less.

The invention consists, further, in means whereby extremely high and low speeds may be obtained and greater efficiency through different ranges of speed.

The invention consists, further, in various details of construction, and in combinations and arrangements of parts, which will be hereinafter fully described and then specifically defined in the appended claims.

My invention is clearly illustrated in the accompanying drawings, which, with the letters of reference marked thereon, form a part of this application, and in which—

Figure 1 is an end elevation of my invention, which is adapted to be positioned at the back end of an armature. Fig. 2 is a vertical sectional view on line 2 2 of Fig. 1. Fig. 3 is a detail sectional view showing the manner of connection of the leads of the armature-coil to the contact switch-points. Fig. 4 is a detail view of the longer of the contact-

points, and Fig. 5 is a detail view showing the shorter of the contact-points.

Reference now being had to the details of the drawings by letter, A designates a fiber disk secured, by means of a yoke A', to an armature-shaft A<sup>2</sup> by means of screws A<sup>3</sup>, said disk being adapted to be fastened adjacent to the back of an armature. Said disk has secured thereto the various sets of contact-points F, G, and H, and to these contact-points are fastened the switch-leads F', G', and H', which run to the armature-coil in the manner shown in Fig. 3 of the drawings. Mounted to have an adjustable movement upon the armature-shaft is a disk O, having a pin O' passing through the hub of said disk and also through an elongated slot A<sup>4</sup> in the armature-shaft, whereby said disk O may have a limited movement upon the shaft. One end of the hub of said disk O is convexed, as at O<sup>2</sup>, and the yoke A' has a concaved or chambered portion A<sup>5</sup>, adapted to receive said convexed end of the hub when the disk O is moved to its limit in one direction. Secured to one face of the disk O and projecting beyond its circumference is a fiber band Q, and secured to said fiber band Q, at locations beyond the circumference of the disk O, is a series of posts Q', each of which is held by means of a screw Q<sup>2</sup> upon the band Q, and each post carries a pin J', having pivotal connection with a blade J, said pin working in a slot J<sup>2</sup> in the blade J. The outer ends of the blades J have pivotal connection with the contact-points F, as shown clearly in Fig. 2 of the drawings. The contact-points G, which are shorter than the contact-points H, have their outer ends inclined, and each contact-point G as well as the contact-points H are slotted, as shown in the detail views of the drawings, to receive the blade J in the manner illustrated in dotted lines in Fig. 3 of the drawings.

Referring to Fig. 3 of the drawings, it will be observed that I have only shown three turns of the armature-coil for the purpose of simplicity, said turns being designated by letters K, K', and K<sup>2</sup>, the letter X designating the negative current to the commutator, and the letter Y the positive current to the commutator.

In order to move the disk O to cut out different circuits, I provide a longitudinally-movable rod T, which is mounted within a central longitudinal aperture in the armature-shaft, and the inner end of said rod has con-

nection with the pin O', (shown clearly in Fig. 2 of the drawings,) and by which rod the disk may be moved backward or forward, as may be desired.

5 In operation when the switch-blades are in the position shown by solid lines in Figs. 2 and 3 of the drawings all armature-conductors are working, and as the current from the commutator enters the armature-coil through the  
10 lead to the turn K, there being no point for it to leave the coil, it will travel through the three turns and back to the commutator through the lead K<sup>2</sup>. When the switch is thrown so that the blades J will occupy the  
15 position designated in dotted lines J<sup>x</sup>, the current will enter another coil from the commutator through the commutator-lead to turn K, will follow turn K until it gets to the switch-lead F', then it will follow out through  
20 the switch-lead F', through the contact-points F, through the switch-blade J, through contact-points H, thence to the switch-lead H', and into the turn K', and thus short-circuiting parts of coils K and K', leaving two turns  
25 active out of three turns. With the switches thrown in positions shown by J<sup>y</sup> in dotted lines in Fig. 3 the current coming from the turn K follows the latter until it gets to the switch-lead F', thence passes through the  
30 switch-lead F', through the contact F, blade J, contact G into the turn K<sup>2</sup>, thence to the lead to the commutator, whereby part of turn K, a portion of turn K<sup>2</sup>, and all of turn K' are short-circuited, leaving only one complete  
35 turn active.

While in the drawings I have shown but three turns per armature-coil, it will be understood that I do not limit myself to any number of turns, as I am now working a machine having twenty-six turns per armature-coil and by which I can cut out twelve turns in each coil, and in the position J<sup>y</sup> there are eighteen turns out of the twenty-six that would be cut out or short-circuited. It will  
45 be also understood that my apparatus may be made in almost any number of different sizes and have various sets of switches and various numbers of turns per coil, various devices being constructed to meet the requirements of  
50 individual motors; but the construction and action will be the same in all.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

55 1. An attachment for motors for short-circuiting turns in the armature-coils thereof, consisting, in combination with the armature-shaft of a motor, of a disk fixed to said shaft adjacent to the end of the armature, a series  
60 of contact-points carried by said disk, a movable disk upon the armature-shaft, a fiber band carried by said movable disk, blades pivotally connecting said fixed disk and band and adapted to be thrown into electrical connection with

the contact-points upon said fixed disk, turns 65 of armature-coils electrically connected with said contact-points, and means for operating said movable disk, as set forth.

2. An attachment for motors for short-circuiting turns in the armature-coils thereof, 70 consisting, in combination with the armature-shaft of a motor, of a disk fixed to said shaft adjacent to the end of the armature, a series of contact-points carried by said disk, a movable disk upon the armature-shaft, a fiber 75 band carried by said movable disk, blades pivotally connecting said fixed disk and band and adapted to be thrown into electrical connection with the contact-points upon said fixed disk, turns of armature-coils electrically con- 80 nected with said contact-points, and a longitudinally-movable rod mounted within the armature-shaft and connected to said movable disk, as set forth.

3. An attachment for motors for short-cir- 85 cuiting turns in the armature-coils thereof, consisting, in combination with the armature-shaft of a motor, of a disk fixed to said shaft adjacent to the end of the armature, a series of contact-points carried by said disk, a mov- 90 able disk upon the armature-shaft, a fiber band carried by said movable disk, blades pivotally connecting said fixed disk and band and adapted to be thrown into electrical connection with the contact-points upon said fixed 95 disk, turns of armature-coils electrically connected with said contact-points, a pin passing through the hub of said movable disk through an elongated slot in the armature-shaft, and a rod mounted longitudinally in the armature- 100 shaft and connected to said pin, as set forth.

4. An attachment for motors for short-cir- 105 cuiting turns in the armature-coils thereof, consisting, in combination with the armature-shaft of a motor, of a yoke fixed to said shaft and having a recess in one face thereof about its central aperture, a centrally-apertured disk fixed to said yoke, a series of contact-points carried by said disk, a movable disk upon the 110 armature-shaft, a fiber band carried by said movable disk, blades pivotally connecting said fixed disk and band and adapted to be thrown into electrical connection with the contact-points upon said fixed disk, turns of arma- 115 ture-coils electrically connected with said contact-points, means for operating said movable disk, and said movable disk having a hub portion adapted to enter the recessed portion of said yoke, as set forth.

5. An attachment for motors for short-cir- 120 cuiting turns in the armature-coils thereof, consisting, in combination with the armature-shaft of a motor, of a disk fixed to said shaft adjacent to the end of the armature, a series of contact-points carried by said disk, a mov- 125 able disk upon the armature-shaft, a fiber band carried by said movable disk and projecting beyond the circumference thereof,

posts carried by said fiber band beyond the circumference of the movable disk, blades pivotally connecting said posts with pivotal contacts upon the movable disk, turns of armature-coils electrically connected with said contact-points, and means for operating said movable disk, as set forth.

In testimony whereof I hereunto affix my signature in presence of two witnesses.

JOHN FRANKLIN SHOEMAKER.

Witnesses:

ELMORE THEO. ELVER,  
WILLIAM TRAINOR.