F. W. WOOD.

AUTOMATIC CONTACT MECHANISM FOR ELECTRIC REVOLUTION INDICATORS.

APPLICATION FILED MAR. 20, 1907.

898,621. **Patented Sept. 15, 1908.**

2 SHEETS—SHEET 1.

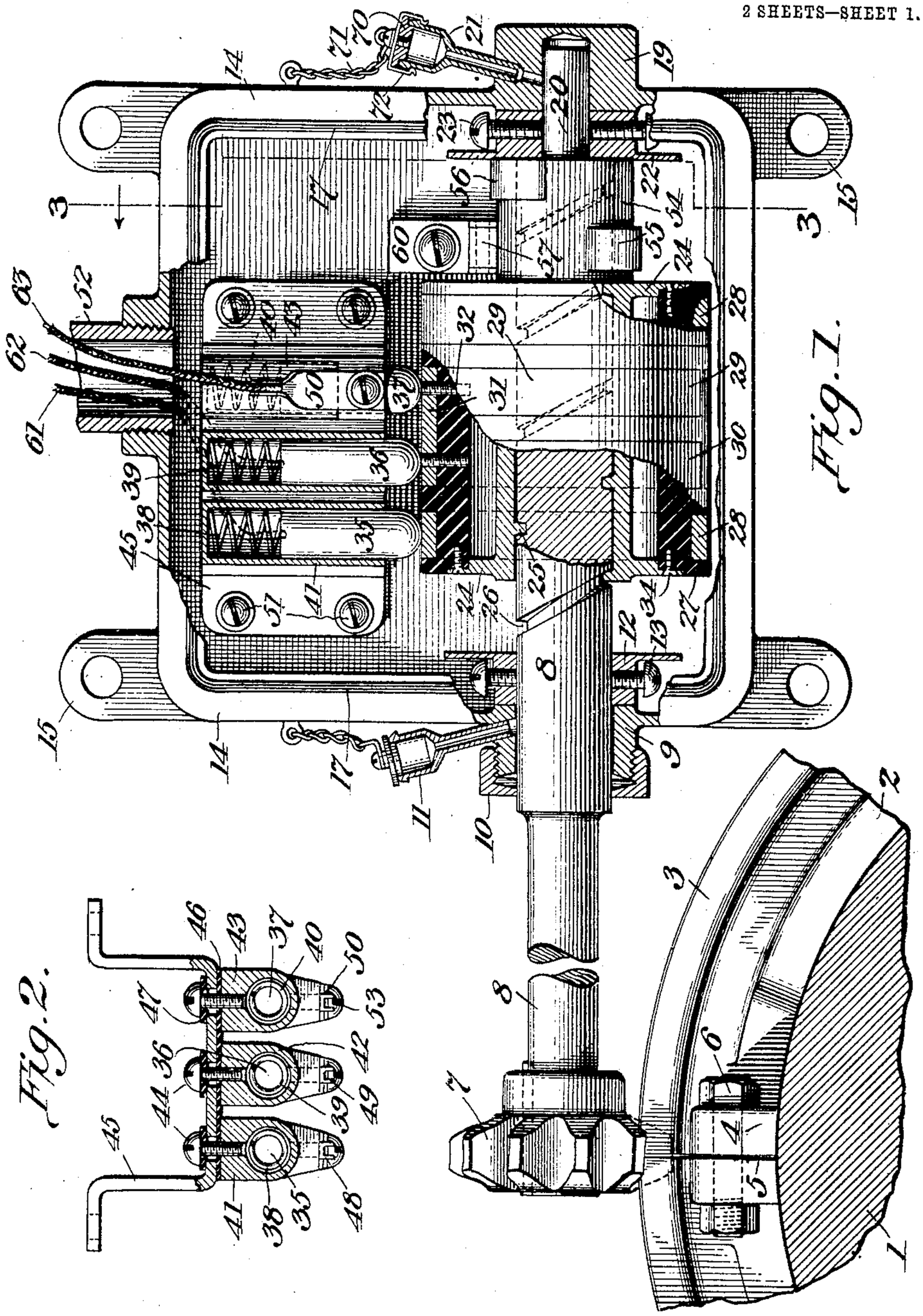

Fig. 1.

Fig. 2.

Witnesses:
J. A. Boyden
T. A. Connors

Inventor,
Frank W. Wood
By Meyer, Cushman & Co.
Attorneys.

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2 SHEETS—SHEET 2.

Fig. 3.

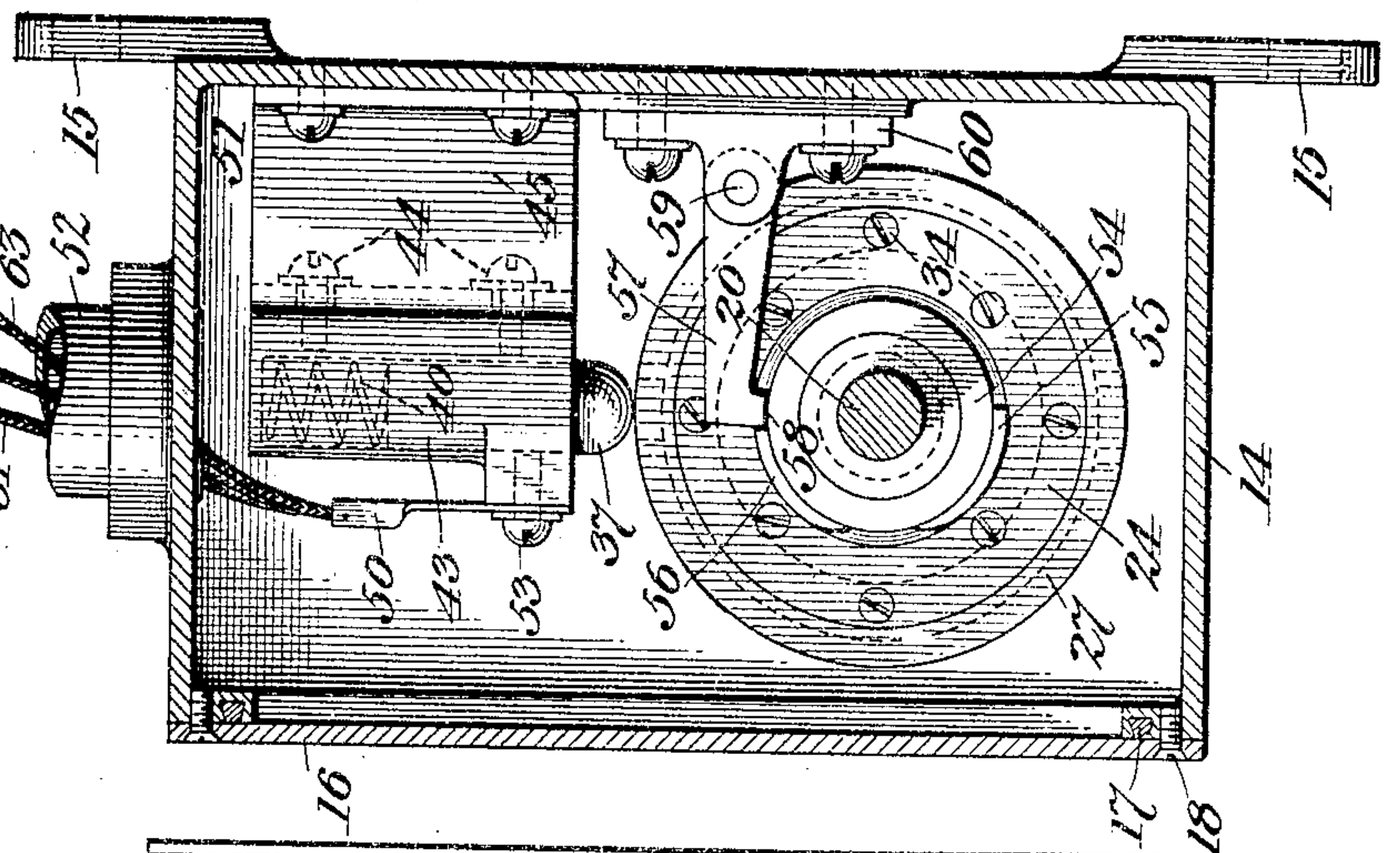


Fig. 6.

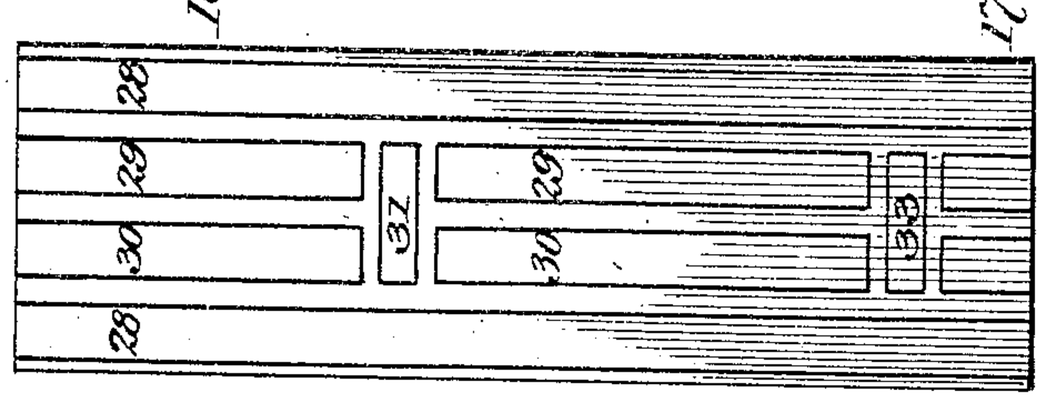


Fig. 4.

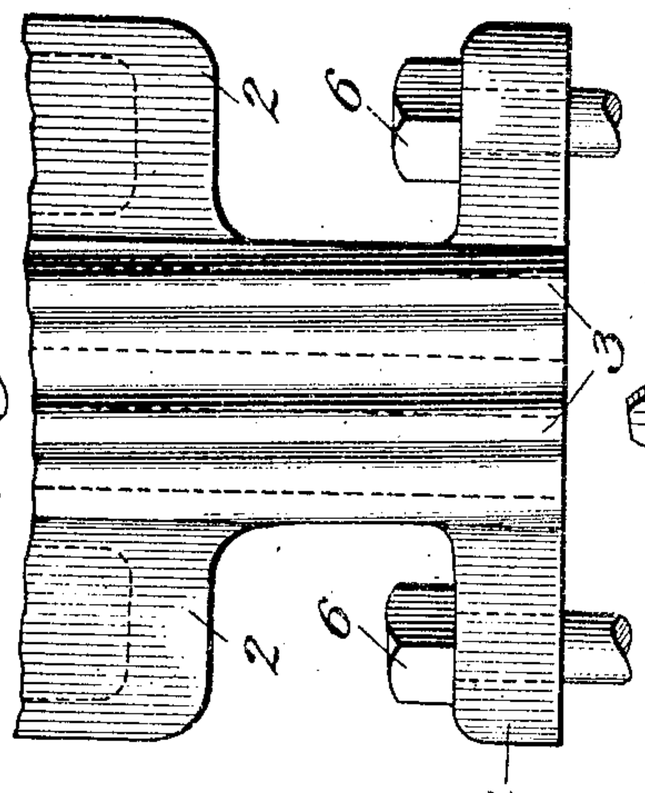
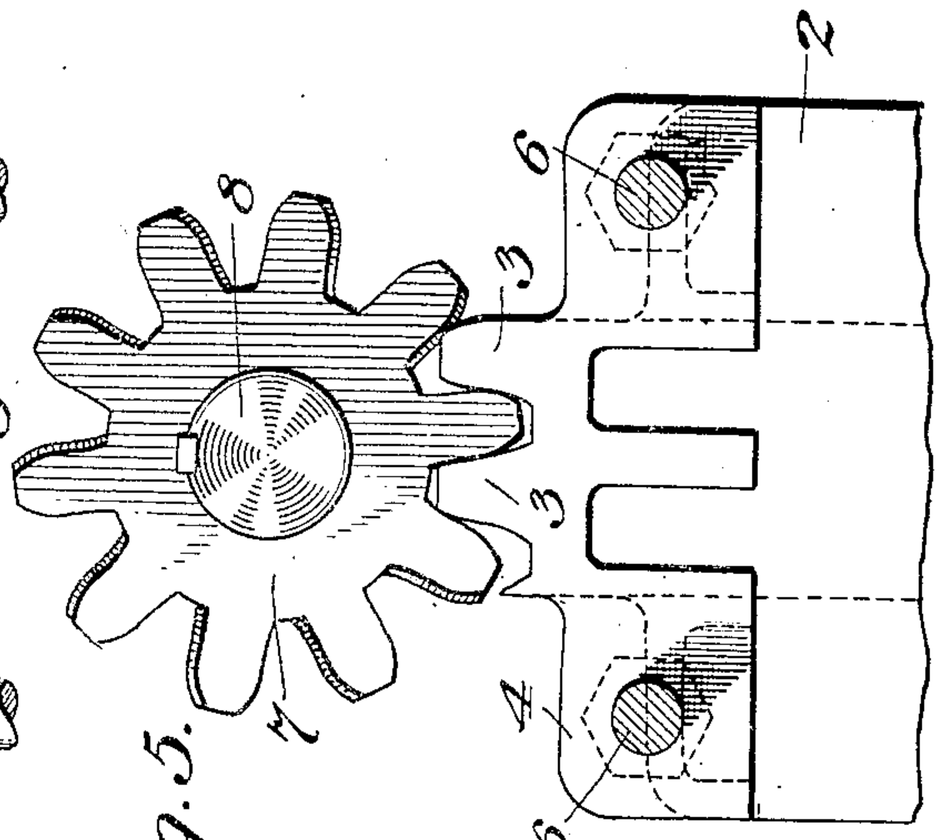


Fig. 5.



Witnesses:

J. H. Boyden

T. A. Common

Inventor,

Frank W Wood

By Meyer, Cushman & Reg

Attorneys.

UNITED STATES PATENT OFFICE.

FRANK W. WOOD, OF NEWPORT NEWS, VIRGINIA, ASSIGNOR TO CHARLES CORY AND JOHN M. CORY, OF NEW YORK, N. Y.

AUTOMATIC CONTACT MECHANISM FOR ELECTRIC REVOLUTION-INDICATORS.

No. 898,621. Specification of Letters Patent. Patented Sept. 15, 1908.

Application filed March 20, 1907. Serial No. 363,361.

To all whom it may concern:

Be it known that I, FRANK W. WOOD, a citizen of the United States, residing at Newport News, in the county of Warwick and State of Virginia, have invented new and useful Improvements in Automatic Contact Mechanism for Electric Revolution-Indicators, of which the following is a specification.

My invention relates to rotary contact mechanism, and more especially to mechanism of this character designed for continuous operation by a shaft, the speed, direction, or number of revolutions of which it is desirable to indicate or register.

My invention is particularly designed for use on ship board, in connection with the propeller shaft, and to this end I have provided certain details of construction not necessary, perhaps, where my invention is employed elsewhere, but it is, of course, to be understood, that the invention may be used with equal advantage in connection with any other shaft or rotating part on any machine whatever.

The primary object of my invention is to provide automatically operating contact mechanism which shall serve to close periodically one of two circuits according to the direction of rotation of the shaft, and which circuits, when so closed, shall serve to operate any suitable indicating or registering device, located at any desired distance from the shaft.

A further object is to provide mechanism of the above character which shall be practically water and dust proof, simple and reliable.

With the above and other objects in view, my invention consists of the construction and arrangement hereinafter described and illustrated in the accompanying drawings, in which:—

Figure 1 is a front elevation of the contact mechanism complete, the cover of the casing being removed, and some of the parts shown in section. Fig. 2 is a sectional plan view of the brush holders, and bracket therefor. Fig. 3 is a sectional elevation, taken on the line 3—3 of Fig. 1, looking in the direction of the arrow. Fig. 4 is a fragmentary plan view of the worm. Fig. 5 is an elevation of the worm wheel, showing the worm in engagement therewith. Fig. 6 is a development of the contact drum or commutator, hereinafter described.

Referring to the drawings in detail, the numeral 1 denotes the shaft from which the mechanism is driven. Clamped upon the shaft 1 is a worm 2, of two or three convolutions, 3, in the form of a ring, split as at 5, and clamped to the shaft by means of bolts 6, passing through lugs 4.

Arranged to gear with the worm is the worm wheel 7, carried on the end of a shaft 8, which passes through a bearing 9 into the casing 14, containing the contact mechanism. Screwed over the bearing 9 is a gland 10, which forms a tight joint around the shaft 1. An oil cup 11, provided with a cover is mounted in the bearing 9 for supplying oil thereto. Just inside the journal 9, a collar 12, having a radial flange, is secured to the shaft 8 by means of set screws 13.

The casing 14, which preferably consists of case metal, is provided with perforated lugs 15, by means of which the casing is attached to a suitable support. The casing is provided with a cover 16, held by means of screws 18, tightly against packing 17, laid in the edge of the casing, so as to form a water and dust-proof seal.

The other end of the shaft 8 is reduced to form a journal 20 which turns in the bearing 19. This bearing also carries an oil cup 21, provided with a cover 70 attached to a chain 71. This cover is preferably provided with spring clips 72, which take over shoulders on the cup, and hold the cover in position. Adjacent the bearing 19, a collar 22, having a radial flange, is secured to the journal 20 by means of set screws 23.

Mounted on the shaft 8 is the contact drum or commutator. This comprises a central hub or spider, 24, provided with an internally projecting square thread, 25, meshing with a similar spiral groove 26 formed in said shaft. This spider supports a cylindrical body 27, of insulating material, such as fiber or hard rubber, carrying on its surface strips 28, 29, 30, 31 and 33 of copper or brass. The strips 28 are located, one near each end of the drum, and consists of continuous metal bands or hoops. The development of this drum is seen in Fig. 6. The strips 29 and 30 are also circumferentially arranged, but consist of

two separated sections, as shown, and between the ends of the sections are located the transverse strips 31 and 33, each of a length about equal to the combined width of the strips 29 and 30 and the intervening space. The body 27 is attached to the spider by means of screws 34, and the strips 31 etc. are secured to the body by means of screws 32, all as clearly shown in Fig. 1.

Disposed immediately above the drum, and in a perpendicular plane passing through its axis, is a set of contact brushes 35, 36, 37. These brushes may, and preferably do, consist of carbon rods, having rounded lower ends. They are pressed into engagement with their respective contact strips on the drum by means of springs, 38, 39, 40, arranged above the same. Each brush and its associated spring is contained in an individual case, 41, 42, 43, all of which cases are secured to a supporting bracket 45, by means of screws 44. Suitable insulation, 46, 47 is interposed in such a way as to effectually insulate each brush from the others. The bracket 45 is adapted to be secured to the casing 14, as by screws 51. Secured on each of the cases 41, 42, 43, as by screws 53, are copper terminals 48, 49, 50, to the end of which, wires 61, 62, 63 may be attached, as by soldering. These wires or leads are adapted to extend out through the conduit 52, to any point where it is desirable to locate the indicator.

At the rear end, the hub of the drum is extended forming the projecting sleeve 54 (see Fig. 1), and carried by said sleeve and preferably formed integral therewith are two cam projections or ratchet teeth, 55, 56. These teeth are offset, as shown in Fig. 1, so as to lie in different planes, are formed with one end beveled, and the other end forming a square shoulder.

Referring to Fig. 3, it will be seen that these square shoulders are approximately 180° apart, and that the beveled ends face in opposite directions. A pawl 57, having a depending square end 58, adapted to ride on said sleeve, is pivoted at 59 to a bracket 60, secured to the casing.

The operation of my improved contact mechanism is as follows: As the shaft 1 rotates, it drives the worm wheel 7, and shaft 8, thus rotating drum 27. The strips 28 have no electrical function, but act merely as wear plates for supporting the brushes. Also, the strips 29 and 30 are insulated from each other, and serve to insulate the brushes while in contact with them. When, however, any two brushes are bridged by one of the plates 31, 33, the circuit is closed between them. As shown, only two strips, 31, and 33, are provided, and with this arrangement, assuming at ten to one worm gear, it is evident that a circuit between the brushes will be closed once for every five revolutions of the shaft 1. It may often be desirable, however, to close the circuit more frequently than every fifth revolution. So, for example, if five contact strips 31 are provided, and equally spaced around the drum, it is evident that the circuit would be closed by one of them passing the brushes every second revolution of the shaft 1. It will therefore be understood, that by varying the number of strips such as 31, any desired frequency of indication may be obtained.

In the position of the parts shown in Fig. 1, and assuming the shaft 8 as viewed from the front, to be turning in a counter-clockwise direction, the circuit will be periodically closed between brushes 36 and 37, while brush 35 remains idle. As the shaft 8 rotates in this direction the end of sleeve 54 is held jammed against collar 22, and the pawl 57 rides up the beveled face of tooth 55 and drops behind the shoulder of the same at each revolution, the pawl 57, and tooth 55, being, in this position, in the same plane. Suppose now the direction of rotation of the shaft to be reversed. Before the sleeve 54 can make a complete revolution, the square shoulder of tooth 55 will catch against the square end of the pawl, thus temporarily locking the sleeve and drum against rotation. But the shaft 8 revolving, causes the screw thread 25, 26, to draw the drum and sleeve longitudinally along the shaft, until the end of the drum jams against collar 12. This movement carries the tooth 55 clear of the pawl 57, and the drum immediately begins to revolve. The pawl is now in the plane of tooth 56, and rides over it in the same manner as it did over tooth 55, the direction of rotation now being reversed. It will thus be observed that the checking of the drum is only momentary, and that it is automatically shifted, by means of the pawl, upon its rotation being reversed. In the shifted position of the drum, the brush 37 becomes idle, and the circuit is periodically closed between brushes 35 and 36. Brush 36 constitutes a common terminal, and is always included in either of the two circuits, the other terminal of which is automatically selected in accordance with the direction of rotation of the shaft. The three leads may extend to any suitable signaling or indicating instrument or instruments, the only requirement being that the apparatus employed be capable of indicating which circuit is closed and how often it is closed, so as to give readings of both speed and direction of the shaft 1. If the direction of rotation is reversed again, the shoulder of tooth 56 will engage pawl 57, as clearly shown in Fig. 3, thus causing the drum to shift back to its original position.

What I claim is:—

1. In a device of the class described, a

rotating member, terminals of a plurality of circuits arranged to bear against said member, and means controlled by the direction of rotation of said member for shifting the same into position for selecting and closing periodically one of said circuits.

2. In an electrical contact mechanism, a plurality of brushes, a rotating member on which said brushes bear, and means carried by said member for bridging, periodica ly, one pair of brushes only when rotating in one direction, and means for shifting said member into position to bridge another pair of brushes when rotating in the other direction.

3. In a device of the class described, a rotating member, capable of occupying a plurality of positions longitudinally of its shaft, a plurality of electrical circuits, and means controlled by said second member for closing one or another of said circuits, according to its position on its shaft.

4. In a device of the class described, a rotating member, a second rotating member driven thereby, and mounted on a shaft, so as to be capable of longitudinal movement thereon, and means controlled by changes in the direction of rotation of said first member, for shifting said second member to different positions on its shaft.

5. In combination, a rotating shaft, a member mounted for longitudinal movement thereon, terminals for a plurality of circuits any of which is adapted to be periodically closed by said member while said shaft rotates continuously in one direction, and means for automatically shifting said member into operative relation with a different pair of terminals for each change in the direction of rotation of said shaft.

6. In combination, a rotating shaft, a member mounted thereon to normally rotate therewith, and means for automatically shifting said member longitudinally of said shaft, whenever its movement is momentarily checked.

7. In combination, a rotating shaft, a member mounted thereon to normally rotate therewith, automatic means for momentarily locking the member against rotation when its direction of rotation changes, and means between said member and shaft for causing the former to shift, longitudinally, upon being so locked.

8. In combination, a rotating shaft, a member mounted thereon to normally rotate therewith, a cam tooth carried by said member, a pivoted pawl adapted to coöperate therewith to momentarily lock the member when its direction of rotation changes, and automatic means, thrown into operation by such locking, to so shift said member as to free said tooth from said pawl.

9. In combination, a shaft having a spiral groove cut therein, a member mounted on said shaft and having an internal thread meshing with said groove, said shaft and member normally rotating together, and means for arresting the motion of said mem ber, and thereby causing the thread to shift the same, whenever its direction of rotation changes.

10. In a device of the class described, a rotating drum carrying contact strips, brushes coöperating therewith and forming terminals for a plurality of circuits, and means for automatically shifting said drum so as to close one or another of said circuits, in accordance with its direction of rotation.

11. In a device of the class described, a rotating drum, brushes, forming the terminals of a plurality of circuits yieldingly held in contact therewith, means for continuously rotating said drum and means controlled by the direction of rotation of said drum for selecting and periodically closing one of said circuits.

12. In a device of the class described, a casing, a shaft journaled therein, collars fixed to the shaft, a drum mounted on the shaft between the collars, to turn continuously therewith, and capable of longitudinal movement on the shaft, and terminals of a plurality of circuits arranged adjacent said drum, and adapted to be controlled thereby.

13. In a device of the class described, a casing, a shaft journaled therein, collars fixed to the shaft, a drum mounted on the shaft between the collars, to turn continuously therewith, automatic means for forcing the drum into engagement with one or the other of the collars, according to the direction of rotation of said shaft, and circuit terminals arranged adjacent said drum and controlled thereby.

14. In a device of the class described, three contact brushes forming the terminals of a pair of circuits, a rotary contact drum arranged to coöperate therewith and carrying a plurality of equally spaced contact strips, the inner ones of which are sectional and the outer ones of which are each continuous bands, and means for producing a relative lateral displacement between said drum and brushes, whereby said sectional contact strips are caused to select and periodically bridge two of said three brushes, and said continuous bands serve as wear plates for the third brush which is not active.

15. In a device of the class described, a rotatable drum, means for driving the same, means governed by the direction of rotation of the drum for shifting the same endwise, a plurality of equally spaced insulated contact strips carried by said drum, and brushes, forming the terminals of a plurality of circuits, arranged to ride on said strips, one of said strips being always idle, and serving to support a brush when the same is not in circuit.

16. In a device of the class described, a plurality of brushes equally spaced, a rotating contact drum carrying a plurality of equally spaced transverse contact strips of a length to bridge two of said brushes, and means for shifting said drum, to bring said strips into position to bridge any two of said brushes.

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

FRANK W. WOOD.

Witnesses:
E. W. HOUSE,
M. S. GODWIN.