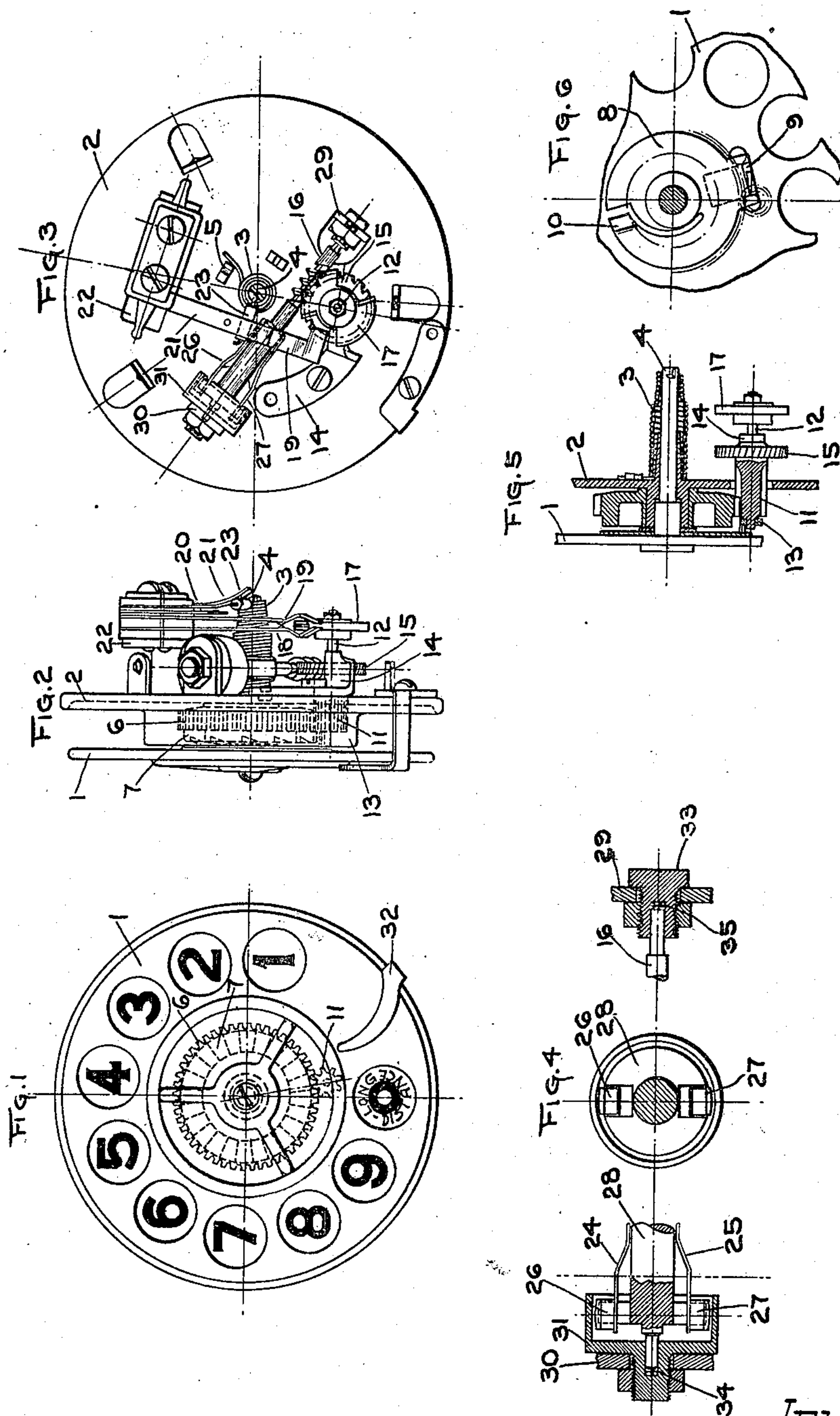


A. E. KEITH.
IMPULSE TRANSMITTER.
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Inventor.
Alexander E. Keith.
W. H. Hales
Attorney.

UNITED STATES PATENT OFFICE.

ALEXANDER E. KEITH, OF HINSDALE, ILLINOIS, ASSIGNOR TO AUTOMATIC ELECTRIC COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

IMPULSE-TRANSMITTER.

1,279,352.

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To all whom it may concern:

Be it known that I, ALEXANDER E. KEITH, a citizen of the United States of America, and resident of Hinsdale, Dupage county, Illinois, have invented certain new and useful Improvements in Impulse-Transmitters, of which the following is a specification.

My invention relates to an improvement in calling devices for automatic or semi-automatic telephone systems, which devices are usually located at the subscribers' stations although often at the central station or operator's position in a semi-automatic system.

The main object of my invention is to provide an improved mechanism for operating a calling device of the above character and which not only causes said mechanism to operate in a more efficient manner but also materially increases the life of said device. It is well known that a device of the above character is subjected to a very great amount of wear and tear and that it is of great importance to construct said device in such a manner that its constant use and the co-operation of its various elements will cause as little frictional wearing away as possible. I have discovered that by the use of inherently lubricant material, such as raw hide, for example, I am able to reduce the abrasion of various parts of the mechanism to *nil*. Other details and features of improvement will be more clearly pointed out in the specification following:

In the drawings, I have illustrated a calling device of the type described and illustrated in "*Automatic Telephony*" by Smith and Campbell, published in 1914. In order to show the desired improvements, however, it is to be understood that the features of my invention may be applied to any well known type of calling device.

Referring to the drawings:

Figure 1 is a front view of a calling device embodying my invention.

Fig. 2 is a side view of the same.

Fig. 3 is a rear view of the same.

Figs. 4, 5 and 6 show in detail certain cooperating gears and bearings which will be more fully explained hereinafter.

I will now explain the operation and construction of my improved device in detail. Referring to Fig. 1, I have illustrated the front plate of a calling device showing a finger hole dial 1 pivoted at a central point in the base plate 2 (Figs. 2 and 3) by means

of a rod and having a coil spring 3, one end of which is fastened to the rod or pin 4 to which the finger hole dial is fastened and which acts as a pivot for said dial, and the other end of which is fastened to a lug 5 on the under side of the base plate 2. This spring 3 acts to return the finger hole dial 1 to its normal position after the spring has been wound up by the rotation of the dial in a clockwise direction. Loosely mounted upon the pivot rod 4 is a gear wheel 6, having gear teeth around its circumference and having also a number of ratchet teeth 7 cut in the face of said gear which lies adjacent to the dial 1. On the rear of the dial 1, in Fig. 1 is mounted a spring 8 which is firmly fixed on the dial 1 and which is cut out to form a tooth or dog which coöperates with the teeth 7 on the gear wheel 6. The spring 8 is shown more clearly in Fig. 6 as being firmly secured to the rod 4 and held in position by a pair of projections which fit over the lug or stop 9. The ratchet tooth is indicated by the raised portion 10, which when the dial is rotated in a clockwise direction, rides over the teeth 7 on gear wheel 6 without rotating said wheel, however, when the dial is released and returned to normal by the spring 3, the ratchet tooth 10 engages one of the teeth 7, thereby causing the gear wheel 6 to rotate with the finger hole dial until the dial reaches normal. Coöperating with the gear wheel 6 is a pinion gear 11, which is firmly mounted on a pivoted rod 12. The rod 12 is pivoted at one end in the bridge 13, which is formed out of a cut out piece of the base 2, and at the other end in a bracket 14, which is fastened to the rear of said base plate. The pinion gear is mounted on the left hand end of said rod, as shown in Fig. 5 and has firmly secured thereto a gear wheel 15, the teeth of which, are cut on the bias to coöperate with the governor 16. On the other end of the rod 12 is fastened a cam wheel or interrupter 17, which is cut away to form two arms or pieces of insulation. The cam wheel 17 operates when rotated to open and close a contact between a suitable pair of springs 18 and 19 to open and close or send impulses over any desired circuit which may pass through said springs. The springs 18 and 19 are mounted together with the springs 20 and 21 on a bracket 22 which is formed out of a portion of the base, and are sep-

arated electrically by suitable strips of insulation. The spring 21 is controlled by a bushing on an extending end of the spring 3 in such a manner that when the dial 1 is first rotated from normal the spring 21, which was normally held out of engagement with the spring 22, is allowed to make contact with said spring 22, and remain in contact therewith until the dial again reaches normal position. In practice the spring 21 is directly connected to the spring 19 and the operation of the springs 20, 21 and 19 is used for the purpose of maintaining the talking equipment of a telephone short circuited during the transmission of impulses.

As previously stated, a governor 16 is associated with the gear 15. This governor controls the speed of rotation of the pinion 11 and therefore of the cam wheel or interrupter 17 in the following manner: This governor is of well known type and comprises a worm gear which meshes with the gear 15 (Fig. 4), and a pair of spring arms 24 and 25 which are firmly secured to the governor 16 at one end and carry rubbing contacts 26 and 27 at the free ends. Between the spring arms 24 and 25 is fastened an aluminum piece 28 which serves to keep the springs 24 and 25 in proper position. The governor as a whole is pivoted between two lugs 29 and 30 on the base plate 2 and firmly secured to the lug 30 is a brass cup 31 which incases one end of the governor 16 and its springs 24 and 25, thereby forming a brake or rubbing surface for the said springs 24 and 25. Now when the gear 15 rotates, the rotation is communicated to the governor 16 through the medium of the worm gear, and in rotating, the springs 24 and 25 are thrown out by centrifugal force, causing the parts 26 and 27 to rub against the inside of the brass cup 31 to retard the movement. It will be seen therefore that as the speed of rotation increases, the parts 26 and 27 are made to bear more heavily against the brass cup, and vice versa. It will be seen therefore that when it is desired to send a number of impulses through the medium of this device, the operator inserts a finger into a hole on the finger hole dial 1 through which the desired number appears and rotates said dial in a clock-wise direction until his finger meets the stop 32, at which time the finger is withdrawn. As before pointed out, the associated gears do not move during this operation, but tension is stored in the spring 3, and the dog or ratchet spring 10 on spring 8 is rotated over a number of teeth 7 in the gear 6. Now, however, when the finger is withdrawn the spring 3 exerts a force upon the dial 1, causing said dial, with the spring 8 to rotate back toward its normal position until stopped by the engagement of the lug 9 with the teeth of the pinion gear wheel 11, as shown in Fig. 6,

thereby causing the dial to come to a positive stop. As the dial returns to normal, the dog 10 now catches in one of the teeth 7 and thereby causes the gear 6 to rotate with the dial, the rotation of the gear 6 is communicated to the shaft 12 through the medium of pinion gear 11 and thereby rotates the cam wheel 17 to cause the springs 18 and 19 to be separated momentarily a number of times. The speed of rotation of all the parts in returning to normal is made uniform by the coöperation of the governor 16.

It will be seen that a device of this character is very efficient but that owing to the strain placed upon certain gears and pivots, its life is made somewhat short. For instance I have found by observation that the gear wheel 15 which was heretofore made of steel, wears out very quickly on its teeth which coöperate with the worm of governor 16. I have therefore made the gear wheel 15 of a heavy piece of rawhide cut in the manner shown, which I have tested out and found to have a much longer life than such gears would have where a metal to metal surface was employed. I have also found that the governor wears out very quickly at other points due to the endwise pull exerted by the biased teeth of the gear 15, for instance, at the points where the rod 12 is pivoted, that is in the pivot screws or sockets 31 and 33, and also on the rubbing surfaces of the parts 26 and 27.

In order to overcome this difficulty, I have provided jewel bearings for the shaft 16 at each end as shown in Fig. 4 at 34 and 35 which consist of a small piece of a hard stone set in the parts 31 and 33 and bearing against the ends of the shaft 16, and I have also used a small part of rawhide for the outer or rubbing surfaces of the parts 26 and 27. It will be seen therefore, that I have provided a very efficient and lasting method of constructing a dial of this type, in which the parts upon which the greatest stress is exerted have no metal to metal rubbing surfaces and which type of impulse sender will outlast by a considerable length of time those which are not fitted with such surfaces.

Having fully described the operation and method of construction of my invention, what I desire to secure and have protected by Letters Patent will be pointed out in the appended claims.

What I claim as my invention is:

1. In an impulse transmitter having a governor, a source of power for operating said governor, and a propeller for said governor, said propeller being made of inherently lubricating material for the purpose of preventing abrasion.

2. In an impulse transmitter in which a worm-gear is used in the operation of a governor, a gear-wheel for meshing with

said worm-gear, said gear-wheel being made of inherently lubricating material for the purpose of preventing abrasion between said gears.

3 3. In an impulse transmitter having a governor, a source of power for operating said governor, and a raw-hide propeller for said governor.

4. In an impulse transmitter in which a worm-gear is used in the operation of a gov- 10 ernor, a raw-hide gear-wheel for meshing with said worm-gear.

Signed by me at Chicago, Cook county, Illinois, this 17th day of December, 1917.

ALEXANDER E. KEITH.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."