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 RINGER FOR TELEPHONE SYSTEMS.  
 APPLICATION FILED FEB. 6, 1908.

917,214.

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Fig. 1.

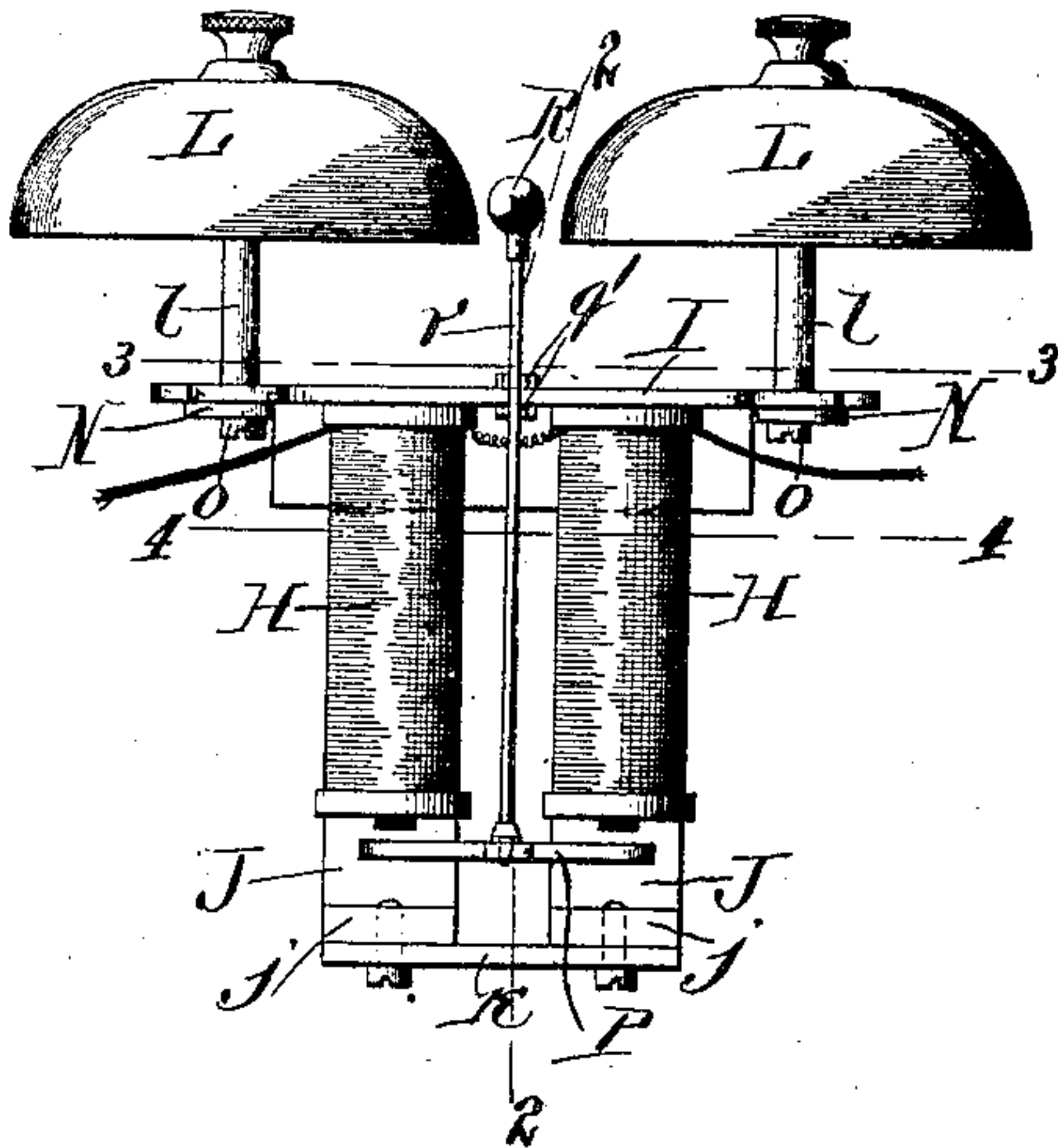


Fig. 2.

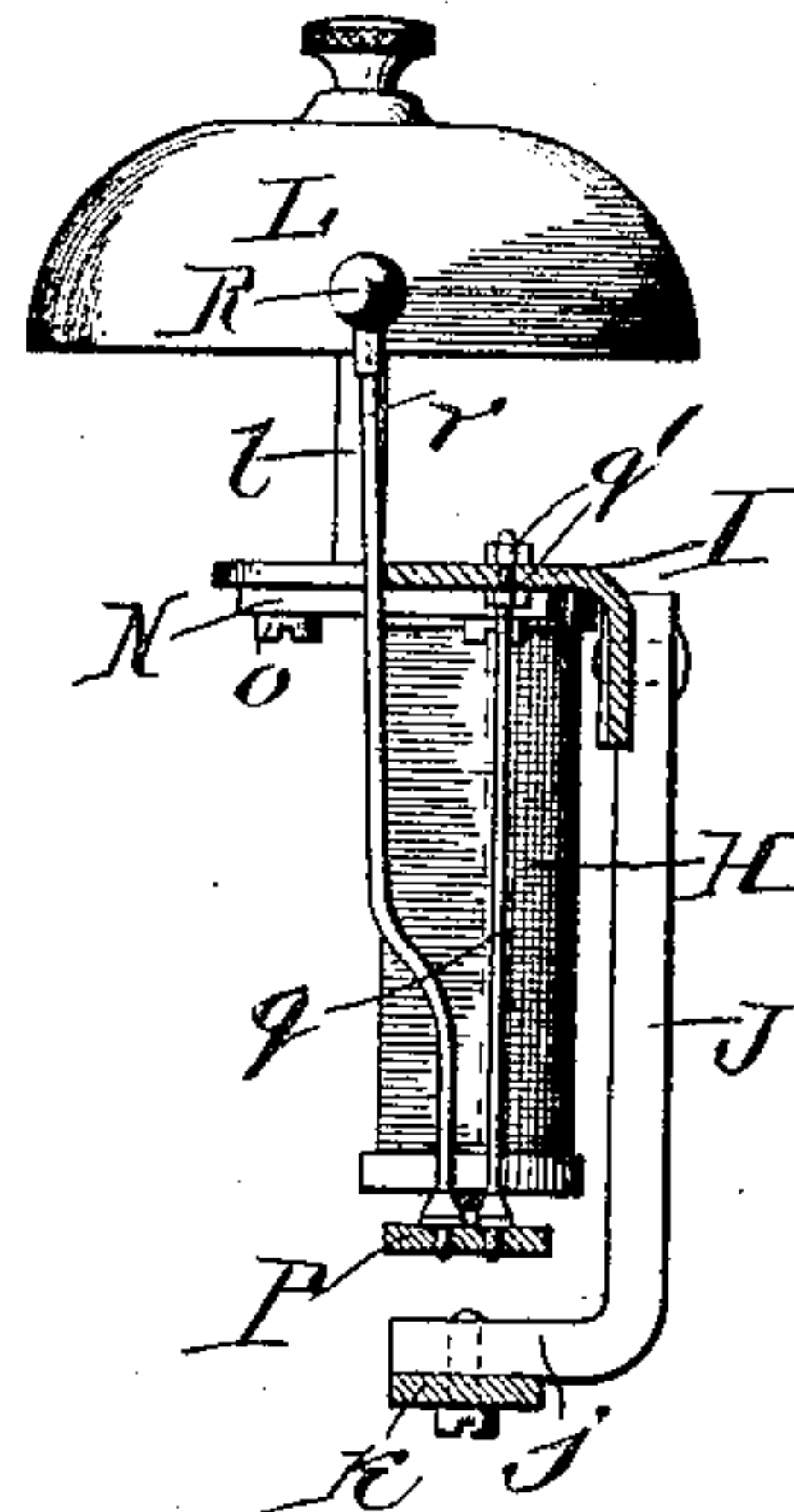


Fig. 3.

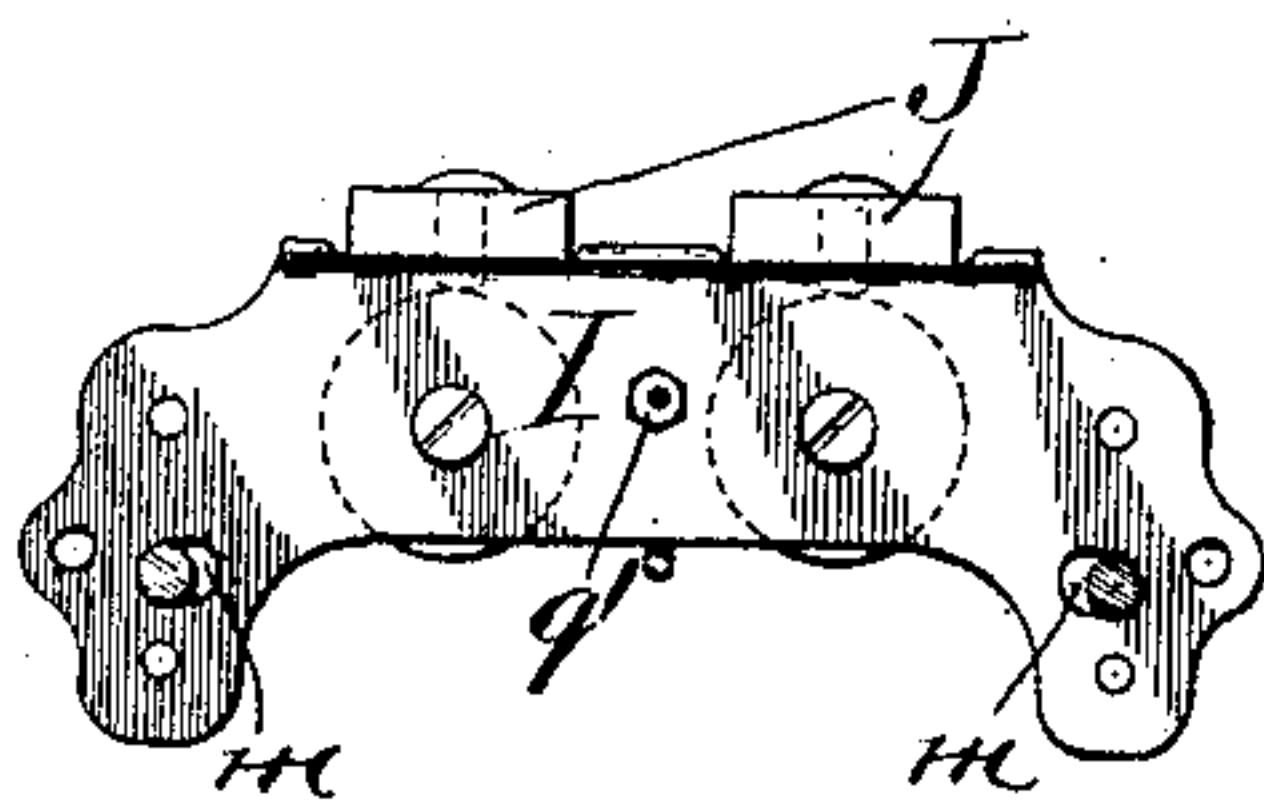


Fig. 4.

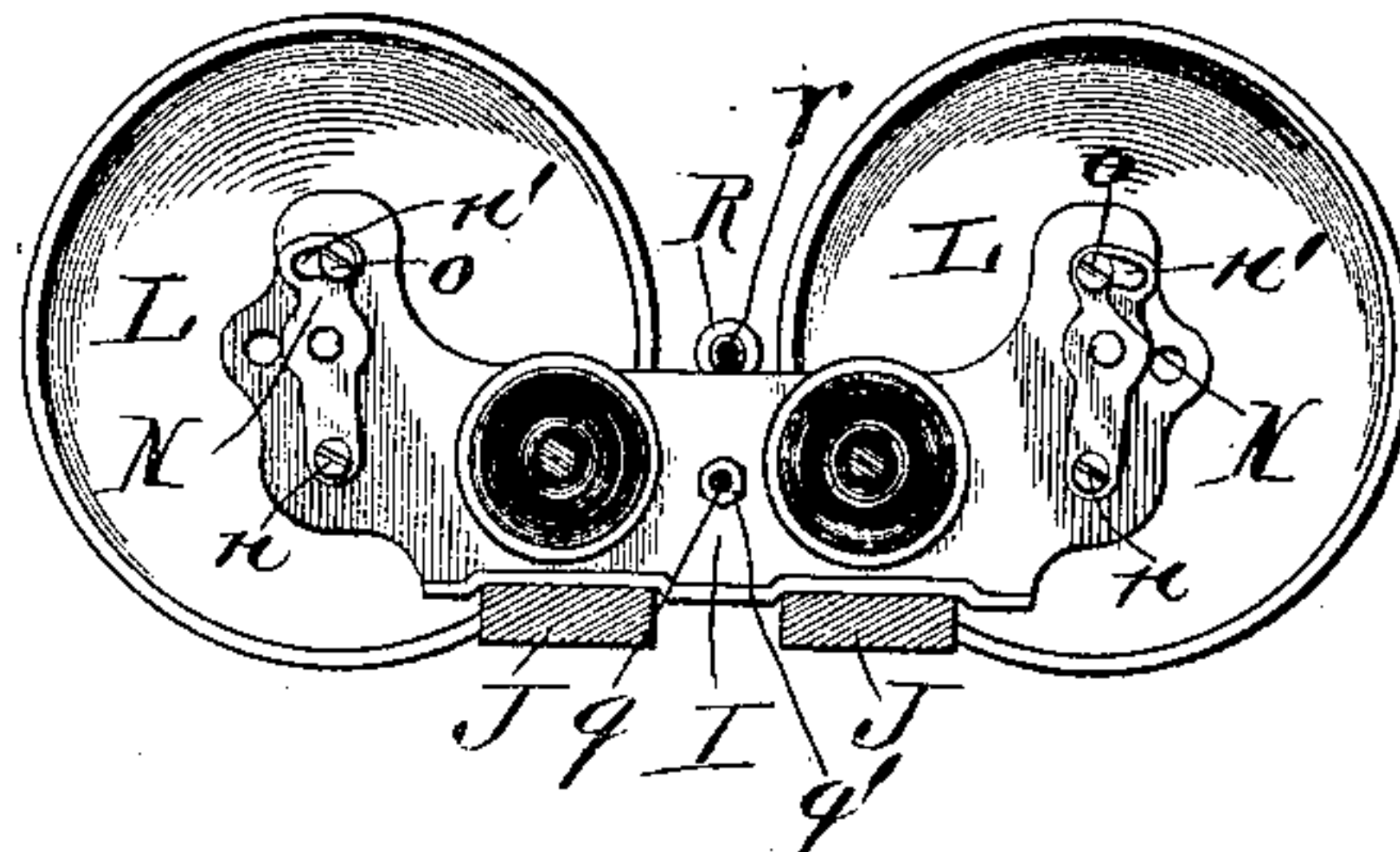
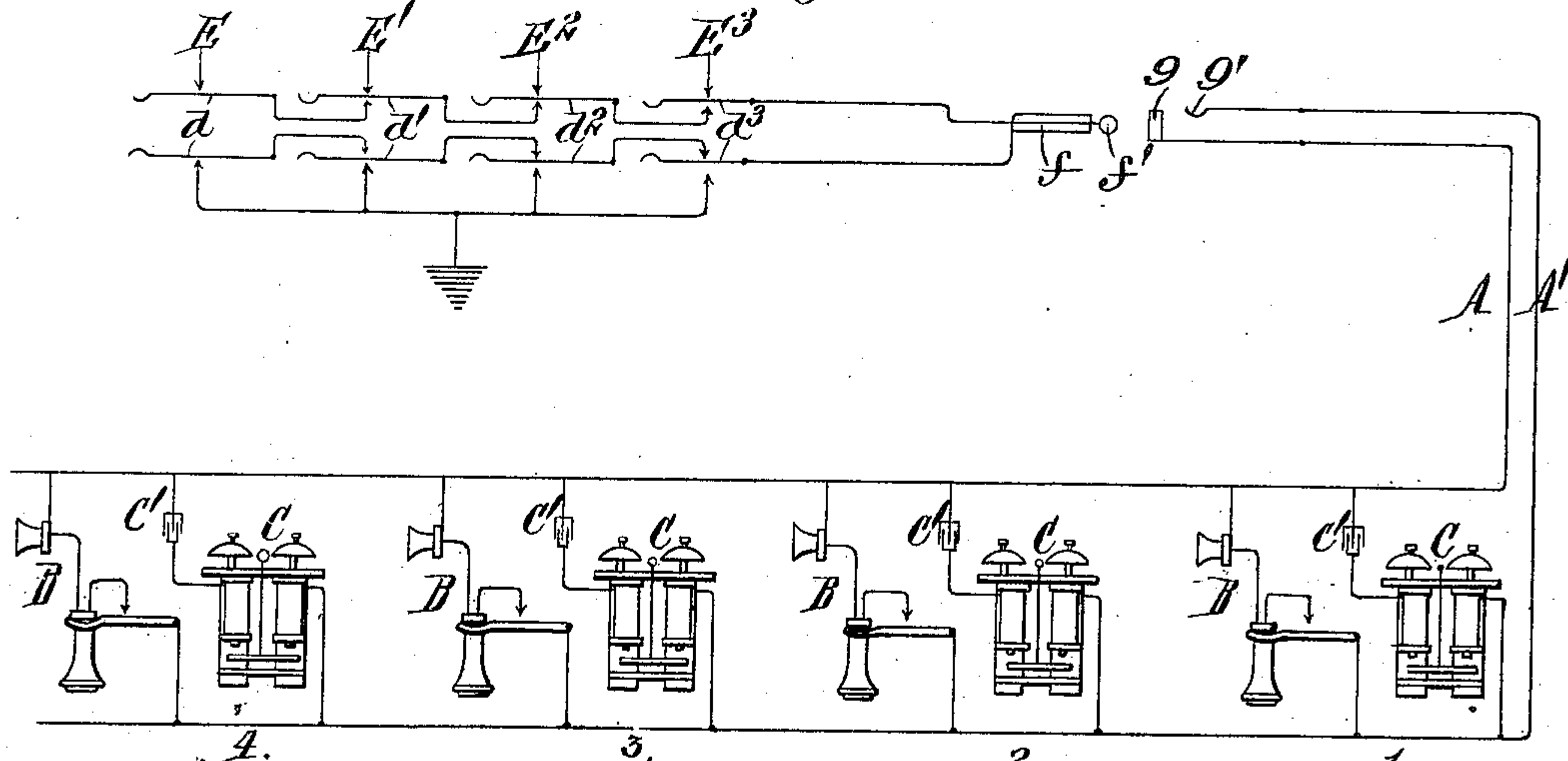


Fig. 5.



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# UNITED STATES PATENT OFFICE.

KLAS WEMAN, OF BUFFALO, NEW YORK.

## RINGER FOR TELEPHONE SYSTEMS.

No. 917,214.

Specification of Letters Patent.

Patented April 6, 1909.

Application filed February 6, 1908. Serial No. 414,466.

*To all whom it may concern:*

Be it known that I, KLAS WEMAN, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented a new and useful Improvement in Ringers for Telephone Systems, of which the following is a specification.

This invention relates to a ringer or call bell for telephone systems, and more especially for harmonic selective signaling systems or those in which the several ringers of the same party-line are attuned to and responsive to ringing currents of different frequencies. The invention is however not limited to that particular use but is generally applicable to electric call bells or signaling devices. As hitherto constructed, the armatures of such party-line ringers have usually been mounted on a pivot or other support located close to the armature. This construction has the objection that the rapid change or alternation of the current impulses sets up a motion of the armature which causes an audible hum, thus notifying the uncalled subscribers of a party-line that another party on the same line is calling. In ringers as heretofore constructed, it has also been necessary that the bell clapper or hammer should vibrate in exactly the same step with the armature, and the action of the armature and hammer has had to be so adjusted in relation to the gongs that the proper working of the ringer depended largely on the rebound of the hammer from the gongs and an accurate spacing or adjustment of the latter by means of micrometer contrivances. This construction greatly limits the range within which the ringer will operate reliably and requires a skilled mechanic to install and adjust it.

One of the objects of my invention is the provision of a simple and reliable ringer which is practically noiseless on party-line service, except when actuated by the corresponding ringing-current, so as to avoid attracting attention of uncalled parties on the same line and insure greater privacy.

A further object is the production of a ringer which is not dependent for its proper operation upon accuracy of construction and nicety of adjustment but which permits a certain inaccuracy of adjustment without affecting its operation or impairing its efficiency.

In the accompanying drawings:—Figure 1 is a front elevation of the ringer. Fig. 2 is

a transverse vertical section in line 2—2, Fig. 1. Fig. 3 is a horizontal section in line 3—3, Fig. 1, looking downward. Fig. 4 is a similar section in line 4—4, Fig. 1, looking upward. Fig. 5 is a diagram of a four-party line selective ringing-system equipped with the improved ringers.

Similar characters of reference indicate corresponding parts throughout the several views.

Referring to Fig. 5, A, A<sup>1</sup> indicate the two limbs of a telephone line extending from the central office to four stations, 1, 2, 3 and 4 on the same party-line. Each station is equipped with a telephone set B of any suitable construction and with one of the improved ringers which is generally designated by the reference letter C, the ringers being bridged across the line through condensers C<sup>1</sup> in the usual manner.

d, d<sup>1</sup>, d<sup>2</sup>, d<sup>3</sup> indicate the ringing-keys of the operator's cord-circuit corresponding to the several party-line stations 1, 2, 3 and 4, and E, E<sup>1</sup>, E<sup>2</sup> and E<sup>3</sup> indicate four leads or conductors corresponding to the respective ringing keys and supplying four ringing circuits of different frequencies from suitable sources of energy, not shown, such for example as a multi-cycle motor-generator. The other side of the line is grounded while any one of the ringing keys is pressed for ringing purposes.

f, f<sup>1</sup> indicate the tip and sleeve of the ringing-plug, and g, g<sup>1</sup> the tip and sleeve of the line-jack, which parts constitute no part of my invention and may be of any ordinary or suitable construction.

Referring to the ringers C, they are of the polarized type and operate on the well-known principle of such ringers, the armature being permanently polarized by a permanent magnet, so that the positive impulse of the signaling current increases the magnetism at one core and weakens it at the other, causing the armature to move toward the pole piece which offers the strongest attraction; while the next current impulse in the opposite direction reverses this action and causes the armature to move toward the other pole piece.

H indicates the electro-magnets of the ringer having the usual cores and depending from a horizontal top-plate or frame I to the underside of which they are suitably fastened. This plate is secured at its rear edge to the upper front ends of a pair of upright



permanent magnets J having forwardly-bent lower portions *j* rigidly connected by a yoke *k*.

L indicates the gongs which are mounted  
5 on posts *l* projecting above the top-plate I. The gongs are preferably adjustable toward and from each other, and for this purpose their posts pass through longitudinal slots *m* in the top-plate and are secured at their  
10 lower ends to laterally-swinging arms N pivoted at their rear ends to the underside of the top-plate by screws *n*. In their front ends, these arms are provided with transverse slots *n*<sup>1</sup> through which pass clamping  
15 screws *o* engaging threaded openings in the top-plate. Upon loosening these screws, the carrying-arms N can be swung toward or from each other for adjusting the gongs.

P indicates the armature which, in the  
20 preferred construction shown in the drawings, is suspended from the top-plate I by a flexible or elastic rod or member *q*. This rod is arranged between the electro-magnets and rigidly secured at its upper end to the  
25 top-plate, while the armature is rigidly secured at its middle to the lower end of the rod. The armature is adjustable relative to the magnet cores, by any suitable means. In the construction shown, its suspension  
30 rod is for this purpose made vertically adjustable on the top plate by means of clamping nuts *q*<sup>1</sup> bearing against the upper and lower sides of the plate.

R indicates the bell-hammer or clapper  
35 and *r* its tongue arranged between the gongs and rigidly secured at its lower end to the central portion of the armature, preferably in front of the suspension-rod, as shown. In the particular construction illustrated in the  
40 drawings, the tongue is bent or offset forwardly a short distance above the armature to clear the top-plate I.

In the operation of the ringer, when the above-mentioned impulses of the ringing-  
45 current force the armature laterally toward the pole-piece where the magnetic attraction is strongest, the armature moves in the arc of a circle whose center is approximately at the junction of the suspension-rod *q* and the  
50 top-plate I. This lateral movement of the armature brings its face nearer said pole piece and gives the hammer a violent swing in the opposite direction, this movement of the hammer depending on the flexibility of  
55 the hammer-tongue or rod and the period of time which elapses before the next current-impulse in the reverse direction pulls the armature in the opposite direction. This rapid lateral vibration of the armature thus  
60 produces a corresponding vibration of the hammer, causing the latter to alternately strike the gongs.

It is clear from the foregoing that there is  
65 no vibration of the suspension-member *q* at its upper or fixed end, but the vibration of its

remaining or body-portion increases toward its free lower end where the vibration is at its maximum, but limited by the vibration of the armature itself. It appears that from the armature upward to a certain point, the  
70 hammer-tongue vibrates in step with the armature, and the extent of vibration gradually diminishes toward a neutral point on the tongue where there is practically no vibration. Above this neutral point, the vi-  
75 bration of the hammer-tongue is set up in the opposite direction from that of the armature, the same gradually increasing toward the upper end of the tongue where it reaches the maximum. 80

This construction has the important advantage that the ringer operates satisfactorily notwithstanding comparatively wide variations in the spacing of the gongs or an inaccurate adjustment of the armature relative to the magnet cores, the hammer-tongue  
85 apparently vibrating on a floating pivot which is coincident with the above-described neutral point and which approaches or recedes from the hammer, according to the distance between the gongs, and automatically  
90 adapts itself to their spacing or adjustment. This permits a certain coarseness of adjustment of the gongs and the armature in relation to the cores without affecting or impair-  
95 ing the operation of the ringer, thus rendering it less liable to get out of order and enabling it to be assembled and adjusted by unskilled labor and in less time than ringers requiring a micrometer or similar fine adjust-  
100 ment of the gongs or other parts. This self-adjusting action of the hammer in relation to the gongs is due largely to the suspension of the armature by a flexible member having its fixed point remote from the armature.  
105 To obtain the best results, it is therefore desirable to locate the fixed end of the suspension-rod as far from the armature as practicable, and it is also desirable to make the hammer tongue of greater length than the  
110 suspension-rod, as shown.

A further advantage of my improved construction is that owing to the length of the suspension rod, there is little or no vibration at its upper or attached end. No crystalliza-  
115 tion and ultimate breakage of the rod is therefore liable to occur, as is the case where the armature is supported by comparatively short springs.

It has been demonstrated that the upper  
120 end of the hammer-tongue may be bent at right angles to its main portion, if desired, without affecting the operation of the ringer.

When these improved ringers are installed on party-lines, the hammer-tongues of the  
125 ringers on the same party-line are tuned or constructed to respond to the respective current frequencies hereinbefore referred to; and when a calling current of a certain frequency is impressed upon the line, only the  
130



corresponding ringer responds, while the others remain silent. In grading or adjusting the several ringers of the same party-line, the yielding suspension-rod should be thicker 5 or stiffer the higher the frequency of the ringing-current and vice versa; and the hammer should be heavier the lower the frequency. The suspension-rod may be of steel or other suitable material, and the rod of 10 each ringer should have the requisite degree of flexibility to allow the armature to vibrate in step with the frequency of the corresponding ringing-current.

It has further been found in practice that 15 by this improved construction the vibration of those ringers of a party-line which are out of tune with the particular current-frequency impressed on the line is so slight as to render such ringers practically noiseless, 20 thus securing correspondingly greater privacy in the telephone-service.

While I have herein shown and described the invention in connection with a harmonic ringer for party-line telephone systems, it is 25 not limited to that use but may be embodied in electro-magnetic ringers or signaling devices for other purposes.

Although satisfactory results have been obtained by the use of a cylindrical suspen- 30 sion-rod of steel rigidly secured at one end to a suitable support and at the other end to the armature, as shown, the cross section of the rod and the fastenings of the same and the armature, as well as the construction of 35 other parts of the device, may be modified without departing from the scope or spirit of the invention.

I claim as my invention:—

1. A ringer comprising an electro-magnet, 40 a support arranged at one end thereof, an armature arranged at the opposite end of the magnet, a yieldable suspension member secured at one end to said support and carrying the armature at its free end, a gong adja- 45 cent to said support, and a hammer-tongue secured to the armature and extending toward the fixed end of said suspension member, substantially as set forth.

2. A ringer comprising an electro-magnet, 50 a support arranged at one end of the magnet, a yieldable suspension rod secured at one end

to said support and extending to the opposite end of the magnet, an armature secured transversely to the last-named free end of the suspension rod, a gong adjacent to said 55 support, and a hammer-tongue secured at one end to the armature and extending lengthwise of said rod and having its free end arranged opposite the fixed end of said rod, 60 substantially as set forth.

3. The combination of an electro-magnet, a support arranged at one end thereof, a single spring-member extending throughout the length of the magnet and secured at one end 65 to said support, an armature arranged across the opposite end of the magnet and secured to the free end of said spring-member, a gong, and a hammer-tongue attached to the armature, substantially as set forth.

4. The combination of an electro-magnet, 70 a support arranged at one end thereof, a single spring-member extending throughout the length of the magnet and secured at one end to said support, an armature arranged across the opposite end of the magnet and secured 75 to the free end of said spring-member, a gong adjacent to that end of the magnet at which said support is arranged, and a hammer-tongue extending lengthwise of the magnet and attached to the armature, substantially 80 as set forth.

5. A ringer comprising a pair of electro-magnets, a support arranged at one end of the magnets and carrying the same, an armature arranged across the opposite ends of 85 the magnets, a spring-rod arranged lengthwise between the magnets and secured at one end to said support and having its opposite free end secured centrally to the armature, gongs mounted on said support, and a hammer-tongue secured to the armature, ex- 90 tending lengthwise of said suspension rod and having its free end arranged opposite the fixed end of said rod, substantially as set forth. 95

Witness my hand this 31st day of January, 1908.

KLAS WEMAN.

Witnesses:

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E. M. GRAHAM.