

H. K. BEASLEY.
ALTERNATING CURRENT ELECTROMAGNETIC INSTRUMENT.
APPLICATION FILED MAR. 7, 1917.

1,324,536.

Patented Dec. 9, 1919.

Fig. 1.

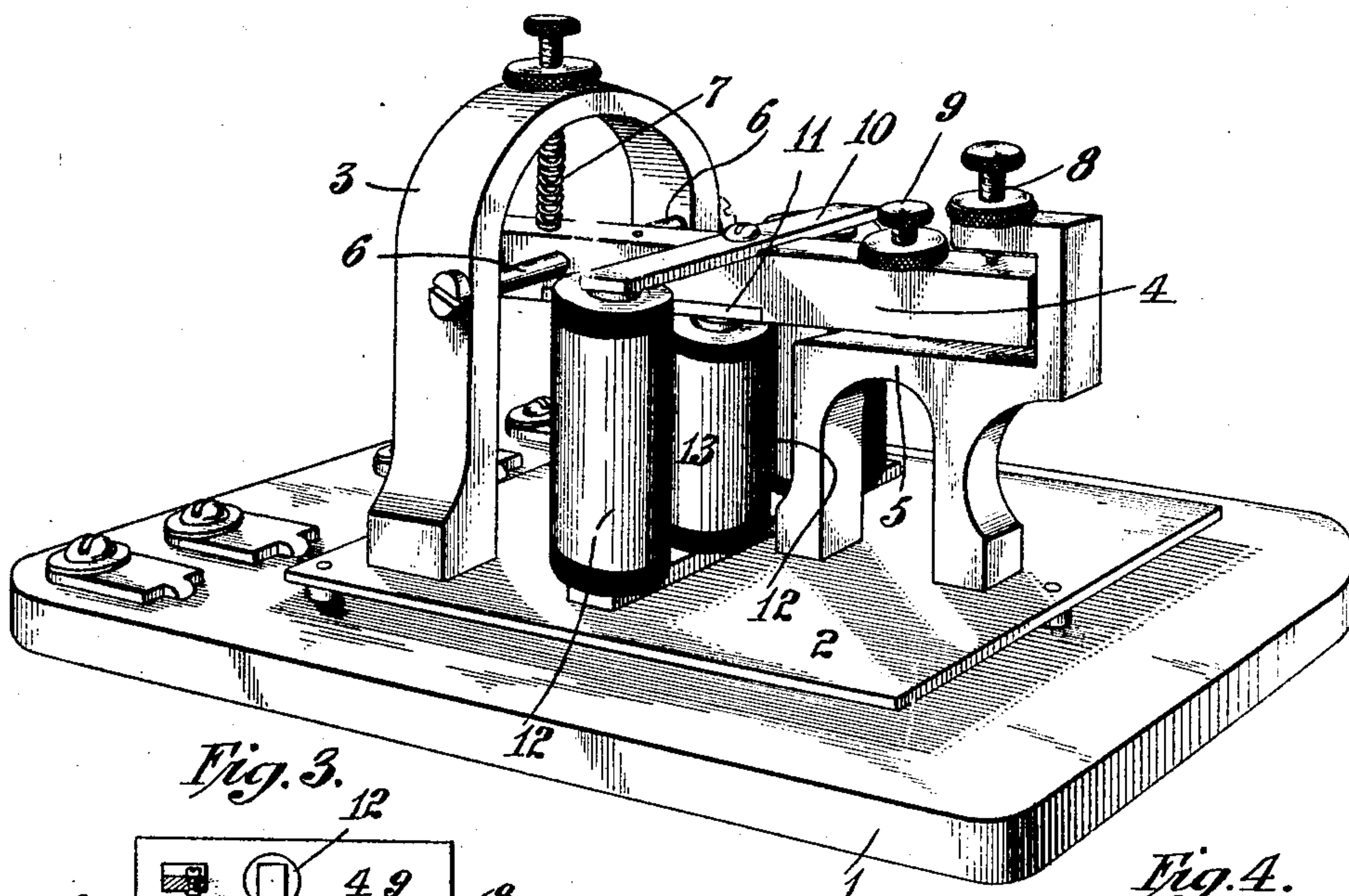


Fig. 3.

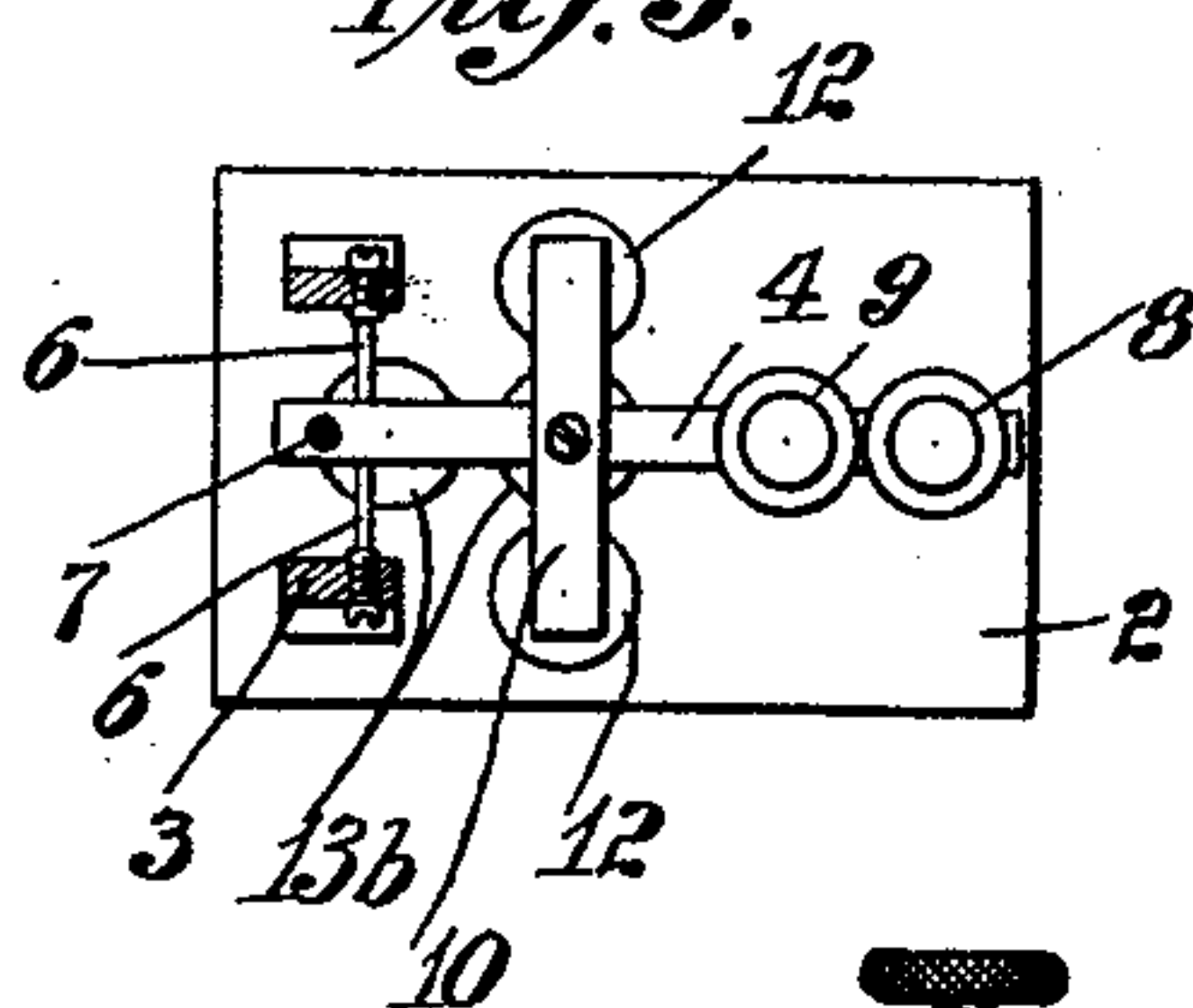


Fig. 4.

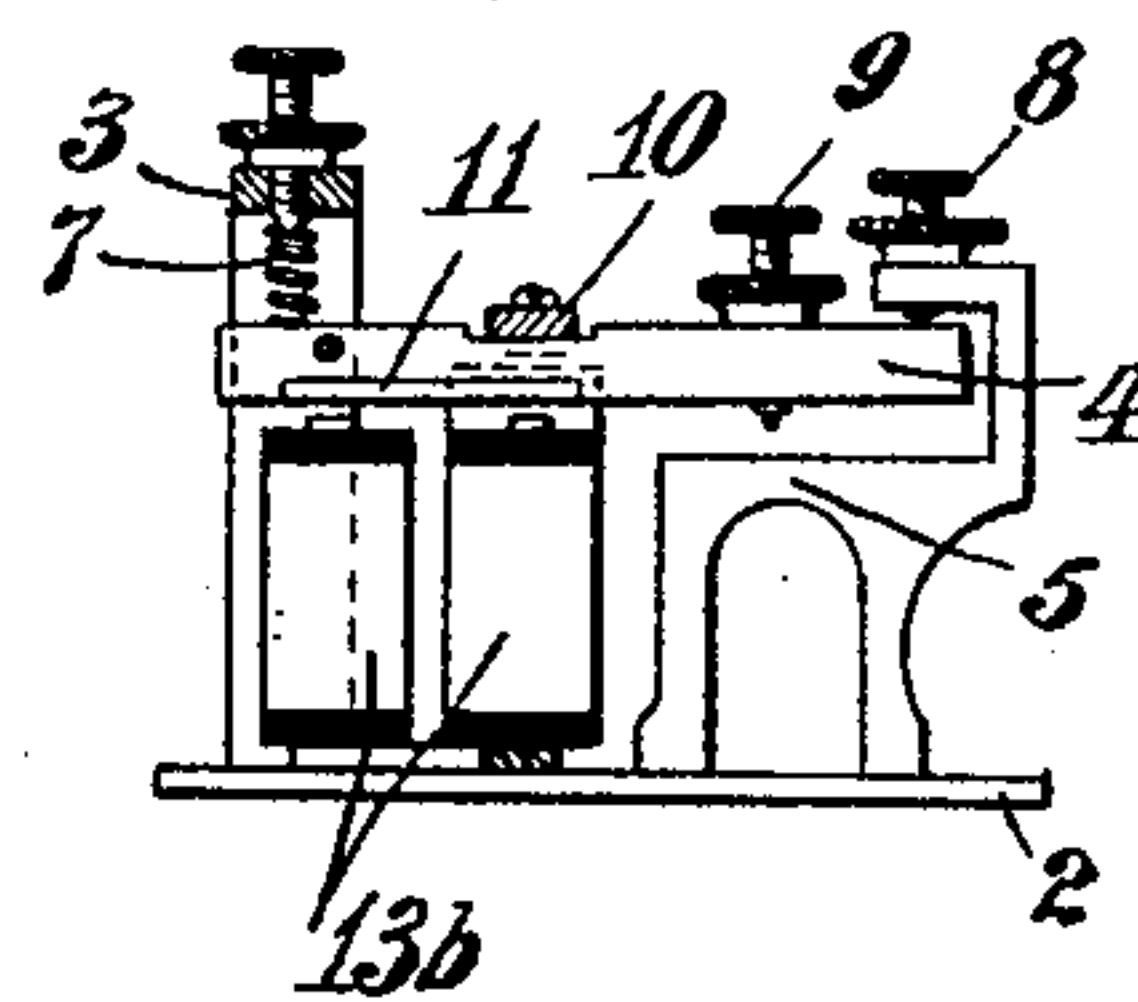


Fig. 2.

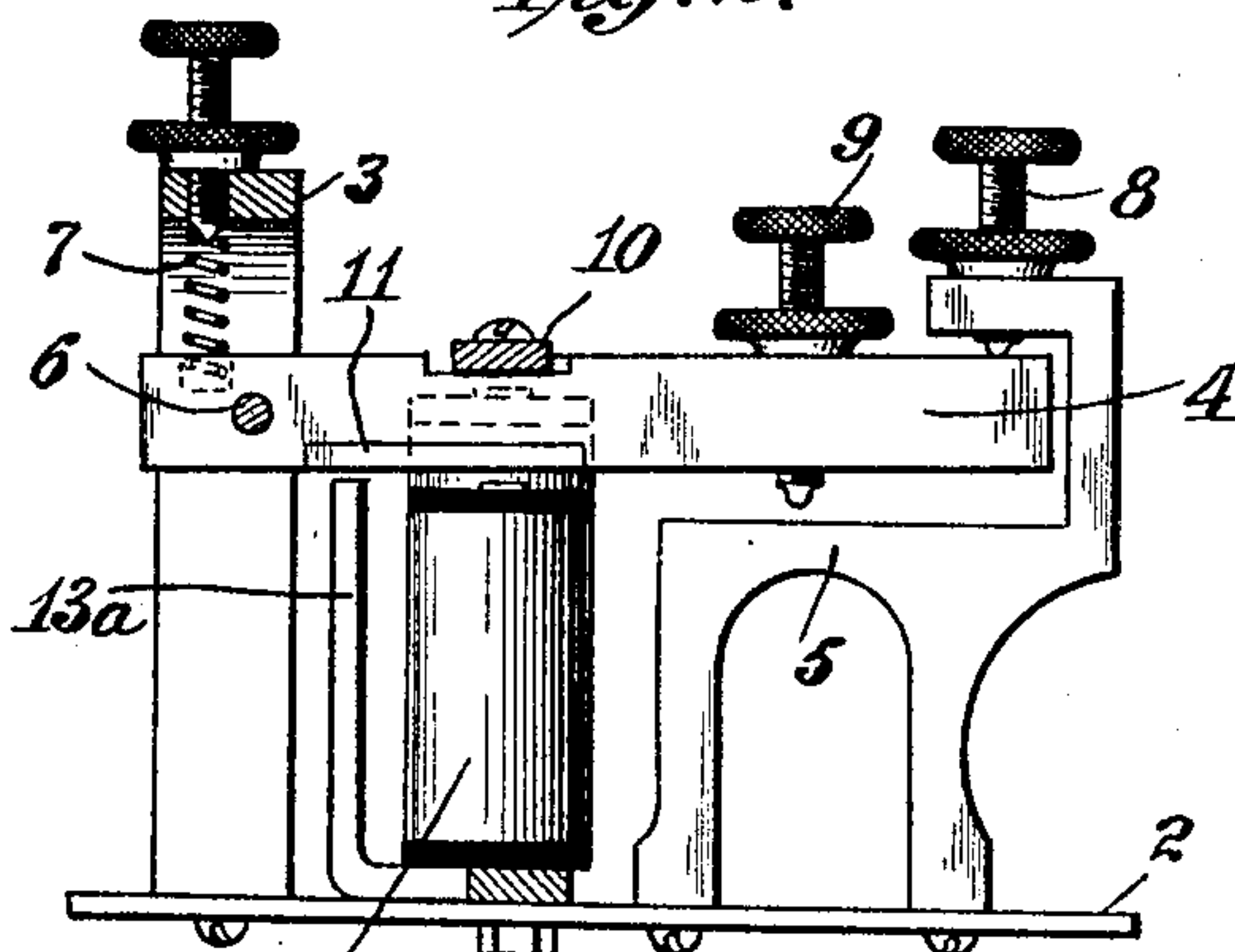
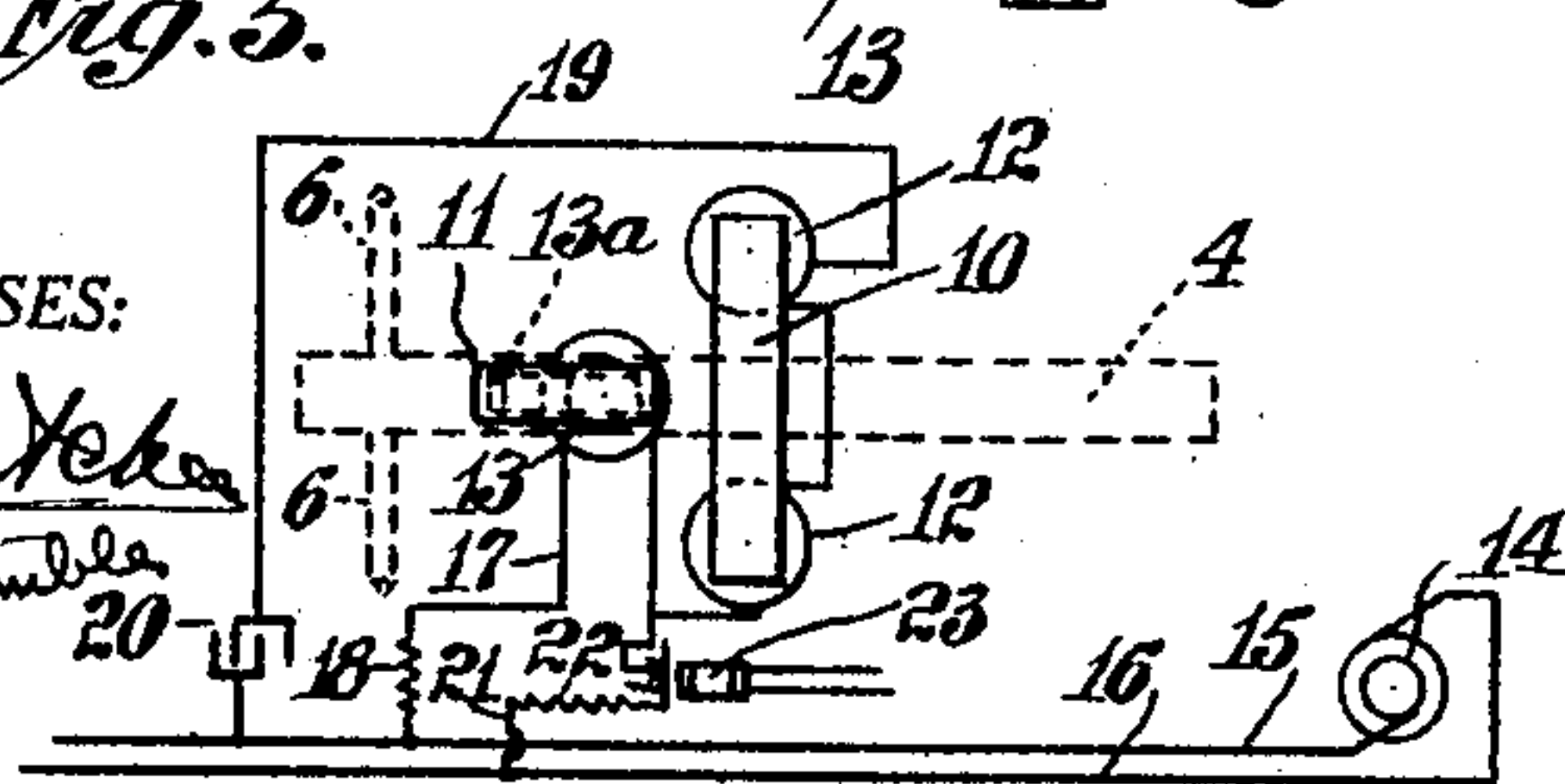


Fig. 5.



WITNESSES:

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ALTERNATING-CURRENT ELECTROMAGNETIC INSTRUMENT.

1,324,536.

Specification of Letters Patent.

Patented Dec. 9, 1919.

Application filed March 7, 1917. Serial No. 153,190.

To all whom it may concern:

Be it known that I, HARRY K. BEASLEY, a citizen of the United States of America, and a resident of borough of Brooklyn, county of Kings, State of New York, have invented Alternating-Current Electromagnetic Instruments, of which the following is a specification.

My invention relates to alternating current electromagnetic instruments, particularly telegraph sounders, relays, electromagnetic switches, etc.; though the principles involved in the instrument herein illustrated and described are applicable to various types of electromagnetic apparatus, and I do not intend that my invention shall be considered as limited to relays and sounders only.

My invention consists in a novel arrangement of magnets and armatures whereby a steady pull, firm contacts, a strong magnetic effort and freedom from vibration of the armature lever, or its equivalent, against its stop, or stops, are obtained, without complication. As embodied in a telegraph sounder, or like instrument, my invention further comprises a structure wherein uniformity of sound, produced by the down strokes of the armature lever, is obtained. This latter consideration is of particular importance in sounders, because if the sound produced on the down or "attracted" stroke is uncertain or variable confusion is apt to be caused in the reception of messages. My invention comprises two magnets operated in split-phase circuits, having a phase difference preferably of approximately 90 degrees; each magnet acting upon its own armature, the two armatures being carried, preferably, by the same armature lever. The other features of my invention will be pointed out hereafter.

The objects of my invention are to obtain in an alternating current electromagnetic instrument a steady pull on the armature lever, or like member of the instrument, a strong magnetic effort, firm contacts, freedom from vibration at the contacts during periods of attraction of the armature lever, or like member, by the magnets, and, in the case of a telegraph sounder, uniformity of sound produced by the down or "attracted"

strokes of the armature lever, or like member of the instrument; also to accomplish the above objects by simple means adaptable to the production of instruments constructed along substantially settled telegraph practice.

I will now proceed to describe my invention with respect to the accompanying drawings illustrating, specifically, two types of telegraph sounders embodying my invention; in the said drawings:

Figure 1 shows a perspective elevation of one type of electromagnetic instrument (specifically, a telegraph sounder) embodying my invention, and

Fig. 2 shows a central longitudinal vertical section of the said sounder.

Fig. 3 shows a top view, and

Fig. 4 a central longitudinal vertical section of a further type of sounder embodying my invention.

Fig. 5 is a diagram illustrating the circuits of the instrument.

Referring first to Figs. 1 and 2:

The sounder shown in these figures is, in general, of ordinary construction (except as to the arrangement of magnets and armatures therefor, as hereinafter described) and comprises the usual base 1, resonator plate 2, yoke 3, armature lever 4, anvil 5, trunnion screws 6, and retractor spring 7. The anvil 5 carries the usual stop screw 8, and the armature lever carries the usual adjusting screw 9. The armature lever 4 should be constructed of non-magnetic material, for example, aluminum, or an aluminum alloy.

This armature lever carries two armatures 10 and 11, of which 10 is arranged transversely of the armature lever, while 11 is arranged longitudinally of the armature lever, and, preferably, is located within a recess on the under side of said armature lever. For each of these two armatures there is a corresponding horseshoe magnet; 12—12 designating the magnet spools of the magnet for armature 10, and 13 designating the spool of the magnet for armature 11. As shown particularly in Fig. 2, the magnet corresponding to armature 11 has one spool only, the other side of the magnet being represented by a bare magnet leg 13^a; this

construction for magnet 13 being adopted principally for compactness, and it being perfectly practicable to provide a spool on each leg of the magnet; such arrangement being shown in Figs. 3 and 4.

It will be understood that the magnets 12 and 13 are in circuits, or circuit branches, through which pass alternating currents of the same frequency, but of a certain phase difference, (preferably a phase difference of 90 degrees). These alternating currents of different phase may be obtained either from the same or from different sources; various means for obtaining currents of different phase from the same circuit being well known; for example as shown in Fig. 5, magnet 13 may be in a branch 17 from an alternating current lead 15 supplied with current from an alternating current generator 14, and magnet 12 may be in another branch 19 from the same alternating current lead 15, one of these branches, as 17, containing non-inductive resistance 18, the other branch, as 19, containing a condenser 20; the return conductor 21 containing non-inductive resistance 22, and passing through contacts, as for example those of relay 23, whereby the circuit of both magnets may be made and broken simultaneously. It will be seen that, from the instrument constructed as described, and connected in circuit as described, magnets 12 and 13 are energized intermittently and alternately; that is to say, when the energization of magnet 12 is low, that of magnet 13 is high, and vice versa. While the centers of effort of the two magnets 12 and 13 are not in line with one another and do not intersect, yet they are both in the plane of oscillation of the armature lever 4, and hence there is no twisting effect on the armature lever produced by the alternating pull of the two magnets, and since the periods of pull of the two magnets alternate regularly, the resultant of the pull of the two magnets is practically uniform, and the instrument operates substantially as an ordinary sounder, and with the same characteristic tone and uniformity of tone, as in the case of an ordinary sounder. In the alternative construction, shown in Figs. 3 and 4, the only difference is that the magnet corresponding to the longitudinal armature 11, which magnet is designated in Fig. 4 by reference character 13^b, has a spool on each leg of its U-shaped core. The action is precisely the same as in the relay shown in Figs. 1 and 2.

Since the present invention relates only secondarily to the particular nature of the instrument in which the electromagnetic structure above described is embodied, and then relates to a specific type of instrument, only in so far as the character of sound produced by that instrument is concerned, it

will be clear that it is immaterial, so far as the present invention is concerned, whether or not the armature lever 4 actuate contact points (as in a relay or switch), or whether it actuate something else, mechanically or otherwise. Obviously the invention is not restricted to sounders only, and since the armature lever may actuate anything which is actuated ordinarily by the armature lever of a magnet, the field of the invention is as wide as the uses to which an armature lever so actuated may be put.

It will be noted that in both constructions of my improved electromagnetic instrument, each magnet, with its armature, constitutes a separate entity, and that the magnetic flux generated by each magnet follows the magnetic path of its core and armature, which together form a closed magnetic circuit; so that there is no tendency for the flux from one magnet to traverse the magnetic circuit of the other magnet. In other words, there is no coöperative relation between the magnetic flux of one magnet and that of the other magnet, and there is neither geometrical nor magnetic symmetry in the separate lines of pull of the magnets.

What I claim is:

1. An alternating current electromagnetic instrument comprising a pivoted armature lever of non-magnetic material, two armatures carried by said lever and arranged at an angle one to the other, and magnetically separated one from the other, and two electromagnets, one for each such armature, and each having its poles in proximity to the corresponding armature.

2. An alternating current electromagnetic instrument comprising a pivoted armature lever, two armatures carried thereby and magnetically separated one from the other, one arranged transversely and the other arranged longitudinally upon said lever, and two electromagnets, one for each of said armatures, and arranged in coöperative relation with respect to its corresponding armature.

3. An alternating current electromagnetic instrument comprising a movably mounted armature lever of non-magnetic material, two armatures carried by said lever, one arranged transversely with respect to said lever, the other arranged longitudinally thereof, and two electromagnets, one for each of said levers, the magnet for the one armature being a horseshoe magnet, and the other magnet being located between the branches of said horseshoe magnet.

4. An alternating current electromagnetic instrument comprising a movably mounted armature lever of non-magnetic material, two armatures carried by said lever, and separate magnets for said armatures, one of said armatures located longitudinally of said

lever and on the side thereof nearest the corresponding magnet, the other armature located transversely of said lever, the magnet of said transverse armature being a horse-shoe magnet the branches of which span the magnet for the longitudinal armature.

In testimony whereof I have signed this

specification in the presence of two subscribing witnesses.

HARRY K. BEASLEY.

Witnesses:

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