

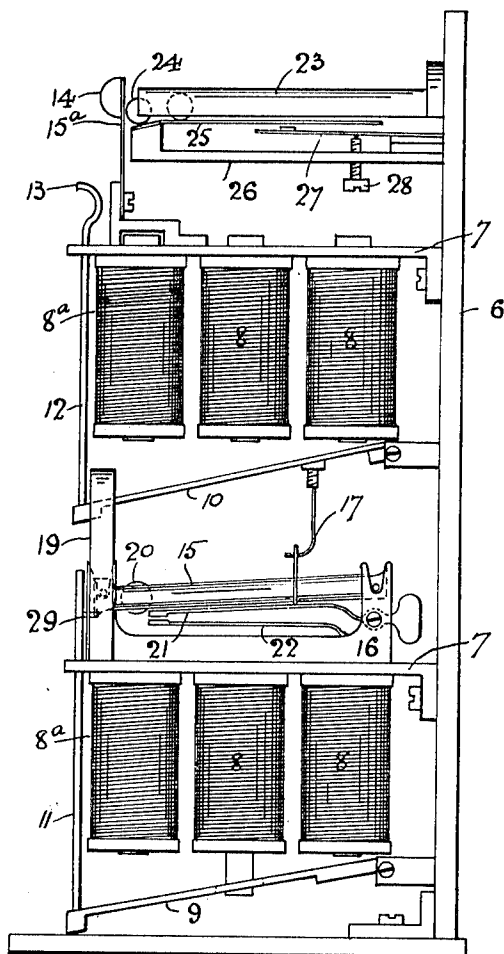


Fig. 1

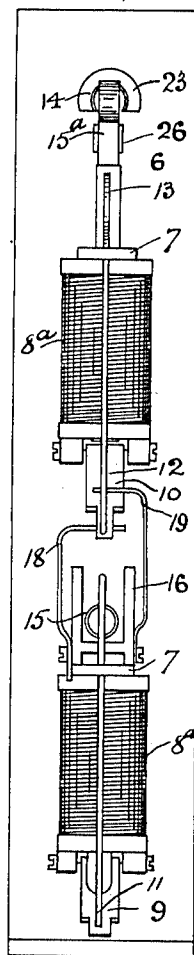


Fig. 2

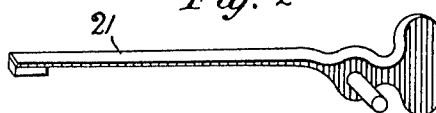


Fig. 3

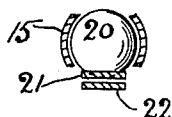


Fig. 4

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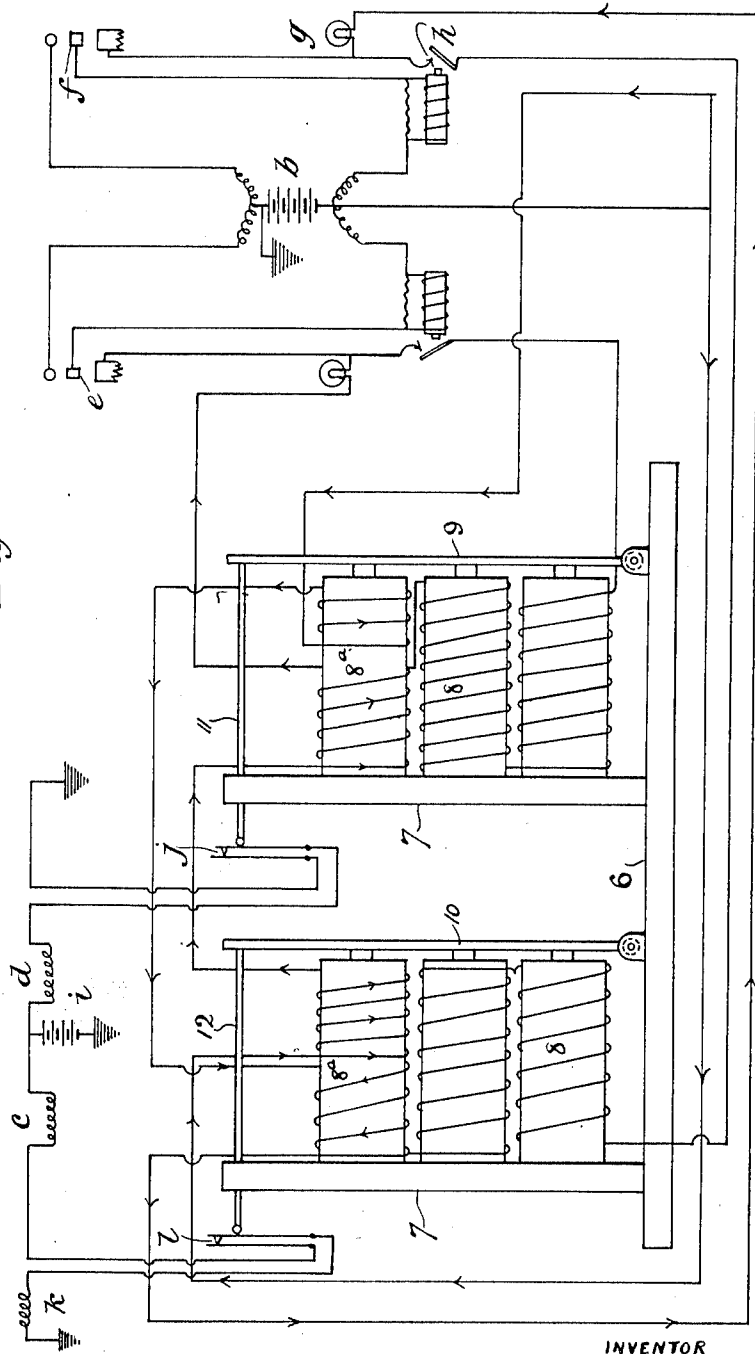
E. H. BRIDGE.
 APPARATUS FOR RECORDING CALLS MADE BY TELEPHONE.
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1,064,049.

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2 SHEETS-SHEET 2.

Fig. 5



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APPARATUS FOR RECORDING CALLS MADE BY TELEPHONE.

1,064,049.

Specification of Letters Patent.

Patented June 10, 1913.

Application filed October 25, 1911. Serial No. 656,580.

To all whom it may concern:

Be it known that I, EDWARD HILL BRIDGE, a subject of the King of Great Britain, residing at Walcote, Melbourne Road, Spotswood, Victoria, Australia; have invented a new and useful Apparatus for Recording Calls Made by Telephone; and I do hereby declare the following to be a full, clear, and exact description of the same.

My invention has for its object to provide a more perfect system and apparatus for recording calls made by telephone in a common battery cord circuit.

By means of the invention effective calls are registered by meter, only when both receivers are taken up for a conversation.

In carrying the invention into effect I utilize an arrangement of electromagnets and armatures in two sets there being in each set a high resistance coil wound in two halves, the outside of one coil being connected to the inside winding of the other coil, in series and vice versa. Means are also provided for registering effective and ineffective calls through switch mechanism. But in order to thoroughly understand the invention reference is made to the accompanying drawings, in which—

Figure 1 is a side elevation of my instrument, and Fig. 2 an end elevation of the same. Fig. 3 is an enlarged detail of the counter-weighted contact device. Fig. 4 is a sectional elevation (also enlarged) of part of the ineffective switch mechanism, and Fig. 5 shows in diagram the wiring of my improved recording means.

Upon a suitable standard 6 are attached yokes 7 to which the electromagnets 8 and 8^a are secured. The armatures 9 and 10 are each hingeably mounted on the standard 6 near its respective tractors and attached to the outer ends of each armature is a vertical rod, rod 11 being upon armature 9 and rod 12 on armature 10. The upper rod is furnished with a bent end piece 13 for the purpose hereafter to be explained. The coils 8 are arranged in tandem in pairs and associated with each pair is a third coil 8^a of higher resistance than the other two. The object of this arrangement of parts is to insure that when a subscriber makes a call and the attendant inserts answering plug, current will flow through the lower set of coils in proportion to their resistance. The armature 9 should be disposed closer to its tractors, the coils of which are in the call-

ing subscriber's circuit, than armature 10 is to its magnets, as by so doing the armature of the lower set will be attracted first and will lift the rod 11 into contact with the rod 12, at the same time slightly lifting armature 10 until it will be within the field of its tractors when they are so constituted by the called subscriber's circuit being closed. When such takes place armature 10 will be attracted and the rod 12 lifted with it, this will bring member 13 into smart contact with the piece 14 on the light flat spring 15^a which will have the effect of operating the metallic switch mechanism that causes the effective calls to be registered.

Referring now to the registering mechanism, situated above each set of coils is a ball race which may contain one or more preferably steel balls or a mercury globule. The lower race 15 is supported by the casting 16 in which it is pivotally and loosely mounted. For the purpose of normally supporting the front of armature 10 I provide a metal bracket 18 which is secured to member 16. On the other side of 16 is a light sensitive sheet spring 19 that is bent inward at right angles at the top and comes over armature 10. The spring 19 is intended to prevent armature 10 being thrown against the high resistance coil when armature 9 is forcibly attracted and thus to prevent a premature registration of the call. If a ball is used in the race there will be situated below and parallel with the race a counter-weighted contact device 21 which is normally clear of its complementary piece 22 but with which it will contact when the ball rolls in the race thereby completing the circuit through the non-effective meter. I prefer to use the contact mechanism as shown as the counter-weighted member 21 can be kept for an appreciable period in contact with member 22 as the ball rolls down the race. When connection is made with the calling subscriber and the armature 9 lifted into contact with its magnets the armature 10 will have been pushed up closer to its tractors. On the called subscriber's circuit being completed the upper set of magnets are excited and the armature 10 attracted into contact with its magnets. Such motion of the armature is a sharp one and brings 13 into somewhat brisk contact with contact piece 14 on spring 15^a.

The upper race 23 is mounted on the standard 6 and contains one or more balls

24 which are disposed upon the spring contact 25 mounted upon the bracket 26, on the other end of which is the complementary contact 27 and insulated adjustment 28. On members 13 and 14 contacting the balls 24 will be projected inward along the inclined race causing springs 25 and 27 to make contact as the balls are going and returning thereby closing the effective meter circuit. Having two balls insures a longer contact and consequently a longer glow in the meter lamp to acquaint the attendant that a registration has been made.

When a subscriber calls the exchange his line lamp is lighted by which the attendant is notified that he desires to be connected with some other circuit. She then puts in the answering plug *e* when the current will flow from battery *b* to the high resistance coils 8^a through them to the lower pair of low resistance coils, through supervisory contact to sleeve of plug *e* thence to earth causing armature 9 to be attracted and canting ball race 15 through pin 29 on rod 11 to permit of ball rolling to back of race clear of springs. On subscriber giving number required operator inserts calling plug *f* and sends ringing current on to line, when the supervisory lamp *g* will glow. When the subscriber is connected with the second circuit this supervisory lamp *g* will continue to glow until the called subscriber lifts his receiver. By so doing he will close a path through the supervisory relay contact *h* which allows battery to flow through high resistance coils 8^a and the low resistance coils, and through the contact *h* to the sleeve of plug and to earth, causing armature 10 to be lifted. At the same time race 15 will be lifted at the back by hook 17 clear of member 21 and ball 20 will roll back without touching 21. The armature 10 will also be sharply attracted when the called subscriber answers by taking his receiver off the hook. When the armature 10 is attracted by its magnets the balls 24 are as before explained, propelled along the race making contact between parts 25 and 27 causing registration in effective and service meters. The call is registered as effective when the second subscriber takes his receiver up, but another call cannot be registered until both subscribers are finished and have hung up and the attendant has disconnected the cord circuit. The cycle is then complete.

Special provision is made for ineffective calls by the disposition of the race 15. For instance should the subscriber not obtain the number he wants an ineffective call would be registered in the following manner: On subscriber calling the exchange he closes circuit by removing receiver from hook. The operator inserting the answering plug causes attraction of armature 9 and cant-

ing of race 15 which allows ball 20 to roll back therein clear of piece 21. If unable to get the party he wants subscriber will hang up and operator will know on seeing both supervisory lamps glowing that she can disconnect. Armature 9 will be released and race and ball will resume its normal position but in doing so the ball in returning will cause ineffective meter circuit *d* to be closed through pieces 21 and 22. If the wanted number had answered armature 10 would have been attracted. Such action would cause race 15 to be lifted or recanted from the rear by hook 17 and the ball to roll to its normal position in the race still clear of contacts 21 and 22. In this case therefore registration must be through effective meter *c* and service meter *k*. If one of the subscribers after being connected has to temporarily leave his instrument and hangs up his receiver the third or high resistance coils 8^a will keep the armatures locked until the attendant disconnects by removing plugs. The attendant will be governed entirely by the supervisory lamps while controlling the switch board.

Referring to the switch circuits these are local distinct circuits. The ineffective meter *d* line is closed mechanically through contact of pieces 21 and 22 which allows current to flow from battery *i* through the ineffective meter *d* contact *j* and to earth. The circuit through the effective meter *c* and service meter *k* will be from battery through meter *c* pieces 25 and 27 contact *l* and service meter *k* to earth.

In telephonic systems where spool resistances are employed I have found that such resistances can be eliminated and this invention used in their place to perform the functions of the same.

Having now fully described and ascertained my said invention and the manner in which it is to be performed, I declare that what I claim is:—

1. In a telephone call recording apparatus, the combination of two sets of electromagnets in each of which is a relatively high-resistance split wound coil; a movable armature for each set of coils; recording means controlled by each armature; electrical means adapted to conduct current to said sets of coils, when a calling and an answering subscriber are connected to the cord circuit, whereby said sets are energized; and means for maintaining current in the high-resistance coils until the subscribers' plugs are removed.

2. In a telephone call recording apparatus, the combination of two sets of electromagnetic coils placed one above the other; electrical means for automatically supplying current to said sets respectively when a calling and an answering subscriber are connected to the cord circuit, whereby said sets

are energized; hinged armatures adapted at times to be attracted and moved by the said respective sets of coils; recording means adapted at times to be controlled by the movements of the respective armatures; and an operative connection between the armatures for causing one of the armatures to be moved nearer its set of coils by means for the movement of the other armature.

3. In a telephone call recording apparatus, the combination of two sets of electromagnetic coils placed one set above the other; means for automatically energizing the upper set when an answering subscriber is connected to the cord circuit; a hinged armature adapted to be attracted by the upper set, when energized, when the armature is brought within the field thereof; means for automatically energizing the lower set when a calling subscriber is connected to the cord circuit; an armature adapted to be attracted by the lower set, when energized; a means operated by the lower armature for pushing the upper armature near its set of coils; means controlled by the upper armature for registering effective calls.

4. In a telephone call recording apparatus, the combination of an upper and a lower set of electromagnetic coils; an upper and a lower armature for said sets respectively; means for automatically energizing the upper set when an answering subscriber is connected to the cord circuit; means for automatically energizing the lower set when a calling subscriber is connected to the cord circuit, whereby the lower armature is raised; an ineffective-call meter controlling means adapted to be moved to an abnormal position by the lifting of the lower armature, said operating being adapted to return, after the release of the lower armature, with one kind of movement if the upper set be not energized; means connected with the upper armature for causing the operating means to return with a second kind of movement if the upper set be energized; an ineffective-call meter; and means for causing the same to be operated and adapted to be operated by said operating means only when the operating means returns to position with said first named movement.

5. In a telephone call recording apparatus, the combination of an upper and a lower set of electromagnetic coils; an upper and a lower armature for said sets respectively; means for automatically energizing the up-

per set when an answering subscriber is connected to the cord circuit; means for automatically energizing the lower set when a calling subscriber is connected to the cord circuit; an open race having an upper and a lower end and adapted to be raised at either end; a ball normally resting in the lower end of the race; a counter-weighted lever below said race and adapted to be contacted by the ball when running down the race when both ends are in lowest position; means connected with the upper armature for raising the upper end of the race; means connected with the lower armature for raising the lower end of the race; and means operated by said lever for registering ineffective calls.

6. In a telephone call recording apparatus, the combination of an upper and a lower set of electromagnetic coils; an upper and a lower armature for said sets respectively; means for energizing the lower and upper sets respectively when a calling or answering subscriber is connected to the cord circuit respectively; an open race; a ball therein; means connected with the upper armature for causing the ball to roll in the race; a contact piece adapted to be moved by the ball; and an effective-call meter adapted to be controlled by the movement of the contact piece.

7. In a telephone call recording apparatus, the combination of an upper and a lower set of electromagnetic coils; an upper and a lower armature for said sets respectively; means for energizing the lower and upper sets respectively when a calling or answering subscriber is connected to the cord circuit respectively; means connected with the lower armature for causing movement of the upper armature into the field of the upper set; a rigid bracket beneath the upper armature; a light flat steel spring secured to said bracket and extending vertically and having its upper end bent at right angles to come over said upper armature to limit said movement; and means controlled by the upper armature for registering effective calls.

In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses.

EDWARD HILL BRIDGE.

Witnesses:

P. M. NEWTON,
M. ALLAN.