KS-5133 ONE-HALF AMPERE RINGING MACHINE

DESCRIPTION AND APPLICATION

1.01 The Holtzer-Cabot one-half ampere ringing machines described hereinafter are used in step-by-step and manual offices. The "Requirements and Adjusting Procedures" for these ringing machines are outlined in Bell System Maintenance Practices, Section 163-701-701.

1.02 Section 2 of this specification describes the principal parts which go to make up the complete unit and will be called "Description".

1.03 Section 3 of this specification describes the operation of the ringing machines and will be called "Operation".

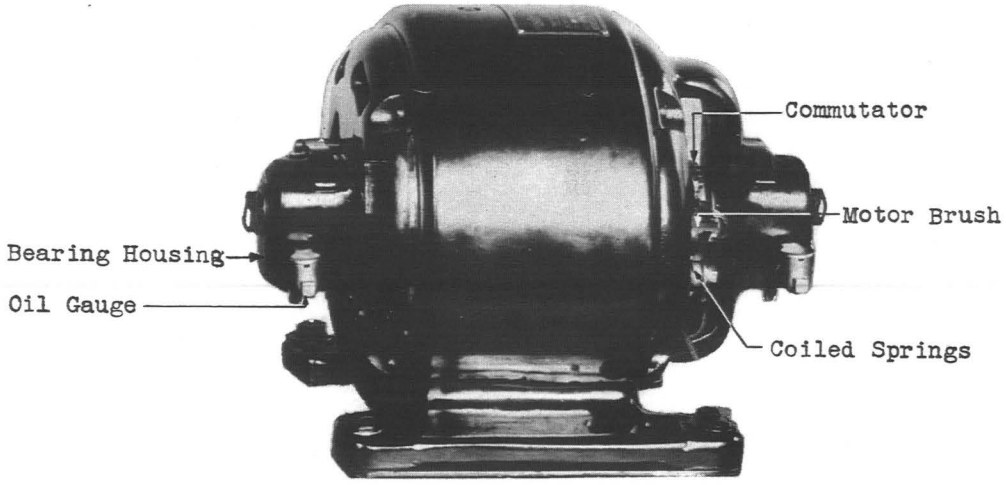
1.04 Section 4 of this specification describes the various conditions which may interfere with the proper operation of the ringing machines and will be called "General Troubles".

SECTION 2 - DESCRIPTION

GENERAL

2.001 The Holtzer-Cabot one-half ampere ringing machine consists essentially of a motor direct-connected to a ringing generator, high and low speed interrupters, a speed regulator (furnished with D.C. motors) and an output transformer.

DRIVING MOTOR

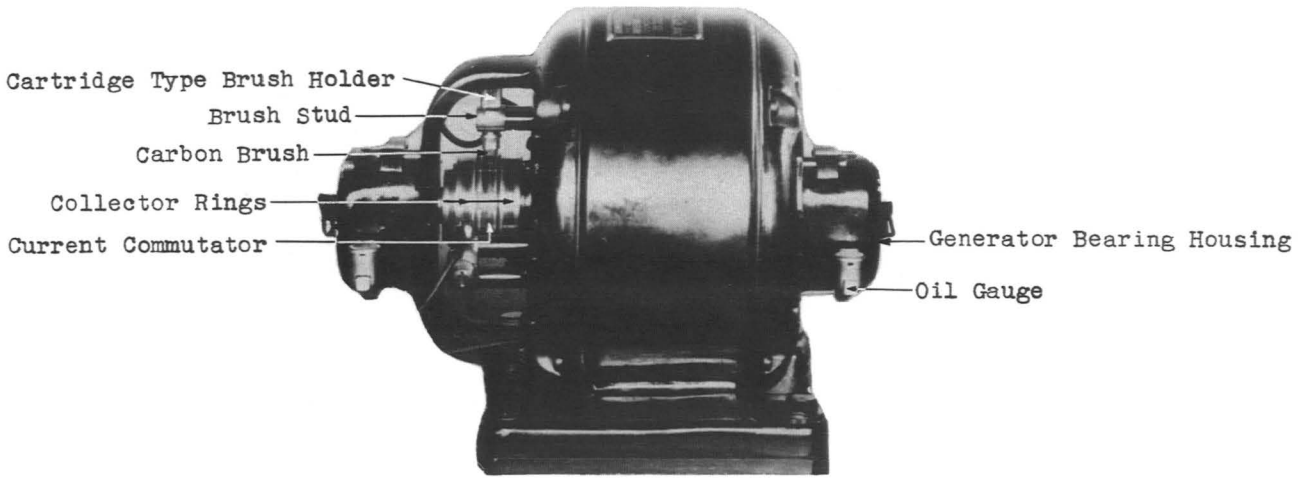


2.01 Type Motors furnished are either shunt wound DC motors, sometimes having a small series field to reduce the starting current, or split phase AC induction motors with an internal automatic centrifugal switch for disconnecting the starting winding after starting.

2.02 Bearings The motor is provided with self-oiling bearings of the oil ring type. The bearing linings are of bronze and are lubricated by means of oil rings which rest upon the shaft in slots cut through the bearing. The rings dip into the oil in the oil chamber and as they rotate, deposit oil on the shaft where it passes along grooves cut into the bearing lining, thus lubricating the bearing surface.

2.03 Brush Assembly The motor brushes are self-lubricating carbon brushes provided with pigtails and mounted in brush holders rigidly attached to a brush yoke by means of insulated brush studs. The brush yoke is held in position by set screws and may be moved around the bearing housing to the desired position (indicated by chisel mark) for good commutation. Constant brush pressure is maintained by small non-adjustable coiled springs.

GENERATOR



GENERATOR

2.04 Type The generators driven by battery motors are shunt wound and have an auxiliary field winding in series with the motor line. AC and DC line driven sets are shunt wound and self-excited. An auto-transformer for delivering voltages different from the machine voltage may be furnished with the set.

2.05 Bearings The generator bearings are of the same general construction as the motor bearings described in paragraph 2.02.

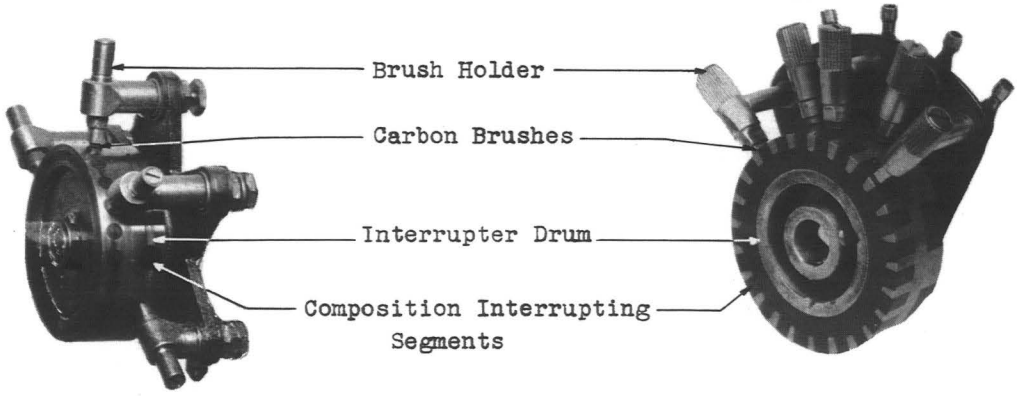
2.06 Brush Assembly The generator commutator brushes on self-excited generators are self-lubricating carbon brushes mounted in cartridge type brush holders clamped to brush studs. The brush studs are firmly fastened to the brush yoke which is held in position by set screws and may be moved around the bearing housing to the desired position (indicated by chisel marks) for good commutation.

2.07 Pulsating Current Commutator and Collector Rings A pulsating current commutator arranged between and connected to two collector rings is provided for the ringing generator. This commutator is of the same diameter as the collector rings. The cartridge type brush holders are clamped to brush studs which are fastened to a brush yoke. The brush yoke is held in position by set screws but may be shifted 180° for changing the amount of audible ringing.

HIGH-SPEED DRUM - TYPE INTERRUPTERS

Circular Segment Type Drum

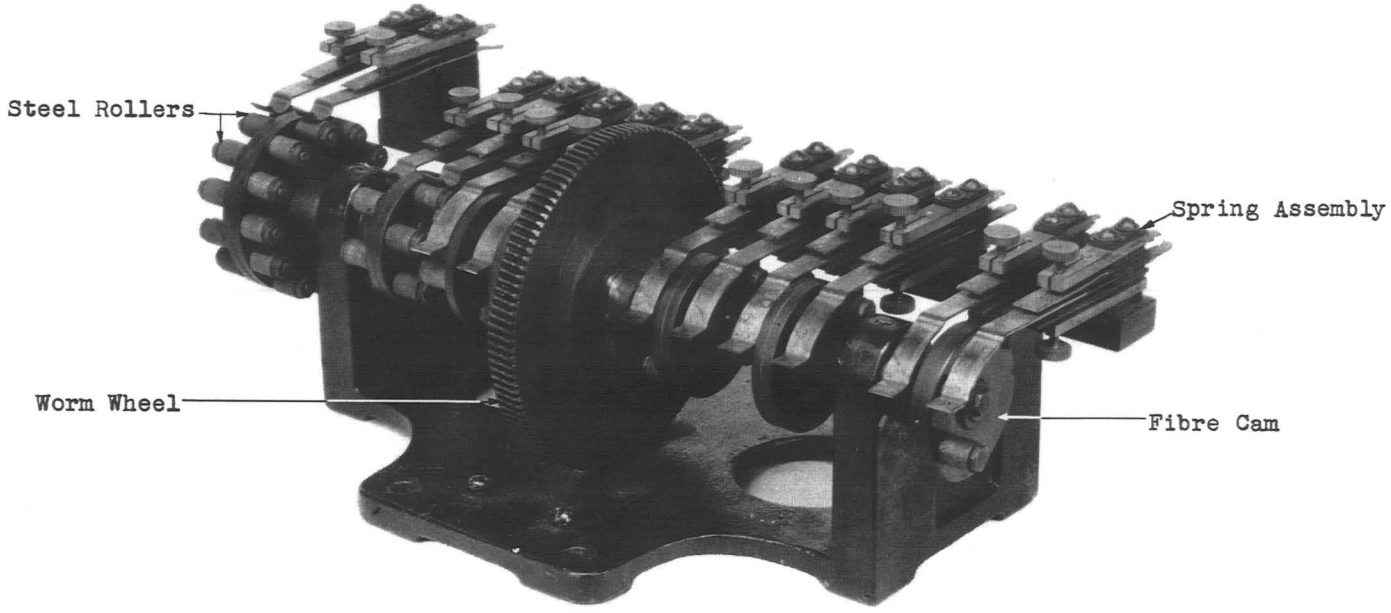
Rectangular Segment Type Drum



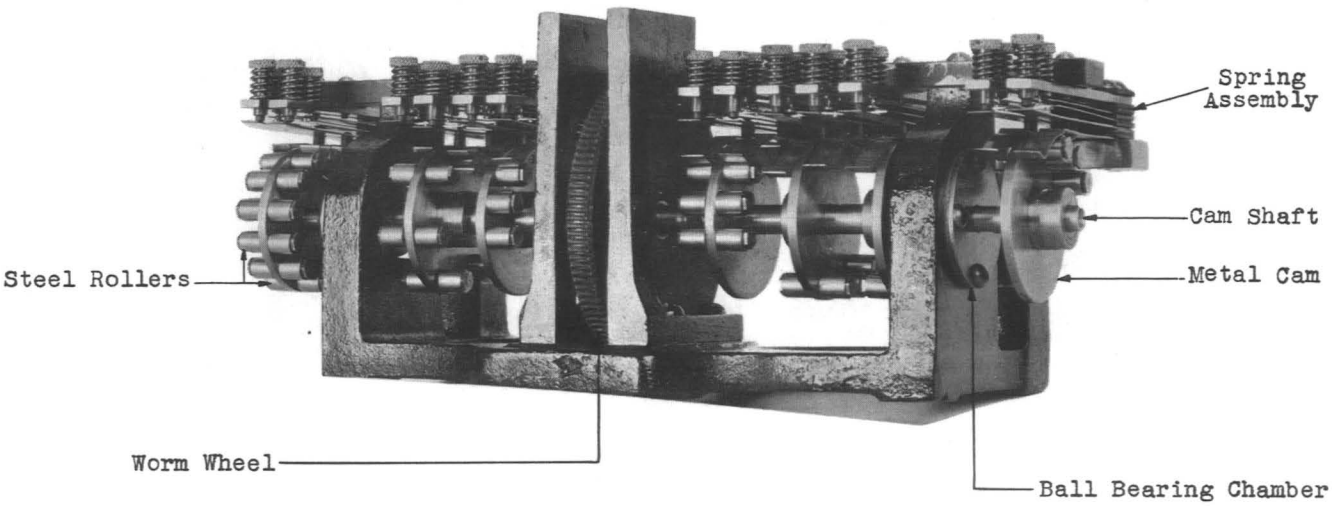
INTERRUPTERS

2.08 High-Speed Drum Type Interrupter A drum type interrupter having composition interrupting segments and an associated brush rigging furnishes the high and low tones for the ringing machine. The interrupter drum is mounted on the generator shaft extension and its associated brush rigging on the generator end shield. The brush rigging is made up of five cartridge type brush holders mounted upon a metal plate. The brushes are self-lubricating carbon brushes.

INSULATED CAM-TYPE LOW-SPEED INTERRUPTER

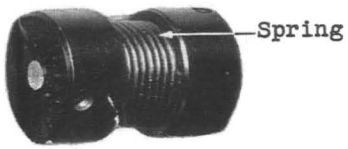


METAL CAM-TYPE LOW-SPEED INTERRUPTER

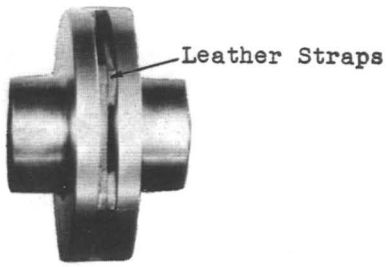


2.09 Low-Speed Interrupter The low-speed interrupter mechanism is made up of a number of cams (giving the required timing intervals of make and break), combinations of springs and contacts (to give make or break intervals), and a worm and gear wheel to give the necessary speed reduction between the generator shaft and the low-speed interrupter cam shaft. The interrupter cams are provided with steel rollers which turn freely on their bearings.

SPRING TYPE COUPLING



LEATHER STRAP TYPE COUPLING



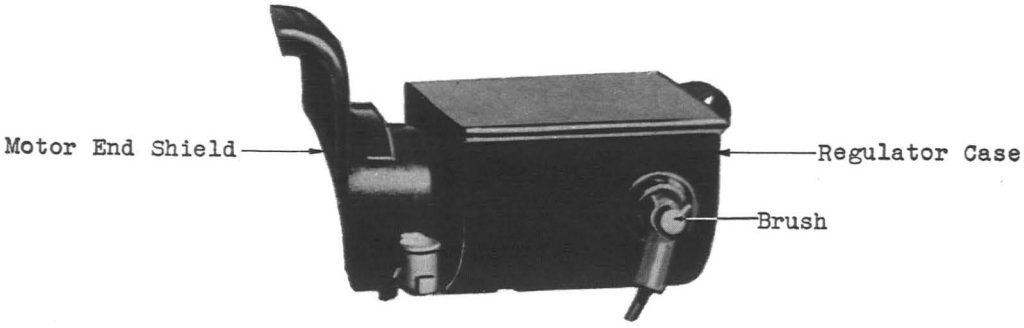
COUPLINGS

2.10 Type A flexible type of coupling with leather driving straps is used to connect the ringing generator to the motor. One-half of the coupling is secured to the end of the driving motor shaft and the other half is attached to the ringing generator shaft, the leather straps being attached and arranged in such a manner that a flexible driving connection is provided between the motor and ringing generator. On the earlier machines a spring type coupling was provided.

SPEED REGULATOR

2.11 Type A centrifugal type speed regulator controls the D.C. motor speed. The regulator consists of two contacts

SPEED REGULATOR



mounted on two leaf springs which are attached to a rotating arm by two mounting screws. The position of the outer contact is adjustable to provide for variable regulation of the motor speed.

2.12 Operation In normal operation, contact is rapidly made and broken maintaining the speed very closely. As the speed becomes high (predetermined value), the contacts close, short circuiting an associated regulator resistance in series with the motor field, thus strengthening the field and decreasing the motor speed. When the speed becomes low, the contacts open and the regulator resistance is again inserted in the motor field circuit, thus weakening the field and increasing the motor speed.

SECTION 3 - OPERATION

3.1 Preparation for Starting Before starting make a general inspection to insure that nothing is in or on the motor or driven unit which will interfere with the starting. Check the height of the oil in the bearing oil wells.

3.2 Starting The ringing machine shall be started by closing the motor line switch.

3.3 Running After starting, inspect the oil rings to see that they are turning on the shaft and delivering oil to the shaft and bearings.

3.4 Transfer and Stopping The load may be transferred from one machine to another in the following manner:

1. Start the ringing machine to which the load is to be transferred.
2. Close transfer switches placing load on machine just started.
3. Check all connections for signals coming through.
4. Open motor line switch to machine from which load was removed.

SECTION 4 - GENERAL TROUBLES

4.01 Failure to Start

Cause	Action
Fuses blown	Locate and remove cause, replace fuses.
Armature blocked	Remove obstruction.
Defective motor winding	Repair or replace motor
Motor brushes not making contact	Clean or refit brushes

4.02 Failure to Come Up to Speed

Cause	Action
Low voltage	Notify supervisor
Poor motor brush contact	Refit brushes, clean commutator
Regulator contacts sticking	Clean contacts
Dirty motor commutator	Remove brushes, clean commutator and brushes.

4.03 Excessive Speed — Shut Down Immediately

Cause	Action
High motor voltage	Notify supervisor
Abnormal resistance in motor field circuit	Inspect speed regulator contacts and all field connections
Short circuit in motor field.	Take voltage drop across each coil.
Motor shunt field circuit open.	Repair or replace motor.

4.04 Motor Stops

Cause	Action
Fuses blown	Locate cause and replace fuses
No voltage	Notify supervisor

4.05 Overheating of Bearings

Cause	Action
Insufficient oil	Add oil
Oil rings not functioning	Adjust or replace
Bent shaft	Replace armature
Rough bearing surface	Refit or replace bearing
Improper fitting, lining too tight	Refit or replace bearing
Improper alignment	Realign
Improper grade of oil	Clean out bearing and lubricate with proper oil
Dirt or grit in oil	Clean out bearing and lubricate with fresh oil.

NOTE If a hot bearing develops, the load shall be removed from the machine. The bearing should then be flushed with dynamo oil until cool. The motor should, in no case, be stopped until the bearing is cool, unless there is danger of the armature striking a pole-piece. Stopping a machine with a hot bearing before the bearing has cooled may result in the shaft adhering to the bearing lining and make the replacement of the bearing more difficult. After cooling the bearing, the motor shall be shut down and an inspection made to determine the cause of the heating, and the condition corrected before again placing a load on the motor.

4.06 Sparking at Commutator and Collector Rings

Cause	Action
Brushes not properly seated	Refit
Brushes too short	Replace
Incorrect brush tension	Adjust tension or replace brush and spring as required
Oily or dirty commutator or collector rings	Clean
Rough or pitted commutator or collector rings	Smooth
Defective windings such as an open or short circuit	Repair or replace rotor

4.07 Sparking at High-Speed Interrupter Drum

Cause	Action
Brushes not properly seated	Refit
Brushes too short	Replace
Incorrect brush tension	Adjust tension or replace brush and spring as required
Oily or dirty drum	Clean
Rough or pitted drum	Smooth
Defective filter	Check and repair

4.08 Failure of Low-Speed Interrupter

Cause	Action
Spring assemblies incorrectly aligned	Realign springs
Rough or pitted contacts	Smooth or replace
Improper adjustment	Adjust

4.09 Overheating of Commutator or Collector Rings

Cause	Action
Excessive brush pressure	Reduce pressure
Excessive sparking	See paragraph 4.06
Defective commutator insulation	Replace armature
Defective commutator or collector ring connections	Repair or replace
Winding trouble	Repair or replace armature or collector rings

NOTE If the commutator or collector rings appear excessively heated, the load should be removed, the machine stopped at once, the temperature checked with a thermometer and the condition corrected if necessary before replacing the load on the motor.

4.10 Overheating of Motor or Generator Windings

Cause	Action
Short-circuited or grounded windings	Repair or replace
Clogged ventilating passages	Clean passages

4.11 Excessive Noise and Vibration

Cause	Action
Loose commutator segments	Replace armature
Worn bearings	Replace
Armature striking pole-pieces	Replace bearings
Loose bolts or nuts	Tighten
Loose coupling	Tighten or replace worn parts
Bent shaft	Replace armature
Unbalanced armature	Balance or replace armature
Improper end play	Adjust bearings
Low-speed interrupter bearings noisy	Lubricate with specified oil.
Noisy cam rollers	Lubricate with specified oil
Rough commutator	Smooth