

General Electric Company

Schenectady, N. Y.

RAILWAY DEPARTMENT

June, 1914

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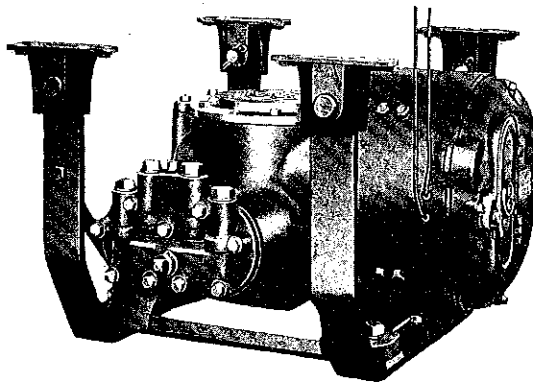
MOTOR-DRIVEN AIR COMPRESSORS—GEARED TYPE

The motor-driven air compressors manufactured by the General Electric Company for use in connection with air brake equipments were designed after a careful study of the exacting requirements of modern electric railway service. Compressors of the type described herein are in use on hundreds of electric railway systems and have demonstrated their superiority over types previously used for this class of work.

The principal points of advantage incorporated in these compressors are:

1. All bearings are contained in one casting insuring perfect and permanent alignment of all parts.

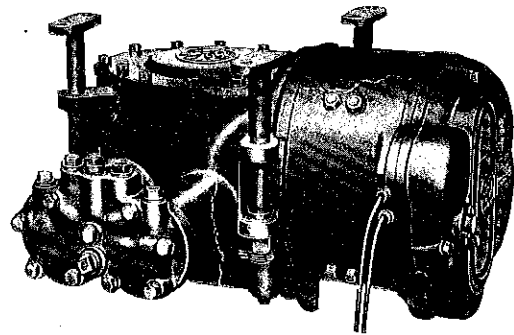
2. The motor has four field coils, resulting in perfect commutation and long life of commutator and brushes.



AIR COMPRESSOR WITH CRADLE SUSPENSION

3. The gear is located on the center of the crank shaft, providing for equal distribution of strains and reducing noise and vibration to a minimum.

4. The pinion is located on the cylinder side of the gear, making the crank shaft bearing pressures practically constant in direction, thus eliminating pounding and increasing the life of the bearings.



AIR COMPRESSOR WITH TEE BOLT SUSPENSION

5. The method of lubrication, with but one place to oil, insures a positive and abundant supply of oil for all bearings with a minimum amount of oil in the crank chamber.

GENERAL CONSTRUCTION

All of the material and workmanship is of the highest grade, and all motor and compressor parts are made to gauge and are therefore interchangeable.

Motor

In design and workmanship, the motor is in every way equal to the high standard of quality common to the latest types of G-E railway motors.

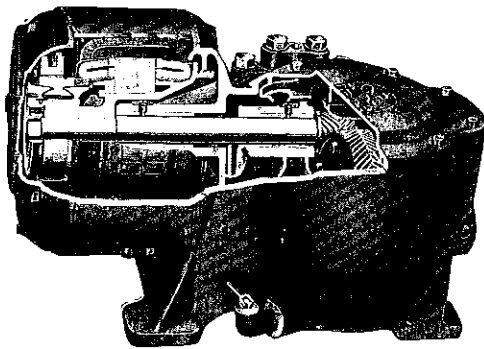
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*Supersedes Bulletin No. 4699.

Class 11

44591-2 Motor-Driven Air Compressors—Geared Type

Since the dimensions of the motor are not limited by mechanical considerations, it is possible to use four salient poles, as in railway motors. Better commutation is thus obtained than is possible with the consequent pole



SECTIONAL VIEW SHOWING ARMATURE CONSTRUCTION

construction. The motor frame is an independent cylindrical steel casting securely bolted to the compressor. There are four laminated steel pole pieces, each held by two tap bolts, the heads of which are on the outside of the frame where they are readily accessible. The four field coils are held by spring steel spool flanges clamped in place by the pole pieces.

The armature is similar to standard railway construction, the end windings being thoroughly protected against mechanical injury. The commutator is large with deep segments, insuring long life. The brush-holders, which are of the mica stud type, are thoroughly insulated from the frame, the creepage distance between the brush-holder and frame being unusually long. The brush-holders are readily adjustable for wear of the commutator, and are interchangeable.

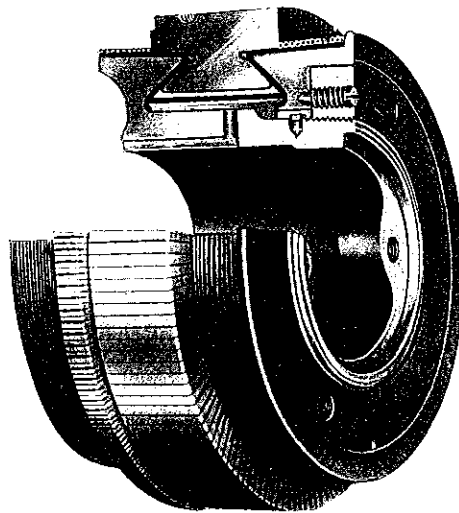
The armature and the interior of the motor are thoroughly protected from oil by deflectors which divert oil passing the motor bearing into a pocket from which it returns to the crank case through a hole entering below the oil level. The oil therefore acts as a seal, effectively preventing vapor from entering the interior of the motor. A light frame head

cover held in place by four tap bolts thoroughly protects the interior of the motor. A dust-proof door, held closed by a cam locking device, is provided in the cover where it is readily accessible from the side of the car. This door permits convenient inspection of the brushes and commutator when required. The interior of the motor frame is free from pockets and can be thoroughly and quickly cleaned by an air blast.

The armature is well supported against vibration, as its bearings reach to its center of gravity. The armature can be quickly removed when required, without disturbing any of its bearings by taking off the motor frame head and crank chamber cover, turning back the brush-holders, and removing the pinion nut. It is not necessary to disturb the crank shaft or gear. The illustration herewith shows the arrangement and location of the armature bearings.

Compressor Frame

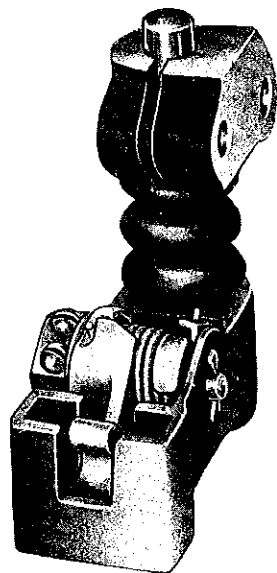
The compressor frame consists of a single casting containing all bearings for both



COMMUTATOR

the armature and crank shaft. A large opening directly over the crank shaft, provided with a removable cover permits of convenient inspection of the gearing, connecting rods and crank shaft. This cover is slightly

larger than the top of the crank case, which facilitates its removal. The two cylinders, forming an integral part of the frame casting, project horizontally so that the maximum dissipation of heat is obtained.



BRUSH HOLDER

The heads for the two cylinders are combined in a single casting. There is one inlet and one outlet valve in this casting for each cylinder. The valves operate in a vertical position and are of the tubular type, turned from a solid steel bar. The intake air passages have liberal areas and are arranged so that clean air can be taken from the inside of the car. An air strainer is provided for the receiving end of the intake pipe.

The crank chamber vent is located on the underside of the compressor frame where there is the least liability of dirt collecting and working its way into the interior of the machine. The vent pipe is protected on top by a hood to prevent the escape of oil. A drain plug is provided at the bottom of the frame casting, so located as to completely drain the crank case when desired.

Bearings

All bearings for motor and compressor are made of bronze bearing metal, lined with a thin layer of babbitt, and are liberal in size.

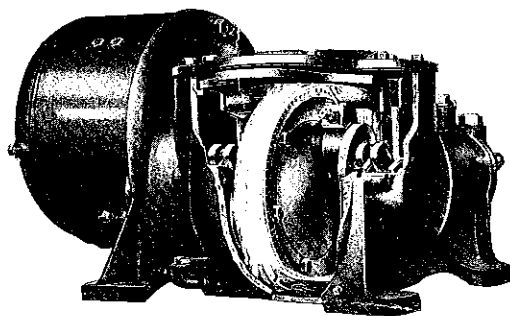
Lubrication

The compressor frame forms a well from which all bearings and working parts are automatically lubricated. The filling elbow is located on the side of the crank case near the bottom, and through it oil is supplied. The filling elbow is accessible from the side of the car and is located so as to readily indicate the proper oil level.

The driving gear picks up oil from the well and throws it in a steady stream into an oil distributor on the under side of the crank chamber cover. Oil feed to bearings is effected through large channels formed in the distributor from which the oil flows to the various bearings. The illustration below shows clearly the action of the gear in throwing the oil into the cover, and its distribution to the bearings.

No oil waste or oil rings are used, and there are no pipes or small holes to clog with sediment or thick oil.

The oiling system is positive in action and continuously delivers oil to the bearings, which flows back into the well after doing its work. So long as oil remains in the well, all parts of the compressor are perfectly lubricated.



AIR COMPRESSOR, SHOWING OIL PUMPING ACTION OF GEAR AND DISTRIBUTION OF OIL TO BEARINGS

Gearing

The gearing consists of a gear and pinion having accurately cut herring-bone teeth. The pinion is secured to the armature shaft on a taper fit, allowing the armature to be readily removed after loosening the

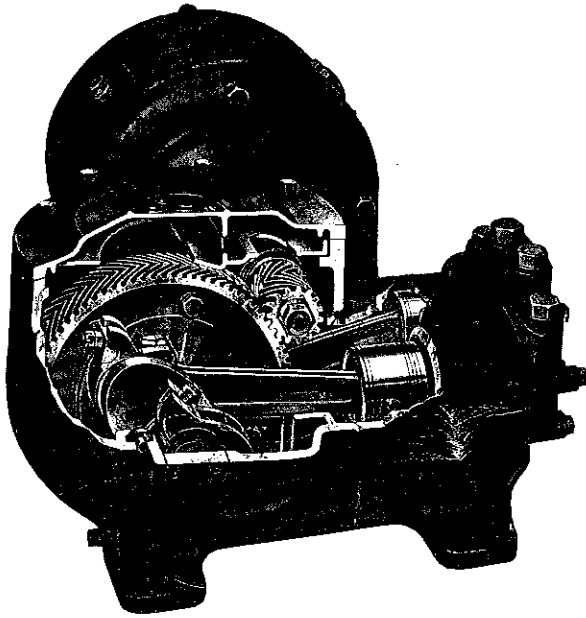
44591-4 Motor-Driven Air Compressors—Geared Type

pinion nut. The gear is built up of two forged rims riveted together, mounted on and keyed to a central hub, which is an integral part of the crank shaft. The gear is held in

Since the crank shaft and armature shaft bearings are located in the same casting, the most accurate mesh of the gear with the pinion is obtained. Standard compressors are provided with series wound motors and can be furnished for operation at 600, 250 and 125 volts.

Compressors having a piston displacement of 25 and 36 cu. ft. respectively can be furnished to operate on 1200 volt systems.

Information on compressors driven by alternating current motors is given in Bulletin A4069A.



SECTION VIEW, COMPRESSOR END

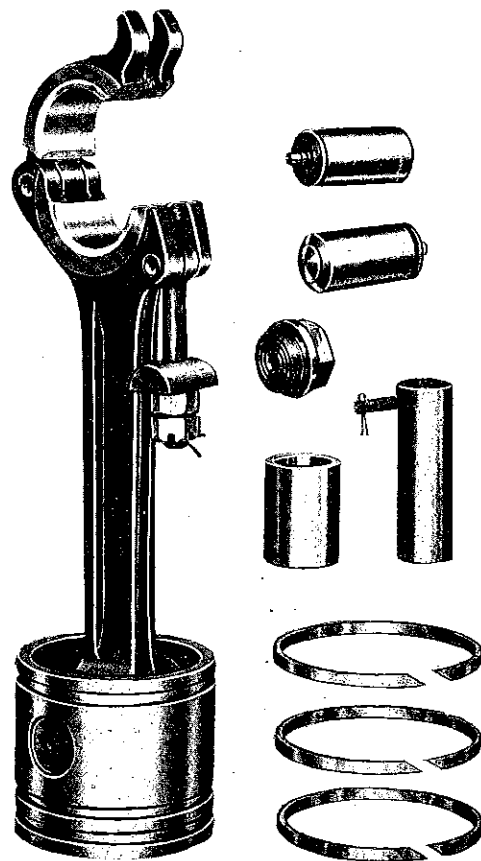
alignment with the hub by means of through bolts and aligning washers.

The gear and pinion are so located that any wear of the bearings cannot force the teeth of the gears deeper in mesh thus causing one to "bottom" in the other.

Due to the location of the pinion with respect to the cylinders crank shaft bearing pressures are practically constant in direction thus reducing noise and vibration. Hence wear on the bearings is reduced, and smooth running with an efficient driving arrangement is secured.

The gear is mounted in the center of a short rigid crank shaft, thus equally dividing the load. Strains are therefore transmitted to the crank pins through very short distances and through the strongest section of the shaft.

Due to the absence of gear case, oil leakage is prevented and the crank shaft can be very quickly removed if required.



PISTON, RINGS, CONNECTING RODS AND VALVES

METHOD OF SUSPENSION

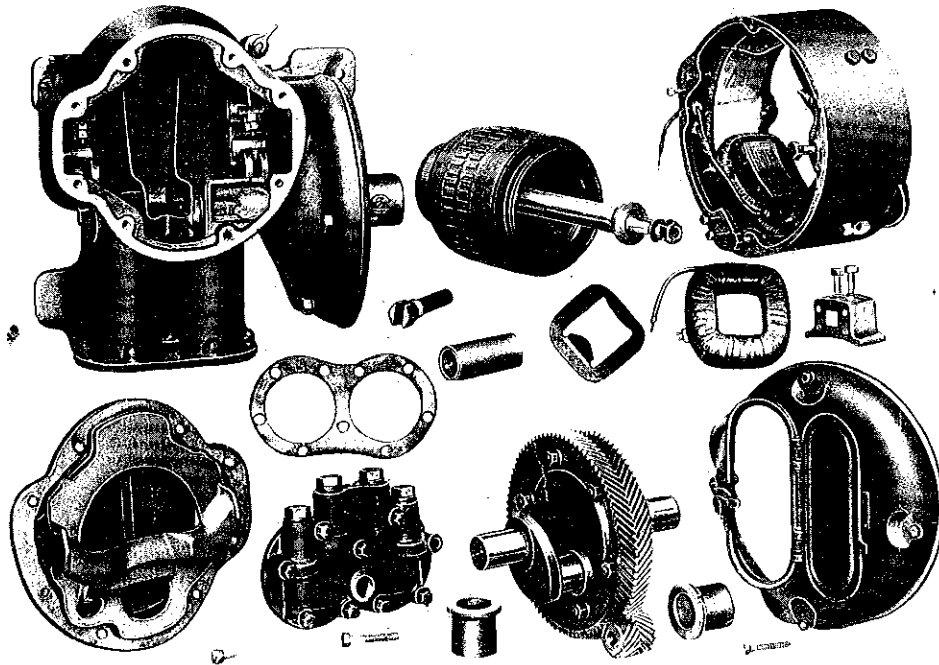
The CP-27-A, CP-28-A, CP-29-A and CP-30-A compressors are designed for cradle suspension (see page 1).

Motor-Driven Air Compressors—Geared Type 44591-5

The CP-25-C and CP-27-B compressors are designed for tee bolt suspension (see page 1). With this form of suspension the combined weight of compressor and suspension is approximately the same as the weight of the compressor alone when adapted for cradle suspension.

MAINTENANCE

These compressors, because of their unusually ample proportions, both of bearings and of motor parts, their perfect system of lubrication, and the careful arrangement of parts, are showing exceptionally low maintenance under severest service conditions.



COMPRESSOR DISASSEMBLED

GENERAL ELECTRIC COMPANY

44591-6 Motor-Driven Air Compressors—Geared Type

General Dimensions, Weights, Speed and Capacities CP-27, CP-28, CP-29 and CP-30 compressors are given below when working against a tank pressure of 90 lb. per sq. in.

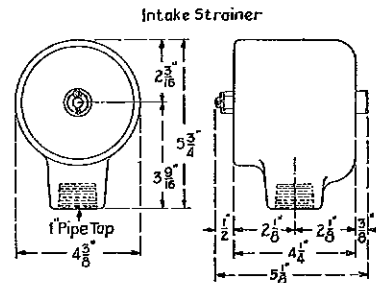
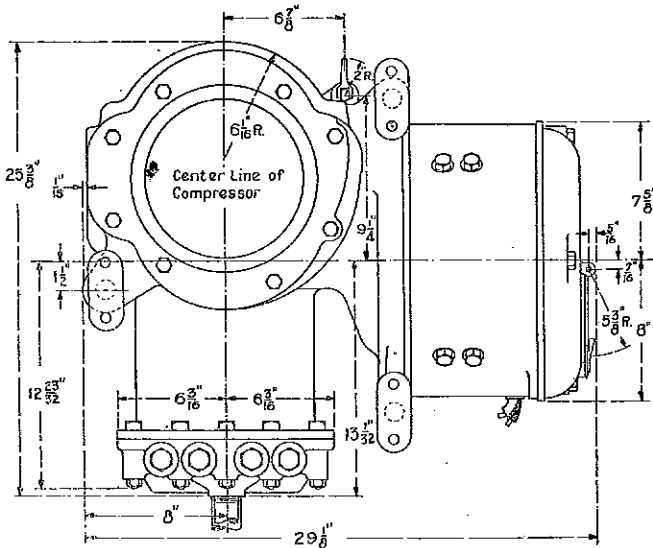
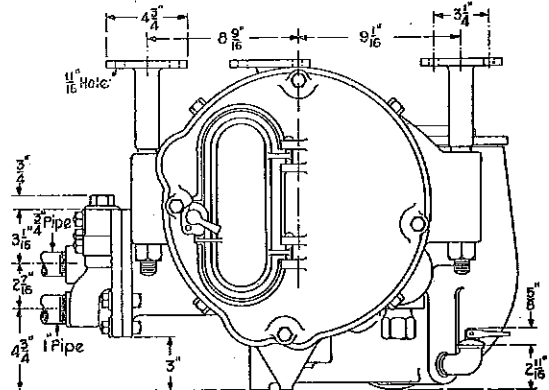
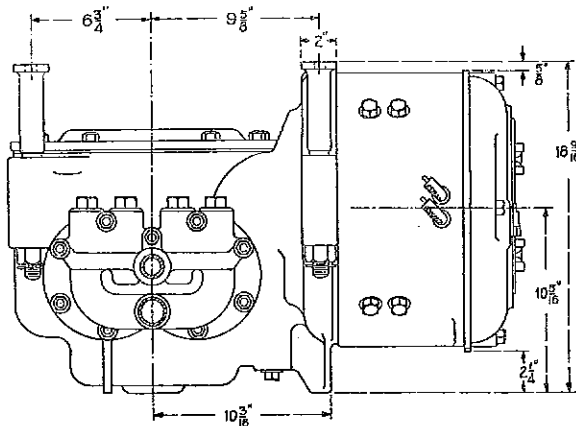
The general dimensions, weights, speeds and piston displacements of the CP-25, CP-27, CP-28, CP-29 and CP-30 compressors are given below when working against a tank pressure of 90 lb. per sq. in.

	CP-25-C	CP-27-A	CP-27-B	CP-28-A	CP-29-A	CP-30-A	CP-30-A
Piston displacement, cu. ft. per min.	10	15	15	25	27	35	36
Voltage	600	600	600	600	1200	600	1200
R.p.m. of compressor	256	200	200	203	220	182	190
R.p.m. of motor	1265	1094	1094	1110	1200	1027	1072
Amp. input approx.	3.2	4.5	4.5	7.1	3.75	10.3	5.4
Cylinder diam., inches	3 $\frac{3}{8}$	4 $\frac{1}{8}$	4 $\frac{1}{8}$	4 $\frac{3}{4}$	4 $\frac{3}{4}$	5 $\frac{1}{2}$	5 $\frac{1}{2}$
Stroke of piston, inches	4	4 $\frac{7}{8}$	4 $\frac{7}{8}$	6	6	7	7
Intake pipe, inches	1	1	1	1 $\frac{1}{4}$	1 $\frac{1}{4}$	1 $\frac{1}{2}$	1 $\frac{1}{2}$
Discharge pipe, inches	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{3}{4}$	1	1	1 $\frac{1}{4}$	1 $\frac{1}{4}$
Length overall, inches	27 $\frac{1}{8}$	29 $\frac{1}{8}$	29 $\frac{1}{8}$	33 $\frac{3}{4}$	34 $\frac{1}{2}$	36 $\frac{1}{4}$	36 $\frac{1}{4}$
Width overall, inches	21	25	25	29	29	33 $\frac{1}{4}$	33 $\frac{1}{4}$
Height overall, inches,							
Compressor only	15 $\frac{1}{8}$	17 $\frac{1}{8}$	17 $\frac{1}{8}$	20 $\frac{7}{8}$	20 $\frac{7}{8}$	24 $\frac{1}{8}$	24 $\frac{1}{8}$
Including suspension	16 $\frac{5}{8}$	—	18 $\frac{3}{8}$ 10 $\frac{1}{8}$	—	—	—	—
Weight, approx.	470*	620	615*	880	905	1205	1215

* Includes tee bolts for suspension to car body.

Note.—The CP-27 (15 ft.) and the CP-28 (25 ft.) compressors can also be furnished with 250 volt and 125 volt motors.

DIMENSIONS OF CP-27-B AIR COMPRESSOR



Weight of Compressor.....	600 lb.
Weight of Suspension.....	18 "
Total.....	618 "

Dimensions on unfinished parts are subject to a small variation.
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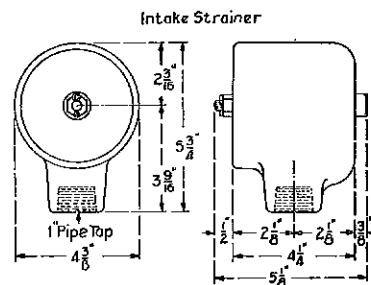
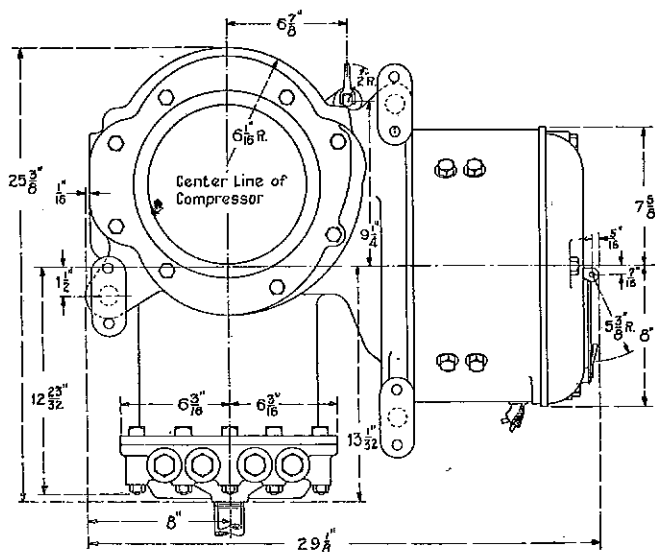
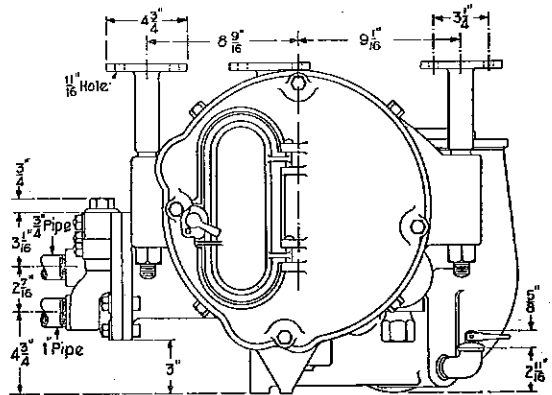
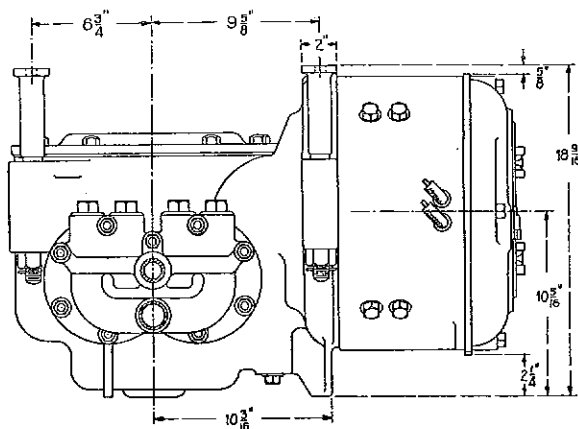
8 OCT., 1914

No. 14825
Supersedes P 1155933

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**ENGINEERING DEPT.
GENERAL ELECTRIC COMPANY**

DIMENSIONS OF CP-27-B AIR COMPRESSOR



Weight of Compressor.....	600 lb.
Weight of Suspension.....	18 "
Total.....	618 "

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