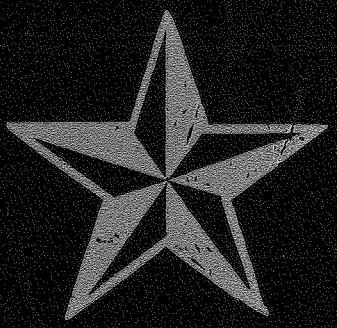
Locomotive Incandescent Equipment



Star Head Light & Lantern Co.

ROCHESTER 6, N. Y.
U. S. A.

FOREWORD

IN the pages following, we have placed before the Trade a description of our TURBO GENERATOR, along with a few instructions for installation and operation. We have avoided all technical terms, so that anyone may understand how to install or operate an Electric Headlighting Equipment. Our machine has been worked out along lines suggested to us from many years of experience in building Locomotive Electric Headlights. We have, therefore, put our efforts to producing a machine with a minimum number of parts and which will do the work with a minimum amount of attention. The main features are unique and exclusive —we own sole manufacturer's rights under patents numbers 1,180,879 and 1,167,018. We know that these features will appeal to the users of Electric Headlights and feel that due consideration should be given the Loco Lights by those who want an efficient and economical headlight generator.

Manufacturers of

Headlights

Electric—Oil

Reflectors: Metal—Glass

Locomotive Classification Lamps

Switch and Marker Lamps

Cab, Water Gauge

and Steam Gauge Lamps

Electric Railroad Lanterns

Trainmen's—Car Inspectors'

Flagging

Signal Glassware

of Every Description used on Railroads

Lantern Globes

Lenses—Roundels

Lamp Chimneys, etc.

Flood Lights and Hazard Lights

For Air Ports and Gasoline Stations

CATALOG No. 12

If you do not find what you desire in this catalog, send us your inquiries.

Star Head Light & Lantern Co.

Rochester 6, N. Y., U. S. A.

Incorporated 1889

STAR LOCO LIGHT TURBO GENERATOR

1. **Special Oiling System.** With our Patent Oiling System, one filling of oil pot will last two months. No other filling or attention is necessary.

2. **Automatic Positive Governor.** Acts directly upon the turbine wheel and eliminates all trouble found in connection with the old style throttling valve mechanism used on other headlight machines. Cannot become clogged or get out of order and requires no attention whatever after being properly set at our Factory.

3. **Re-Action Type Nozzle.** Is of special construction. Uses the steam twice before it reaches the exhaust, insuring the greatest efficiency as well as economy in steam consumption.

4. **Full Ball-Bearing Construction.** The best grade of Ball Bearings are used; one at each end of shaft, eliminating all friction or wear on the working part of the machine.

5. **Three Point Mounting.** Three Spottings keep the machine in alignment on engine.

6. **Low Steam and Oil Consumption.** Due to the special design of our Turbine and Buckets, the steam consumption on the Loco Light is very low, and due to our special Oiling System, the waste in oil is prevented. The Loco Light is the most economical machine on the market.

7. **Simple, yet Rigid Design.** Means a low cost of maintenance. The Loco Light has fewer parts in its construction than any other Machine. The Throttling Valve mechanism which has been eliminated in the Loco Light has twenty-seven different intricate parts which required lots of attention.

8. **Ease of Assembly.** Machine can be disassembled or re-assembled in five minutes. We use no packing of any kind in the construction of the Loco Light Generator. All working parts are accessible.

DESCRIPTION
Type M—Loco Light Generator

The simplest and easiest methods of assembly are used in connection with the Loco Light. All threads are right hand and standard. We give you the following data which may be used for comparison with other headlight generators:

Length over all	18″
Width	14″
Height	15″
Weight—Without base	105 lbs.
Speed	3200 R.P.M.
Voltage	30-32 Volts
Capacity	500 Watts
Maximum steam pressure	250 lbs.
Minimum steam pressure, full load	125 lbs.
Steam consumption, per service hour	106 lbs.

Turbine Wheel—

The turbine wheel is 11″ in diameter, weighing 6 lbs., and is designed so as to give the greatest economy in steam consumption, as well as the highest efficiency. The plates and buckets are made of high-grade steel, which resists the cutting action of the steam and assures the maximum of strength. See Figure 2.

Reaction Nozzle—

The reaction nozzle is of best grade bronze-casting and operates as follows: The steam as it leaves the buckets in turbine wheel is again

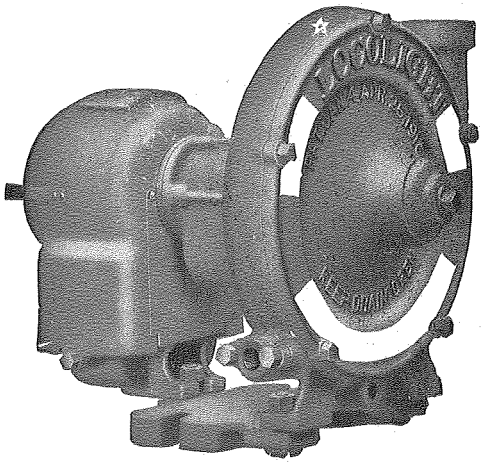


Fig. 1. Complete Unit—Turbine End
Patent Nos. 1,180,879 and 1,167,018

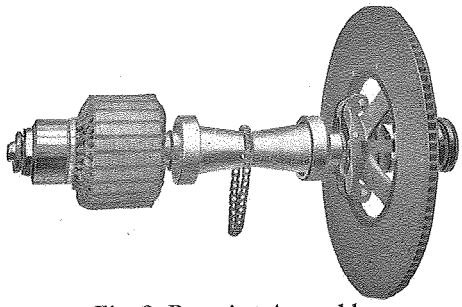


Fig. 2. Rotating Assembly
Showing Armature, Bearings, Shaft, Oil Chain, Wheel and Governor. Weight Complete, 20 lbs.

picked up and directed against the buckets at another point through ample channels in nozzle, increasing the efficiency of the turbine 50 per cent., and insuring greater economy in steam consumption. See large cut No. 7—turbine end.

Oiling System—

The oiling system is clearly shown in Figure 2—the action of which is as follows:

Chain No. 12 being rotated by spacer No. 13, carries a flow of oil from the reservoir to this member. The spacer is machined, tapering with the large end of the taper protruding into the annular ball bearings. The oil is carried by centrifugal force to either end of taper, from whence it flies off into bearing, lubricating this member most effectively. What oil finds its way through the bearings to the other side is carried back through ample grooves to the oil well. The spacers No. 11 at either end of bearing housing No. 15 have a machined ring made so as to throw off any excess oil which in like manner is carried back to the oil well. See Figure 7. The oil well holds one-half pint, and one filling will last two months. We recommend a very good grade of dynamo oil, which should be light and clean.

It is advisable to drain oil out of oil pot before renewing same. Care must be taken in having oil filler cap and pipe plug in drain tight after refilling oil reservoir.

Governor—

The Governor is of fly weight design, acting directly on the wheel, which in turn carries the compressed governor spring No. 5, as can be

seen by reference to Figures 2 and 4. As the load and steam pressure vary within the limits specified, the weights and spring move the wheel to the proper position in the path of the steam to maintain an equal speed.

The shaft wheel and governor as a unit can be removed without destroying the adjustment of the Governor. All that is necessary is to remove turbine name plate (No. 1) and armature lock screw No. 56. The spacers Nos. 11 and 13, ball bearings No. 41 and armature No. 190 will remain in position when the shaft is withdrawn. The spacers, bearings and armature are locked to piece No. 9 by cap screw No. 56. There are no packings or adjustments to be made.

Dynamo and Field—

The dynamo is compound wound, bipolar of the Edison type, and is protected by a housing which completely covers it. The pole pieces and field frame are cast in one piece of best grade electric malleable iron, thus eliminating all joints in the magnetic circuit. See Figures 3 and 5.

Coils—

There is one field coil on each of the two pole standards, as shown in Figure 3, which are compound wound, thus regulating the voltage as the load is changed. The coils are carefully taped with empire and linen tape, impregnated with a high heat-resisting insulating compound and thoroughly baked.

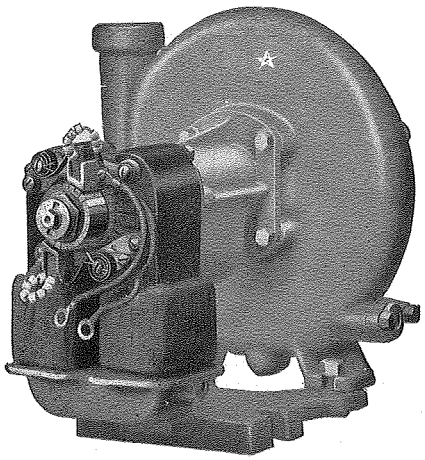


Fig. 3. Dynamo End with Housing Removed, Showing Field Coils and Dynamo Frame

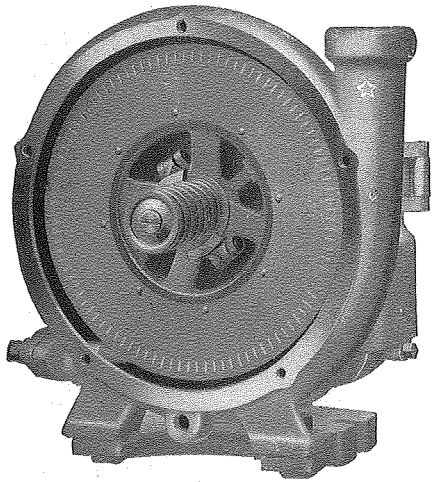


Fig. 4. Turbine Cap Removed, Showing Wheel, Governor and Nozzle

Armature—

The armature is ring wound, the core being laminated and of the best grade of electric steel. The armature is wound with double cotton covered wire of ample size for a considerable overload capacity, and given the same insulating treatment as the coils. See Figure 2.

Commutator—

The commutator is heavily constructed and well insulated with pure India mica. The coil leads are swedged and soldered in, which insures a perfect and permanent contact with commutator bars.

Dynamo Brushes—

The brushes are of hard carbon of low resistance and contain sufficient lubricant to insure perfect commutation. The brush holders are held in a fixed position by screws, making it impossible for them to get out of adjustment.

Instructions for Installing

Figure 7 shows the proper location of base plate on the boiler. A $\frac{3}{8}$″ steam pipe should be used from the fountain to the machine and a $1\frac{1}{2}$″ pipe for the exhaust. Make the exhaust as short as possible and with no sharp bends. Mount the generator as close to the cab as convenient with the turbine end on the right hand side. This will bring the steam connection to the rear and next to cab, and the oil filler cap to the front. A $\frac{3}{8}$″ drain pipe should be connected to the turbine housing and left open.

While in operation, there will be no steam emitting from this drain pipe. It is a poor practice to clamp a long exhaust pipe to the cab. The cab usually works loose and soon breaks the exhaust pipe at the threads where it enters turbine. In like manner, the intake pipe from fountain should have plenty of clearance where it enters the cab and should not be clamped.

If the generator is mounted at front of smoke box, the intake should be a ¾″ pipe from fountain, then reduced to ⅜″ where it enters turbine. It is preferable to protect the supply pipe by running it under the boiler jacket. The pipe should run directly to turbine without sharp turns or pockets. In front end mounting, the steam tends to condense very rapidly because of the small volume of flow in steam, and in piping up the machine the supply should be favored as much as possible.

The generator should never be installed without the base, the two being handled as a unit. However, for service on locomotives, if occasion demands the replacing of a generator, it would be advisable to remove machine from base, leaving the latter bolted to boiler, as the bases are interchangeable with any machine. The important feature in the base is the fact that it keeps the machine in alignment. Three spottings are provided for bolting to machine, and two for bolting base to boiler. A diagram is shown on Figure 7, giving dimensions of base studs and proper location on boiler.

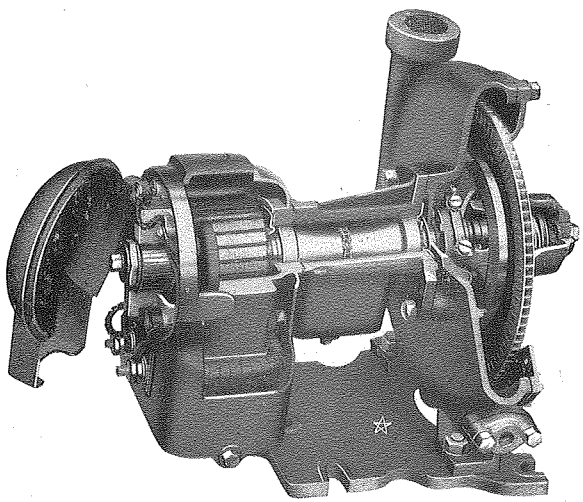


Fig. 5. Complete Unit from Dynamo End, with Commutator Door Open

Wiring—

There are many different methods of cab wiring, but we recommend using conduit throughout, as shown in cut No. 8. Cab wires are a constant source of trouble, and grounds are frequent. Consequently, great care should be exercised in this part of installation.

It is not advisable in wiring locomotives to run the wire from cab to headlight case in hand rail. It is best to run the wire through conduits clamped to the hand rail.

Instructions for Operating

Adjustment of Governor—

To adjust the governor, pipe plug No. 94 should be removed from the turbine name plate No. 1 and adjusting screw No. 57, holding piece No. 4, can be easily reached with an ordinary screwdriver. This is a right hand screw, and turning to the right increases the speed. See Figure No. 4. Usually the speed of the machine will be about 3200 R.P.M.; but in adjusting governor, it is better to connect a voltmeter to dynamo, and adjust the speed to produce 30 volts. This adjustment should be made with full load of lamps and at least 175 lbs. boiler pressure.

The turbine is designed to pull rated capacity at a minimum boiler pressure of 140 lbs. As our governor does not throttle the steam, it is needless to tighten the governor spring in an attempt to make the turbine pull more than rated capacity, or to make it pull full load at a lower steam pressure.

The mechanical men at the round house should examine the governor weights occasionally to see that all parts are working freely, especially after the machine has stood for a considerable length of time out of use.

Care of Generator—

The generator will not require any special care except to see that it is kept clean and that the brush holder springs are not adjusted too tightly. It is a common error among users of Headlight generators to readjust the brush holder springs at the first sign of a dim light. Much abuse to the generator is traceable to this cause. In an incandescent machine the headlight will burn, but not brightly, if the dynamo is grounded, and no amount of spring

tension will increase the light. Also a poor reflector or dirty commutator or imperfect fit of brush on commutator will cause a poor light on the track, and these causes should be looked into first before changing tension on brush springs.

The commutator should always run true and brush springs should only be tight enough to insure proper contact of brush on commutator. The tension of the brush has nothing to do with the voltage output of dynamo, provided the brush is held down tight enough, so that it does not jump or vibrate. Any additional tension only heats the machine and wears away the brush and commutator. If the commutator is clean and runs true, that is, mainly if there are no high bars or high mica, a very light tension is required.

Care of Commutator—

The commutator should be kept clean, but not necessarily bright. After running a week or so, the copper turns a light brown color, and it should remain so. A damp cloth or piece of white waste wiped lengthwise of bars will keep the dust out of the mica slots. It is not necessary to sand the commutator unless brushes have been sparking.

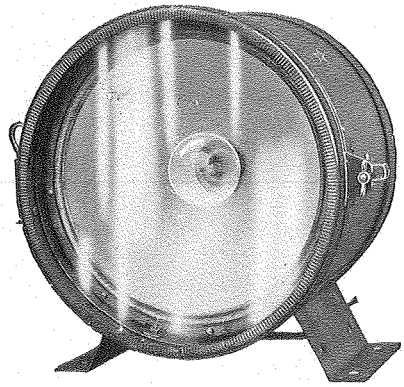
The mica between the commutator bars is packed very tight and is much harder than the copper bars; consequently the copper will wear down and leave the mica high. This should be watched very closely and kept below the surface of the copper by filing out with a three-cornered file. If the copper bars wear down to the mica, and the mica is not filed out, the bars will gradually wear flat between the mica, causing excessive sparking. This can only be cured by removing armature and truing commutator in a lathe, after which the mica should be filed out, and finally the commutator sanded smooth with strips of No. 0 sandpaper. In using sandpaper, cut the strips 1¼" wide, remove top brush and hold the strip at the ends with the sanded surface bearing on the commutator, with the machine running at a moderate speed. Do not press sandpaper on the commutator with fingers, as this will cause a furrow or low place around the commutator. In removing brush, do not loosen spring tension.

If the end of the brush does not conform to the curve of the commutator, insert a strip of

sandpaper about 5 inches in length between the commutator and brush with sanded face next to brush. Hold the sandpaper around the commutator with one hand, and rotate the machine one-half turn from the left to right, holding brush lightly against the sandpaper with the other hand. Then raise brush from sandpaper and reverse the armature. Repeat this operation until curve on brush conforms to commutator, pressing brush against sandpaper only when turning machine from left to right.

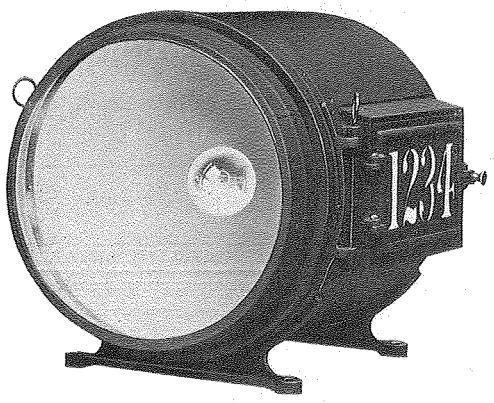
Important

Drain oil pot before removing machine from locomotive to prevent oil from running over boiler and dynamo.



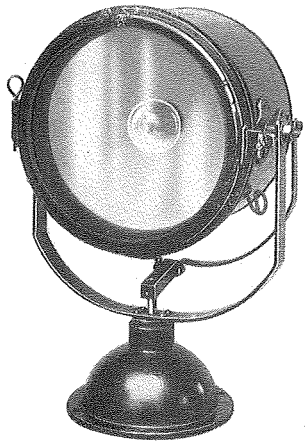
Plain Case

12″ No. 2012 14″ No. 2014



Side Number Case

12″ No. 2012-B 14″ No. 2014-B



Swivel
No. 2012-S

Star Standard
Electric Head Light Cases

Reflectors Glass Silver Plated
Copper Chromium Plated

SPECIFICATIONS

	No. 2012	No. 2014
Reflectors	12 x 4¼″	14 x 5½″
Height of Case	15″	17″
Depth of Case	11″	13″
Base	14 x 7″	17 x 10″
Weight Crated	45 lbs.	50 lbs.

Cases are made of No. 14 and 20 Gauge Anti-Corrosive Rust Resisting Metal Electric Welded, with or without side number frames as illustrated.

The 100, 150 or 250 Watt Locomotive Headlight Lamps can be used with these Headlights.

Fitted with focusing device which is very efficient and dependable.

Star Positive Lock Catch on door, which prevents breakage of glass.

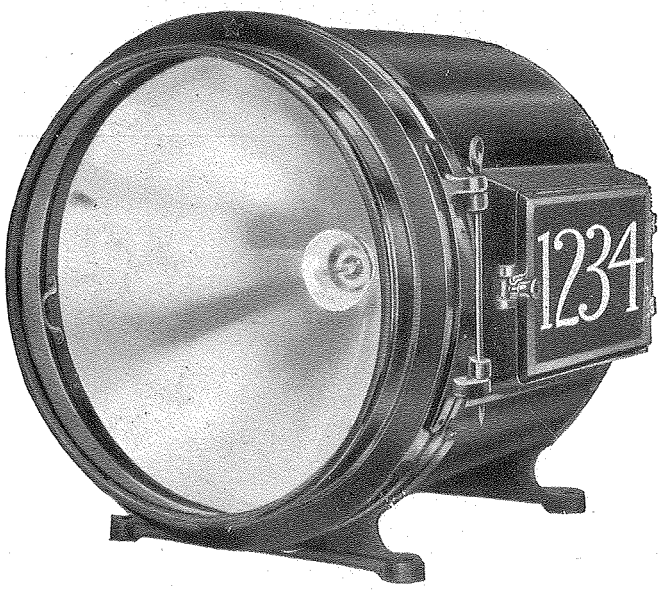
Bulbs furnished at additional cost.

No. 2012-S Swivel Head Light

With 12″ Glass Reflector is especially adapted for use on top of Cab of Locomotive and can be turned in any direction and any angle. Also for Logging Locomotives or Pilot House of a Boat. Has a 24″ Handle for extending thru roof and all attachments. A Hand Wheel locks the device in position.

For Floodlighting and Search Light purposes these Headlights are unexcelled. Are regularly equipped with Silver White Silver Plated Glass Reflectors but the Non glare Uranium type reflector may be had at no increase in cost but at a slight decrease in reflecting efficiency.

ELECTRIC HEADLIGHTS



No. 50-B

Star Standard Incandescent Head Light Case

	No. 50B	No. 50
Reflector Copper Silver plated	18″ x 19″	Plain Case
Height of Case over all	24″	No Side
Depth of Case	19″	Number
Weight Crated	100 lbs.	Frames

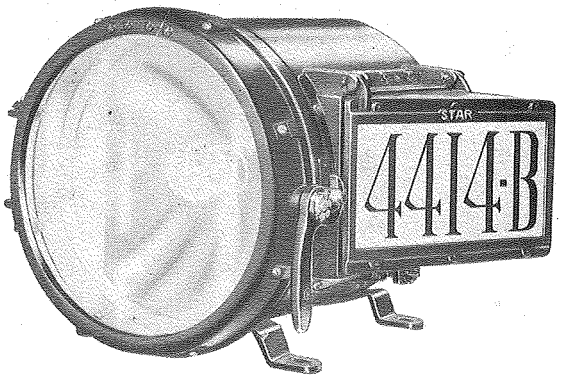
Cases are made of No. 14 and 20 Gauge anti corrosive rust resisting metal—electric welded with or without side numbers.

Reflectors are spun to a true parabola and equipped with an efficient Focusing Device of approved design.

The electric connections are automatic.

We also make cases of special Design or to Blue Prints in sizes from 10″ to 23″.

Electric Locomotive Headlights Heavy Sheet Steel Type Rust-Proof



Star No. 4414-A—Plain Case—No Side Number Frames.

Star No. 4414—With Parallel Side Numbers.

Star No. 4414-B—With 30 Degree Angle Side Numbers of Cast Aluminum.

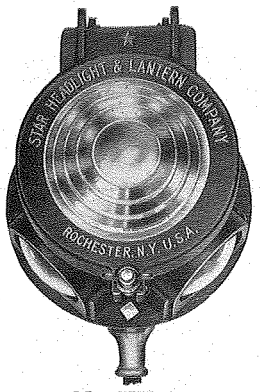
14″ Reflectors of Glass: Crystal or Non-Glare-Uranium.

Cases: 16 Gauge Steel.

Door: Cast Metal with Cast Aluminum Glass Retaining Ring.

Legs or Standards: Heavy Forged Steel. ⅜″ thick x 2″ wide.

Front Door Latch: Positive with compensating take up.

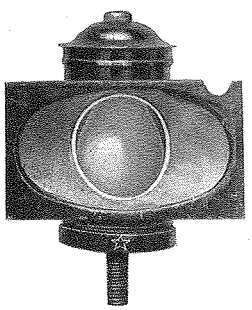


No. XX-1

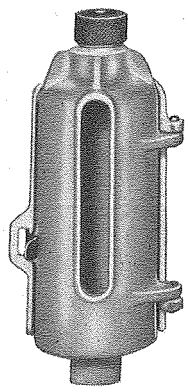
Locomotive Tender Back-Up Lamp Cast Aluminum

Weather-proof, non-corrosive.

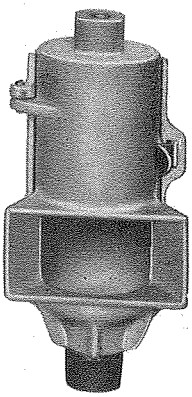
Door is hinged at top and is held closed with a wing nut catch with lock washer. Is equipped with standard 5⅜″ or 8⅜″ Clear or Ruby Semaphore Lens in door, and has a standard 3⅛″ Clear Lens in each side which casts the light rays along the sides of the track so Engineer or Fireman can at all times see that the light is burning.



No. 78-E



No. 79-E

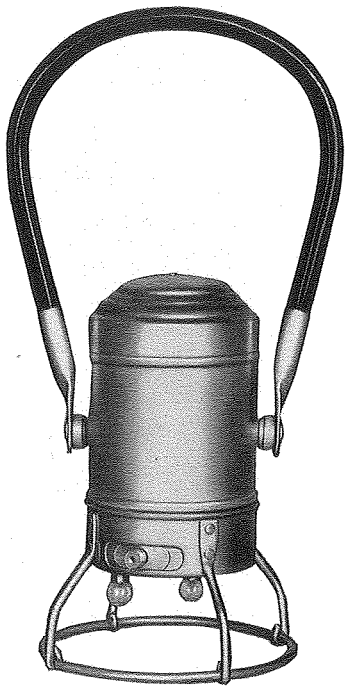


No. 77-E

Cab and Water Gauge Lamps

Are furnished as required either in Black Enamel or Cast Aluminum. We do not equip Headlights or Lamps with Electric Bulbs unless especially ordered.

The Silvered Glass Reflectors are made by us for many uses such as Air Ports, Floodlighting of Switch Yards and Gasoline Stations, etc., etc.



No. 202
Patent Applied For

Star Electric Railroad Trainmen's Lantern

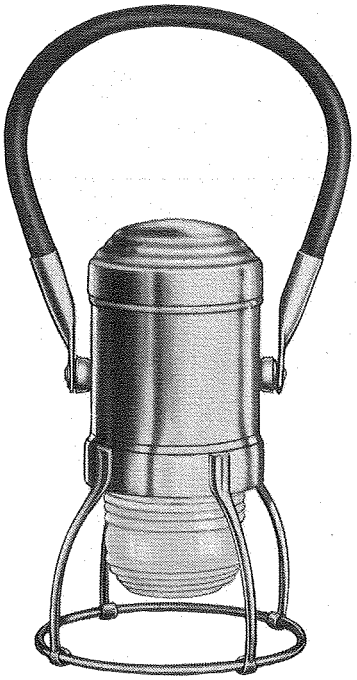
Cadmium Plated, Rust-Resisting, Non-tarnishable Seamless Steel Body, equipped with **Black Fibre** Rigid Bail, Streamlined Top with extra bulb holder inside, and extremely rigid, extra heavy **Wire Base** electrically welded.

Two-purpose Chromium Plated Reflector; one for general work, other for spotting car cardings.

Simple positive acting **Switch,** weather and waterproof, conveniently located and cannot become loose.

Uses **Standard Lantern Battery.** Intermittent burning will give from 80-100 hours service.

Equipped with two No. 502 Mazda Long Life Bulbs. Throws a beam 75 feet. **Bulbs** are extended **downward** from Reflector so **light may be seen from any angle.**



No. 204—No. 210

No. 204 Red Flagging Lantern
No. 210 General Railroad Service

Safety Lantern: Three Bulbs ready for instant use. Operates by turning Wire Guard; Single Hand Operation—no Switch to get out of order.

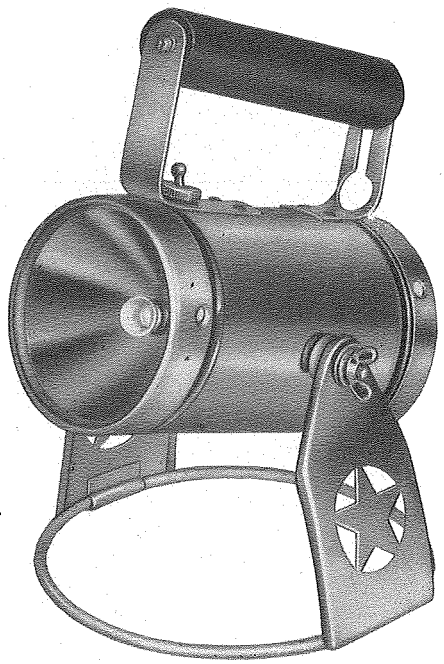
Third Bulb gives 50% greater Safety Factor and extracts more life from Battery than Lanterns with only two Bulbs.

Designed for Railroads, Gasoline Service Stations and Refineries, Utilities, Oil Wells, Trucks, Contractors, etc.

No. 204 equipped with **A.A.R. Red Fresnel Globe** for Railroad Flagging and Emergency purposes.

No. 210 equipped with **Clear Wide Angle Globe** for Flood and Spotting purposes, also general Signalling.

Both precision made at a reasonable price.



No. 180

With Adjustable Body
Star Electric Car Inspector's Lantern

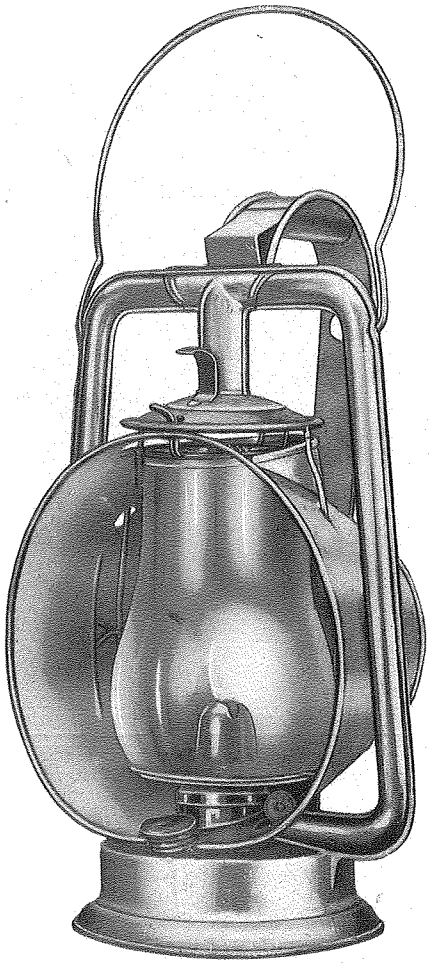
Built for hard Railroad service, durable, efficient, yet light in weight. Polished Chrome and **Cadmium Plated,** rust-resisting, non-tarnishable; with Brass Silver Plated Reflector.

Battery Holder made of Heavy Brass Tubing, Polished Chrome; will not rust or corrode. Fitted with **Star Diffusing Lens.**

Rigid, Non-Tipping Base, and **Adjustable Body** which may be moved to any position, directing the light to ANY Angle.

Toggle Switch of approved design located under handle where Inspector can **readily snap on or off with a flick of thumb while holding Lantern.**

Uses Standard Lantern Battery and **Bulbs** obtainable anywhere.



No. 119

No. 0 Tubular Hood Star Improved Car Inspector Lamp

By this name this perfect lamp is known wherever car inspection by torch has been discontinued.

Equipped with New Type No-Leak, Non-Rust Terne Plate Base.

Gives 20 c.p. Burns 25 hours.

Has new square handle which overcomes breaking and smoking of globes as it throws light directly ahead.

Regular Universal Standard Globe as used in Hot and Cold Blast Tubular Lanterns. Standard No. 1 high cone burner; 5/8" "A" wick.

Guaranteed not to blow out in high winds

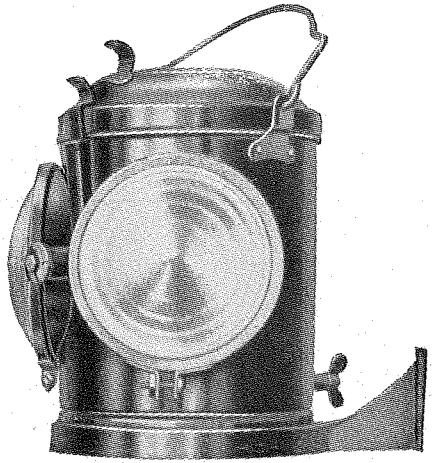
No. 57-RU

Star Switch Lamp with Reflecting Units

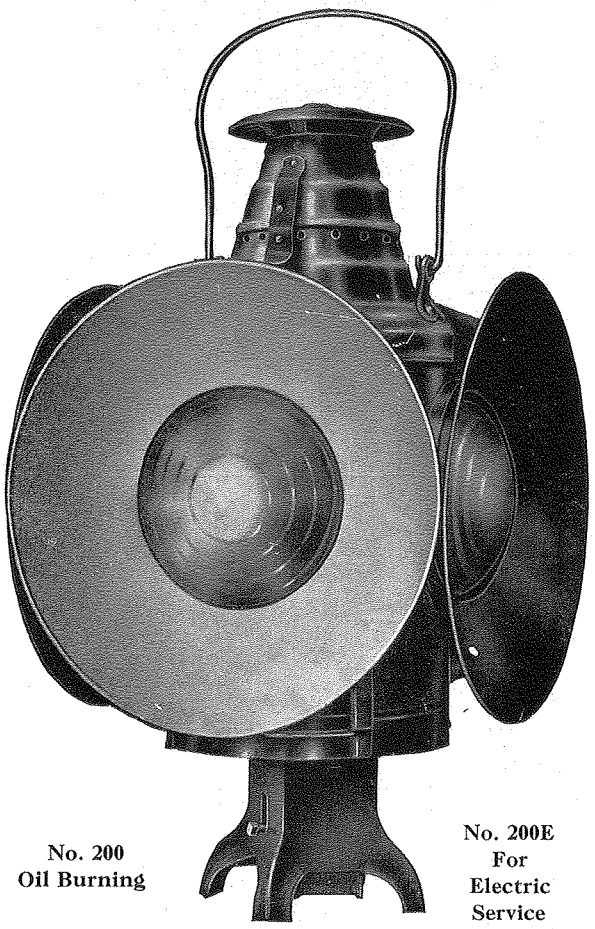
Drawn Body of Heavy Gauge **Copper Bearing** Steel with Brass Coupling Rings, and Cast Iron Base.

Equipped with Corning **Doublet Reflecting Units,** 5 3/8" Diam., any Color desired, A.A.R. Standard. Safety plus Economy.

Oil Switch Lamps having any Lens opening Diameters, may be equipped with **Reflecting Units** by means of various Adapters and Coupling Rings. Reflecting Units are manufactured in 5 3/8" Diameter only.



No. 159—Engine Classification Lamp



No. 200
Oil Burning

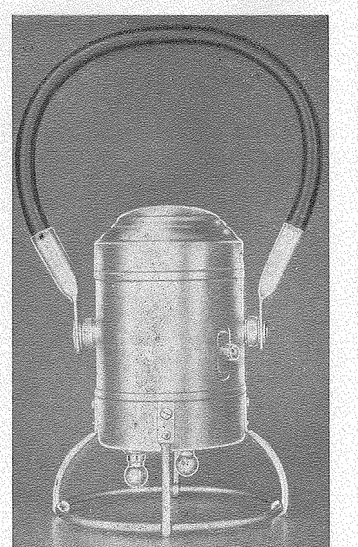
No. 200E
For
Electric
Service

Switch Lamps

Switch and Signal Lamps of every description.

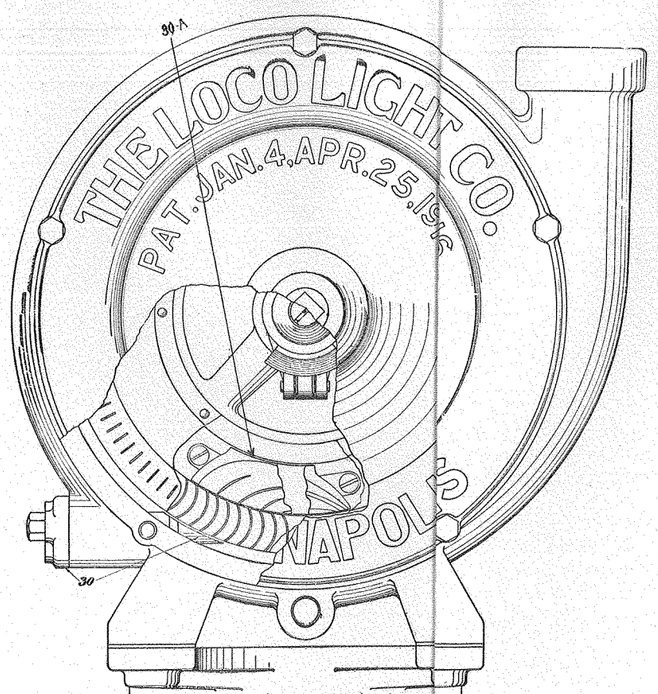
ist of Parts for Type M Loco Light Machine

—Turbine Cap
2—Turbine Case
3—Turbine Wheel complete with Core
3A—Wheel Core
3BC—Wheel Plates
3D—Wheel Buckets
3E—⅛x⅛ Iron Rivet
3EE—Turbine Wheel Plate Ring
4—Gov. Spring Support
5—Gov. Spring
6—Gov. Weight
7—Gov. Pin
7A—Governor Roller Pin
9—Gov. Yoke
0—Bear. Hous. Plate
—Short Spacer
2—Oil Chain
3—Long Spacer
4—Base Plate
5—Bearing Housing
5M—Bearing Housing complete with Insulator, Ball Bearings, etc.
6—Oil Cap
6M—Oil Cap complete with Chain
7—Dynamo Housing
7M—Dynamo Housing complete with Door and Clamping Screw
8—Commutator Door
9—Arm. Spider
20—Governor Yoke Pin
21—Commutator Ring
22—Com. Segment
23—Com. Nut
24—Brush Spring
25—Shaft
25M—Shaft and Yoke complete with Governor Weights, Bushings, etc.
26—Brush
27—Brush Holder
28—Dynamo Frame
29—Key
30—Nozzle
30A—Reaction Nozzle
31—Dynamo Door Clamping Screw Assembly
33—Dynamo Back Plate
34—Mica Rings
34A—Mica Com. Insulation
34B—Lamination Pins
35—Com. Door Catch
36—Base Studs
37—Com. Door Pin
38—Brush Holder Stud
39—Field Coil—Right Hand
39A—Field Coil—Left Hand
40—Oil Cap Chain
41—Ball Bearing
42—Binding Post
43—Bind. Post Nut
44—Bind. Post Washer (Iron)
45—Bind. Post Washer (Mica)
46—Bind. Post Tube
47-55—Brush Hold. Tube and Washer
48—Flexible Cable
50—Dynamo Terminal
51—Br. Hold. Terminal
52—Base Stud Washer, Iron
53—Chain Retainer
56—⅜-24x1 Hex. Cap Screw
57—⅜-24x1 1/16 Fl. Hd. Mach. Scr.
58—Combination Bracket
59—Comb. Brkt. Nut
60—Comb. Brkt. Tube
61—Comb. Brkt. Screw
61A—Comb. Brkt. Scr. Pin
62—Comb. Brkt. Arm
63—Arm. Lamination
64—Arm. Core Insulation
65—Shaft Sleeve
66—Wheel Bushing
67—½" Washer
68—⅜x2½ Bolt and Nut
69—Bearing Housing Fillister Hd. Screw ½"-20x1"
70—1/16x1 Hex. Cap Screw
71—⅜x½ Hex. Cap Screw
72—8-32-⅜ Rd. Hd. Mach. Scr.
73—10-32x⅜ Rd. Hd. Mach. Scr.
74—5/16-18x1 Fil. Hd. Mach. Scr.
75—12-24x½ Rd. Hd. Mach. Scr.
76—⅛x1/16 Rd. Hd. Iron Rivet
77—3/32x¾ Cotter Pin
78—14-24x⅜ Rd. Hd. Mach. Scr.
79—14-24x1 Rd. Hd. Mach. Scr.
80—¼ Iron Burr
81—½ Hex. Nut
84—Governor Weight Roller
85—Spring Stud Lock Screw ⅜-16x1/8 Flat Hd.
86—1" Pipe Plug
87—¼"-20x⅜" Set Screw
90—Bear. Hous. Insulator
91—Tongued Washer
92—Water Flange
93—¼ Pipe Plug
94—¾ Pipe Plug
95—Armature Slot Insulation
96—Armature Spider Insulation
97—Field Frame Insulation complete
99—Drive Link
100—Drive Link Screw
190—Armature



Star No. 200
Electric Hand Lantern

STAR HEADLIGHT & LANTERN CO., Inc.



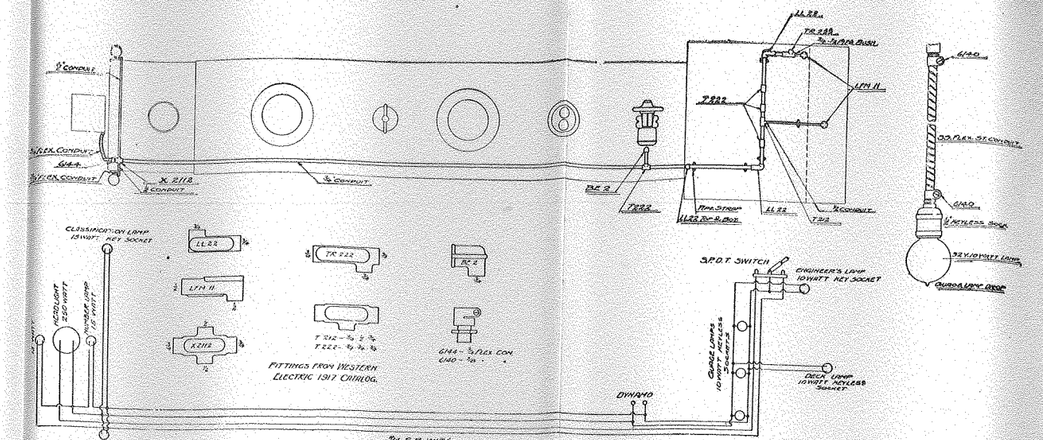


Fig. 8. Wiring Diagram

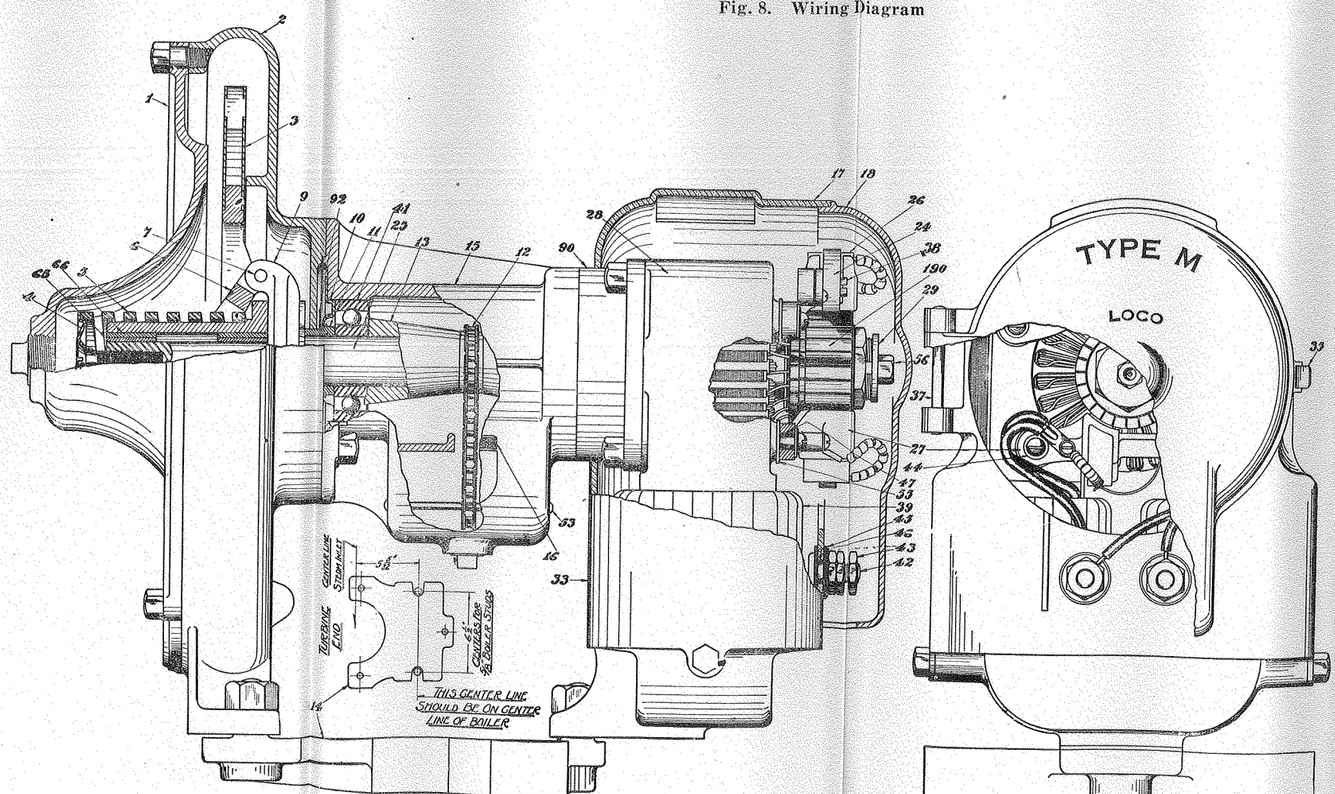
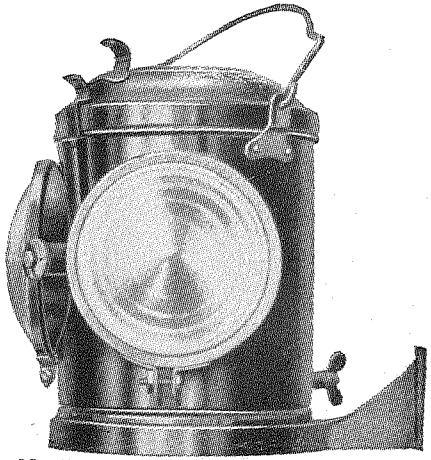
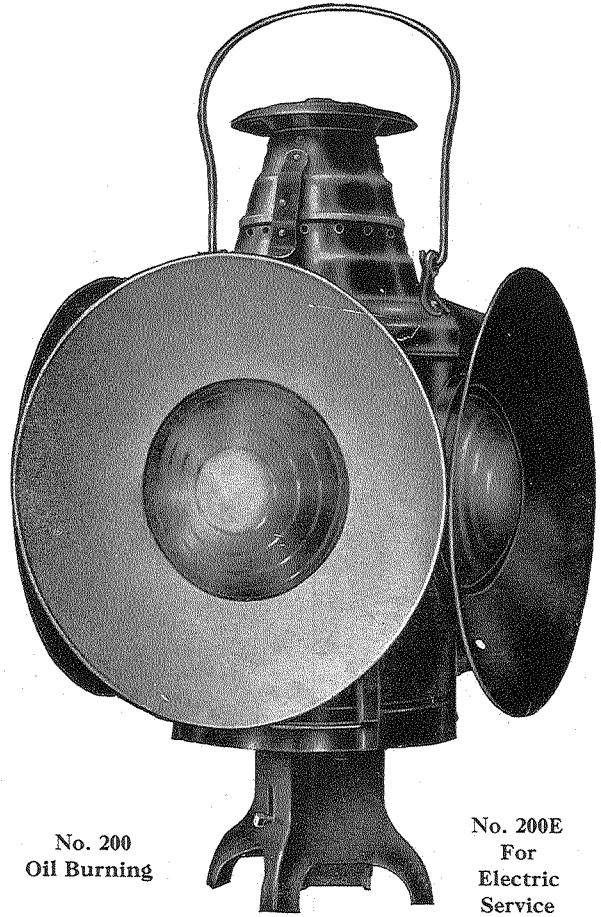


Fig. 7. Type M, 500 Watt Turbo Generator, 30 Volts



No. 159—Engine Classification Lamp



No. 200
Oil Burning

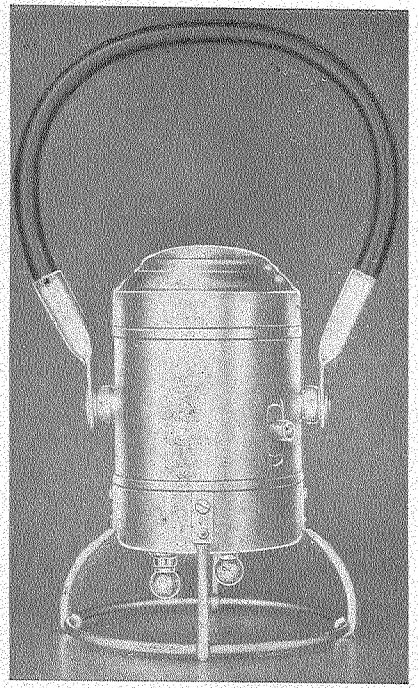
No. 200E
For
Electric
Service

Switch Lamps

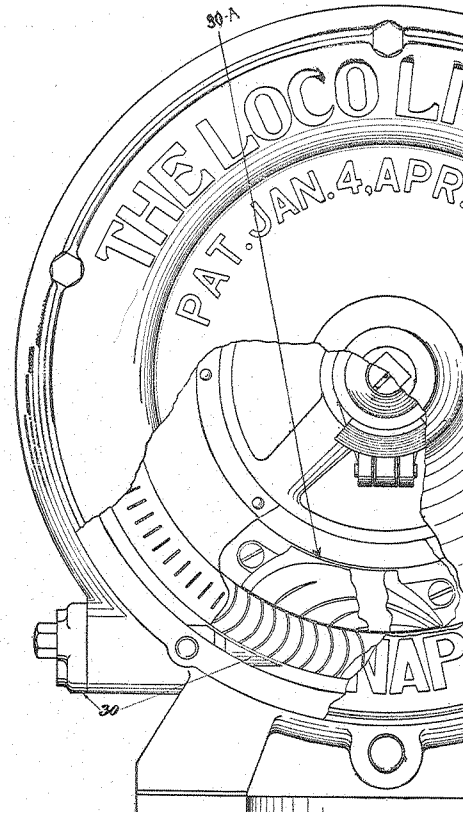
Switch and Signal Lamps of every description.

List of Parts for Type M Loco Light Machine

1—Turbine Cap
2—Turbine Case
3—Turbine Wheel complete with Core
3A—Wheel Core
3BC—Wheel Plates
3D—Wheel Buckets
3E—⅛x$\frac{3}{16}$ Iron Rivet
3EE—Turbine Wheel Plate Ring
4—Gov. Spring Support
5—Gov. Spring
6—Gov. Weight
7—Gov. Pin
7A—Governor Roller Pin
9—Gov. Yoke
10—Bear. Hous. Plate
11—Short Spacer
12—Oil Chain
13—Long Spacer
14—Base Plate
15—Bearing Housing
15M—Bearing Housing complete with Insulator, Ball Bearings, etc.
16—Oil Cap
16M—Oil Cap complete with Chain
17—Dynamo Housing
17M—Dynamo Housing complete with Door and Clamping Screw
18—Commutator Door
19—Arm. Spider
20—Governor Yoke Pin
21—Commutator Ring
22—Com. Segment
23—Com. Nut
24—Brush Spring
25—Shaft
25M—Shaft and Yoke complete with Governor Weights, Bushings, etc.
26—Brush
27—Brush Holder
28—Dynamo Frame
29—Key
30—Nozzle
30A—Reaction Nozzle
31—Dynamo Door Clamping Screw Assembly
33—Dynamo Back Plate
34—Mica Rings
34A—Mica Com. Insulation
34B—Lamination Pins
35—Com. Door Catch
36—Base Studs
37—Com. Door Pin
38—Brush Holder Stud
39—Field Coil—Right Hand
39A—Field Coil—Left Hand
40—Oil Cap Chain
41—Ball Bearing
42—Binding Post
43—Bind. Post Nut
44—Bind. Post Washer (Iron)
45—Bind. Post Washer (Mica)
46—Bind. Post Tube
47-55—Brush Hold. Tube and Washer
48—Flexible Cable
50—Dynamo Terminal
51—Br. Hold. Terminal
52—Base Stud Washer, Iron
53—Chain Retainer
56—⅜-24x1 Hex. Cap Screw
57—⅜-24x1$\frac{7}{16}$ Fl. Hd. Mach. Scr.
58—Combination Bracket
59—Comb. Brkt. Nut
60—Comb. Brkt. Tube
61—Comb. Brkt. Screw
61A—Comb. Brkt. Scr. Pin
62—Comb. Brkt. Arm
63—Arm. Lamination
64—Arm. Core Insulation
65—Shaft Sleeve
66—Wheel Bushing
67—½" Washer
68—⅜x2½ Bolt and Nut
69—Bearing Housing Fillister Hd. Screw ½"-20x1"
70—$\frac{7}{16}$x1 Hex. Cap Screw
71—⅜x½ Hex. Cap Screw
72—8-32-⅜ Rd. Hd. Mach. Scr.
73—10-32x⅜ Rd. Hd. Mach. Scr.



Star No. 200



5/16-18x1 Fil. Hd. Mach. Scr.
2-24x1/2 Rd. Hd. Mach. Scr.
1/8x5/16 Rd. Hd. Iron Rivet
3/32x3/4 Cotter Pin
4-24x3/8 Rd. Hd. Mach. Scr.
4-24x1 Rd. Hd. Mach. Scr.
1/4 Iron Burr
1/2 Hex. Nut
Governor Weight Roller
Spring Stud Lock Screw
3/8-16x5/16 Flat Hd.
1" Pipe Plug
1/4"-20x3/8" Set Screw
Bear. Hous. Insulator
Tongued Washer
Water Flange
1/4 Pipe Plug
3/4 Pipe Plug
Armature Slot Insulation
Armature Spider
Insulation
Field Frame Insulation complete
Drive Link
Drive Link Screw
Armature

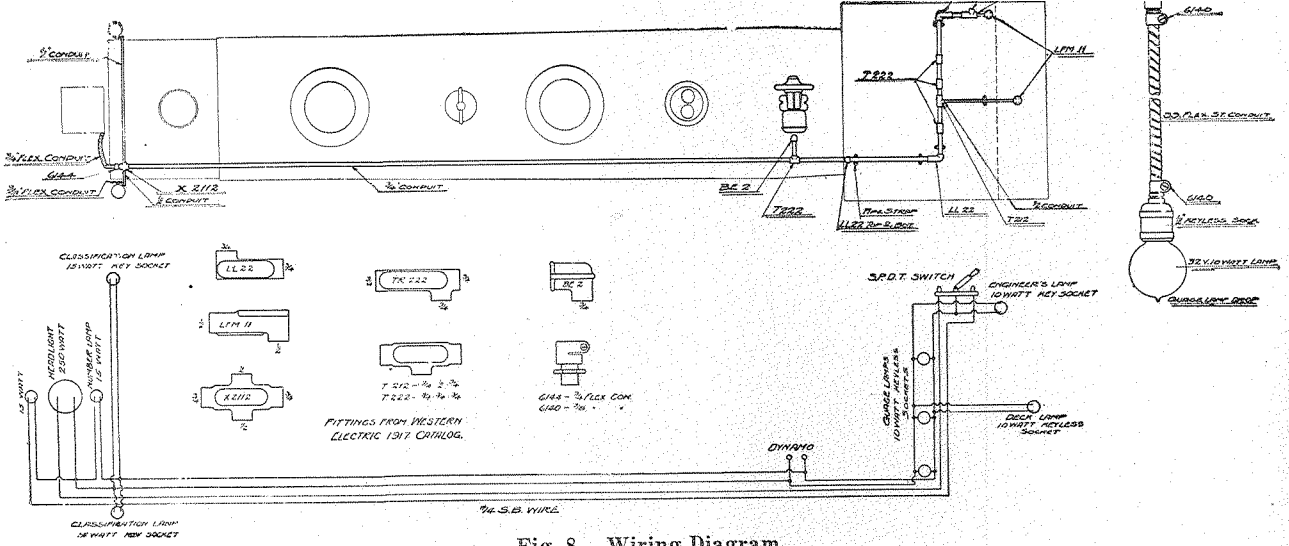


Fig. 8. Wiring Diagram

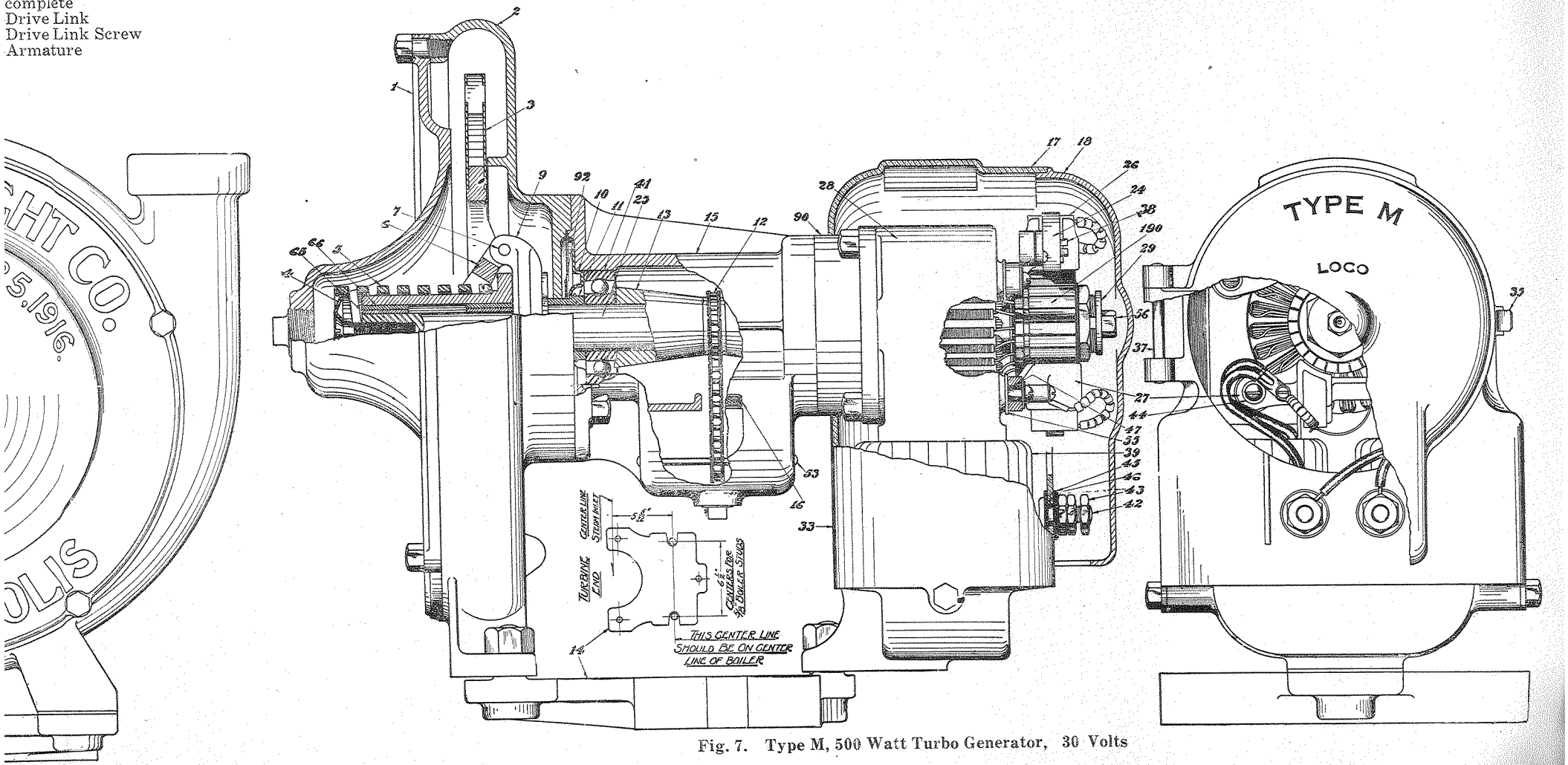


Fig. 7. Type M, 500 Watt Turbo Generator, 30 Volts