DESCRIPTION
and
INSTRUCTIONS
for
INSTALLATION, CARE AND MAINTENANCE

"D-R"
TOOTHED VEE BELT AXLE DRIVES

For TRAIN LIGHTING and AIR CONDITIONING

The only V-Belt that successfully takes a fastener

U. S. A. AND FOREIGN PATENTS

Booklet No. 55

THE DAYTON RODERWALD CO.
SUBSIDIARY OF
THE DAYTON RUBBER MFG. CO.
DAYTON, OHIO, U. S. A.

The WORLD'S LARGEST MANUFACTURERS *of* V-BELTS

CONTENTS

Description of Various Types of Drives

TRUCK HUNG GENERATOR

(Rigid corner-mounting)

This drive consists of a V-groove split axle pulley, a belt tension device secured to end frame of truck, a V-groove driven pulley attached to the shaft in tension device, a drive shaft with two fabric disc flexible couplings. One end of drive shaft is attached to driven pulley and the other end is attached to the generator shaft adapter. The drive shaft is parallel to end frame of truck. The generator is suspended from suitable brackets riveted to corner of truck. The generator is locked in position after the tension has been applied to belt and after the generator has been aligned with driven pulley. More than one belt can be used with this type of drive depending on the capacity of the generator.

DESIGN FEATURES

Fig. 1.

Is a side view of drive showing Generator suspension, adjusting bracket and adjusting screw. The generator shown is a 4 K.W. Machine and is suspended in the suspension bracket with a standard hanger (4). Bracket (2) should be made

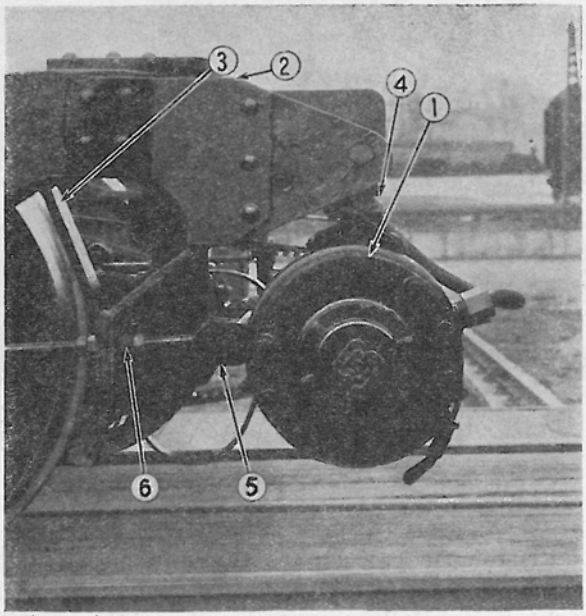

Fig. 1

strong and rigid, preferably of 1″ thick steel plate and forged to shape. It should be attached firmly to corner of truck with ⅞″ rivets. The back side of this bracket should have a full and firm bearing against corner of truck. The adjusting screw bracket (3) is likewise attached securely to truck. Bracket (5) is bolted to generator. The lock nuts (6) are pulled down tight against bracket (3) after generator is aligned. With this arrangement the generator cannot move or vibrate independently of the truck movements.

Fig. 2.

Is a view of the Drive showing the arrangement of the Tension Device. Part (7) is the tension device bracket and should be firmly bolted to bracket (8), which should be firmly attached to end frame of truck with ¾″ rivets. All bolts should be provided with lock washers. The design and location of Part (8) should be such as to allow a minimum belt clearance of 2½″ over top of end frame and under brake beam. The swinging bearing (9) swings on fulcrum pin (10). This swinging bearing contains the driven pulley shaft which is set in ball bearings in a grease-sealed housing. Part (11) is the tension spring and Part (12) the tension adjusting screw and locking handle.

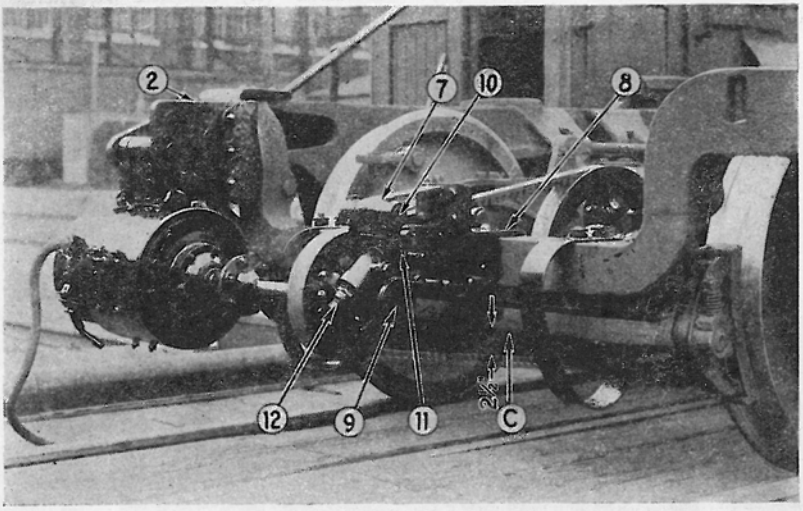

Fig. 2

Fig. 3.

Part (13) is a deep V-groove split pulley attached to the axle. No machine work of any kind is required on the axle. Rubber bushings specially prepared under rigid specifications,

aged and seasoned are used for clamping the heavier pulleys to axle. This rubber bushing may be used for lighter pulleys also, or a corrugated bushing such as commonly used by railroads may be used for clamping the axle pulley to axle. Part (14) is the driven pulley. It, also, has a deep V-groove. Part (15) is the belt which is 2″ wide and 1″ thick, and has a 28° included angle. On the inner side of the belt are teeth, or cogs, which give the belt flexibility and crosswise rigidity and pro-

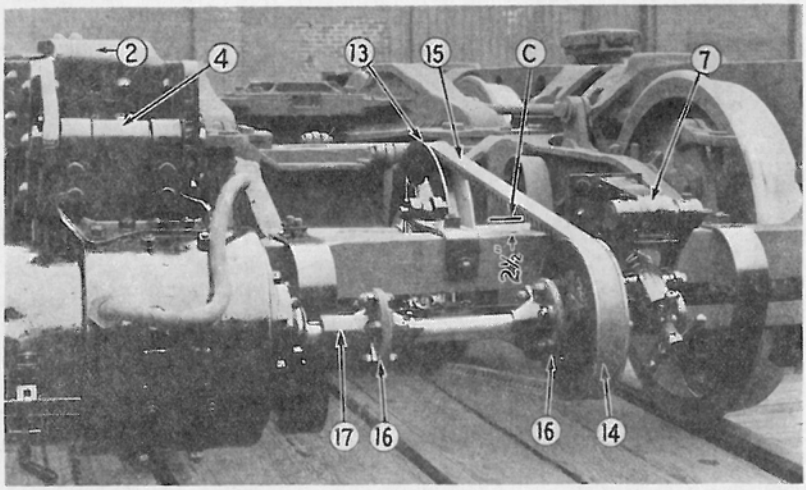

Fig. 3

vides great strength for holding the fastener. These teeth do not mesh with any part of the pulley — only the angled sides come in contact with the sides of the pulley groove. The belt has a wedging action in the pulley groove providing great pulling power. A patented hinge-pin fastener is used to hold the ends of the belts together.

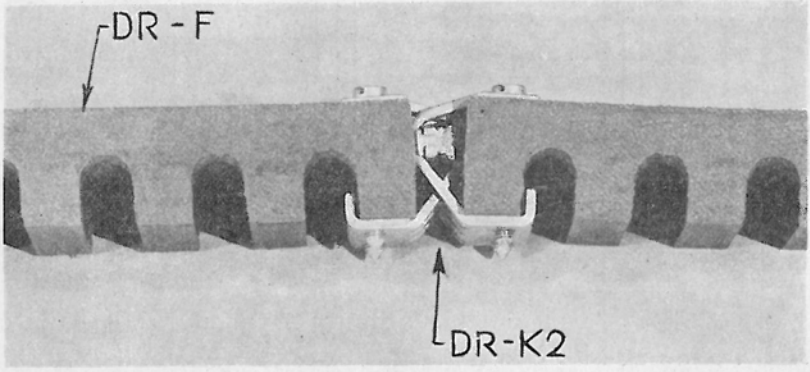

Fig. 4

Figure 4 shows the fastener as applied to a 2″ V-Belt.

Integral with the driven pulley casting is a 3-point bracket. To this bracket is attached one end of the drive shaft with flexible coupling (16). Flexibility in the couplings is obtained by a rubberized fabric disc. The other end of the drive shaft is attached to a 3-point bracket sleeve (17), which is adapted to the generator shaft. The coupling discs are held between the 3-point brackets by studs and castellated nuts secured by cotter pins.

Fig. 5.

Shows a typical method of attaching the tension device bracket to the truck end frame.

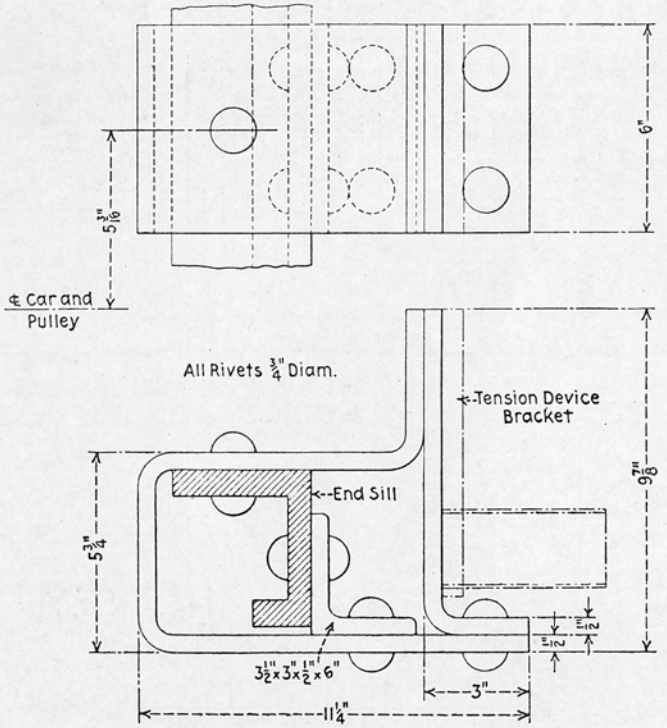

Fig. 5

Fig. 6.
Is a typical layout for a type M. Truck.

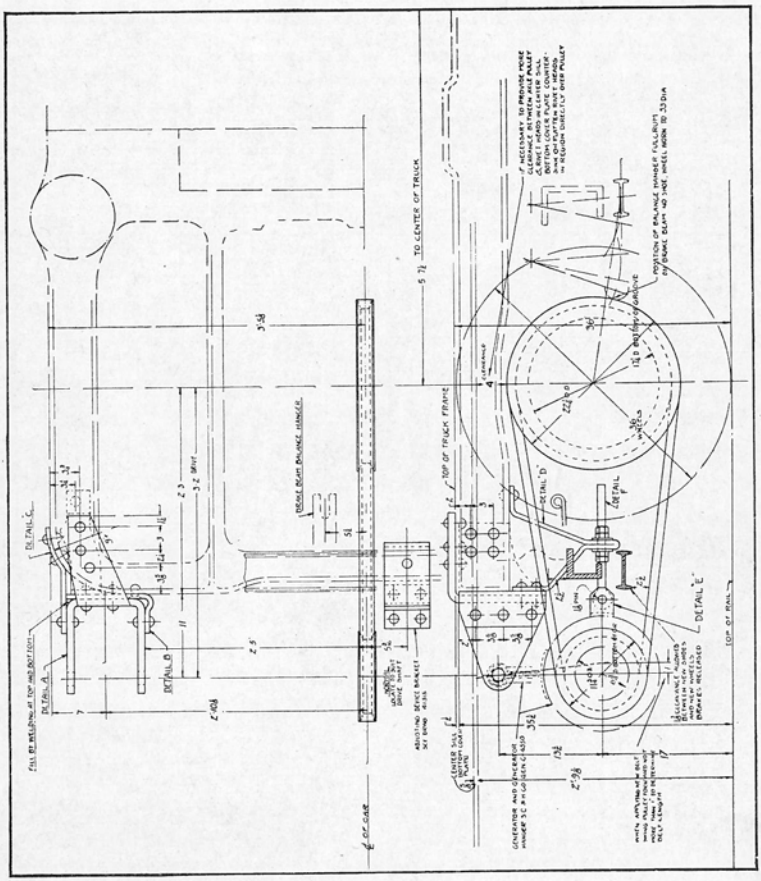

Fig. 6

Fig 7. .

Are typical details of suspension parts, locking screw and bracket.

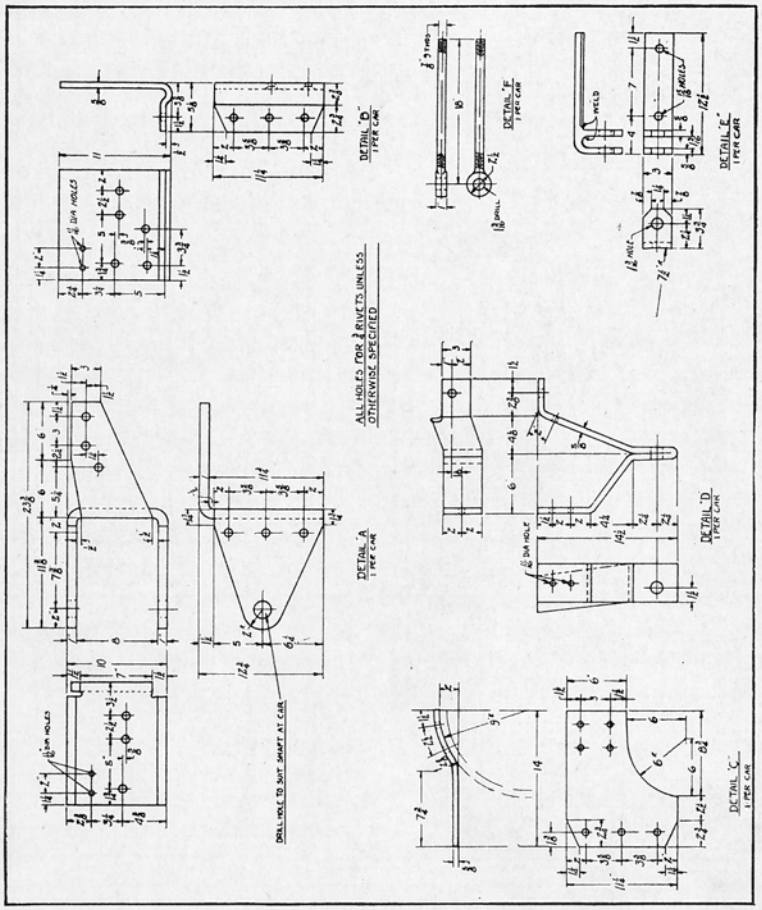

Fig. 7

TWO OR FOUR POINT CONVENTIONAL TRUCK SUSPENDED GENERATOR

This type drive merely requires the replacing of the flat belt pulleys with single or multiple V-groove pulleys. Two-inch Dayton-Roderwald V-belts with patented hinge-pin fasteners are used. The tension device usually used with this type suspension is satisfactory with a piece of tubing applied over the spring. The length of the tube should be ¼" less than the compressed length of spring after tension has been applied. This tube limits the travel of the generator and prevents it from transmitting undue shocks to belt when train starts and stops suddenly.

The belt should have a minimum clearance of 2½" over end sill and brake beam.

Figs. 8 and 9.

Illustrates a typical 2-point truck suspension. It is recommended that the regular Dayton-Roderwald Tension Device be used with this arrangement to assure long belt life and eliminate entirely the shocks to belt due to generator surges. In this case the generator must be moved laterally on suspension rods. The suspension itself is locked in position to prevent movement. The tension device is then attached to end frame of truck. The generator should be moved far enough to permit the installation of the drive shaft between generator adapter and driven pulley which is attached to tension device shaft. This drive shaft with its fabric disc flexible couplings is the same as used on the rigid corner-mounting.

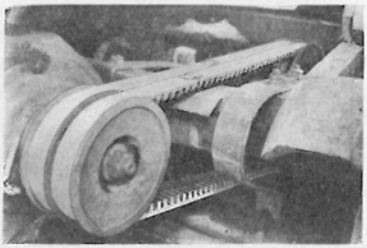

Fig. 8

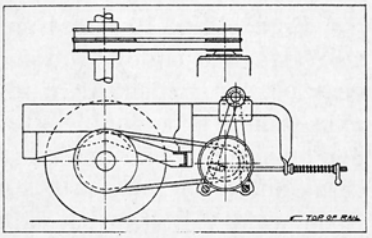

Fig. 9

COMBINATION DAYTON-RODERWALD V-BELT AND GEAR BOX DRIVES

There are several types of drives used with car lighting generators and air conditioning equipment that employ a gear box suspended inside the end sill. Pulleys of from 9″ to 14″ diameter are used, depending on the ratio required and the ratio obtainable in the gear box. The generator or compressor is attached rigidly to car body. A spline shaft with universal joints transmits the power from gear box to generator or compressor. Depending on the power requirements, single or multiple belts are used. Two, four and six belt drives are in use. In case of multiple belt drives, preferably two pulleys should be used on axle and two on gear box shaft, one on each side of gear box. This will preserve equal balance and symmetry of design.

It is very important that at least 3″ clearance be provided between driven pulley and end sill and between driven pulley and brake beam, when brakes are in applied position with worn brake shoes.

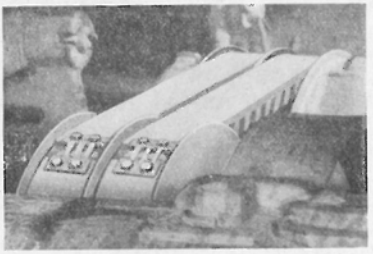

Fig. 10

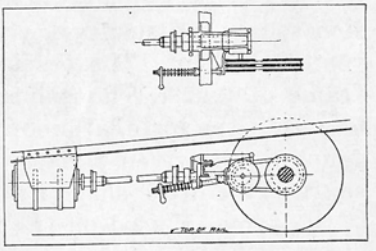

Fig. 11

Figure No. 10 and Figure No. 11 show a 4 K.W. generator attached rigidly and on center line of center sill. A small gear box is suspended inside of the end frame of truck. The axle pulley is a double groove split pulley mounted on rubber bushings. The driven pulley, also a double groove pulley, is mounted on shaft in gear box. Two 2″ x 28° Dayton-Roderwald V-Belts with patented hinge-pin fasteners are used. A spline shaft with universal joints transmits the power from gear box to generator.

Another type of combination V-Belt and Gear Box Drive is where the tension device and gear box is one unit which is installed on the outside of the end sill. A spline shaft with universal joints connects the gear box shaft with generator or compressor for air conditioning, which are attached rigidly to center sill of car. See Figure No. 12.

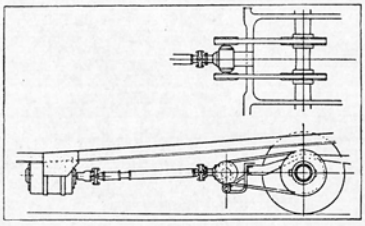

Fig. 12

Latest Designs of Combination V-Belt and Gear Drives for Air Conditioning and Car Lighting Which Have Proven Highly Successful.

Fig. 13.

Shows a compressor drive. The compressor is suspended rigidly to center sill of car. The condenser fan is driven by three standard endless Dayton Cog-Belts. The drive from the axle is thru six 2″ Dayton-Roderwald V-Belts with patented hinge-pin fasteners. Three belts are on each side of the gear box. The 3-groove split axle pulleys and 3-groove driven pulleys on gear box shafts are 14″ in diameter. This is a powerful, positive, noiseless belt drive which has proven highly successful.

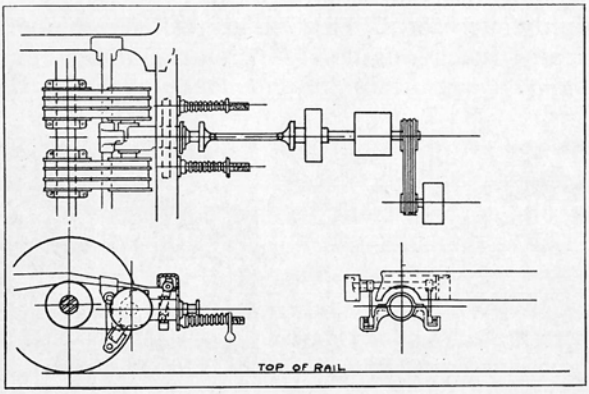

Fig. 13

Fig. 14.

Is the same V-Belt Drive and gear box arrangement. In this case the spline shaft drives a stub shaft on which is a driven pulley. A 15 K.W. high speed generator is rigidly mounted on one side of car body. The generator shaft is parallel to center line of car. Eight 88″ standard "C" section endless Dayton Cog-Belts drive the generator from driven pulley.

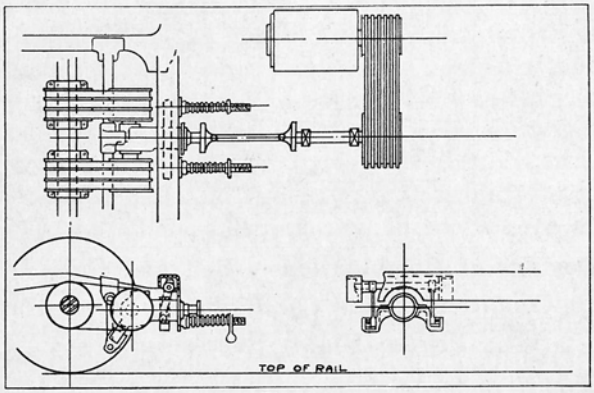

Fig. 14

CONVENTIONAL BODY-SUSPENDED GENERATORS

This type drive merely requires the replacing of the flat belt pulleys with V-groove pulleys and V-Belts. Dayton Endless "C" Section Cog V-Belts or the Dayton-Roderwald 7/8″ Double Angle V-Belts with fastener may be used. When endless belts are used it will be necessary to cut the end sill and install a removable splice plate. Both these type drives have proven highly successful. The V-Belts will accommodate themselves to any truck angularity when rounding curves. See Figs. 15 and 16.

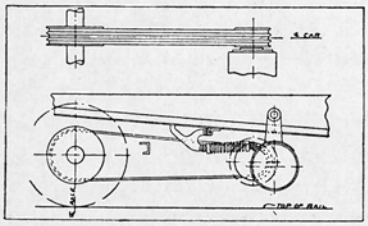

Fig. 15

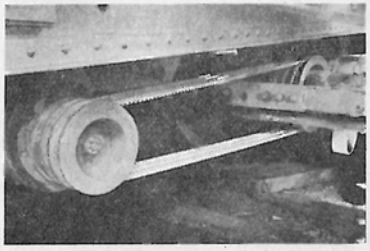

Fig. 16

INSTALLATION

Truck Hung Generator (rigid corner-mounting)
Generator, Tension Device and Drive Shaft:

1. The holes in truck frame should be located from the generator bracket after bracket has been aligned with truck.

2. The large hole in the generator bracket for the shaft which supports generator should be located after tension device has been located on end sill of truck. This is done to secure an approximately correct alignment of generator shaft with driven pulley center.

3. Locate the tension bracket so that it is parallel with end sill and so that driven pulley is perpendicular and at right angles to center line of axle.

4. Move brake beam balance hanger off center.

5. Move brake beam release spring to a location that will not interfere with generator.

6. Move brake beam equalizing lever bracket back to a position that will not interfere with tension device or driven pulley when truck is rounding curves. Lengthen and shorten brake rods accordingly.

7. After generator has been located apply coupling adapter to generator shaft.

8. The Drive shaft is supplied long purposely. With driven pulley in position on tension device bracket determine length of drive shaft and cut off unneeded length.

9. Apply coupling adapter to drive shaft. A keyway is provided in adapter so that same will slide over end of drive shaft to permit assembly of fabric disc couplings.

10. In "setting" location of generator with respect to center of driven pulley the generator should be misaligned away from truck about ½". When the belt becomes "seated" the driven pulley will move away from truck and align itself with generator shaft for normal running position.

PULLEYS

Locate the axle pulley on axle so that it is in alignment with driven pulley. Allowance should be made for side play of axle in journal boxes. Both halves of pulley should be clamped tight, so that all chances of slipping on axle are eliminated. Be sure that grooves in pulley are in line.

DETERMINING BELT LENGTH

(a) With the Dayton-Roderwald Tension Device:
Remove screw cap over spring on tension device. Remove spring and push swinging bearing toward truck so that it is not more than 1″ forward of vertical center line of fulcrum pin. Put belt around pulleys and mark belt for length. See Fig. 6.

(b) Other types of Spring Tension Devices:
Swing generator or gear box towards axle and put belt around pulleys and mark belt for length.

CUTTING BELT

After length of belt has been determined cut off the portion of belt not needed. Use a sharp knife, dipped in water if possible, and use sawing action to cut off belt flush with end tooth. Do not cut on an angle. If cut is made on an angle into belt, screw strength of fastener screws will be diminished. Cutting on an angle away from belt will cause difficulty in inserting rocker pins of fastener. The end of belt should be cut off **flush.** Care should be exercised in "flushing" end of belt so that the cut is straight. See Figure No. 17 for right and wrong way to flush ends of belt.

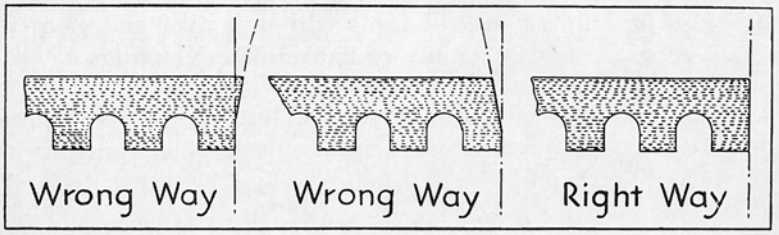

Fig. 17

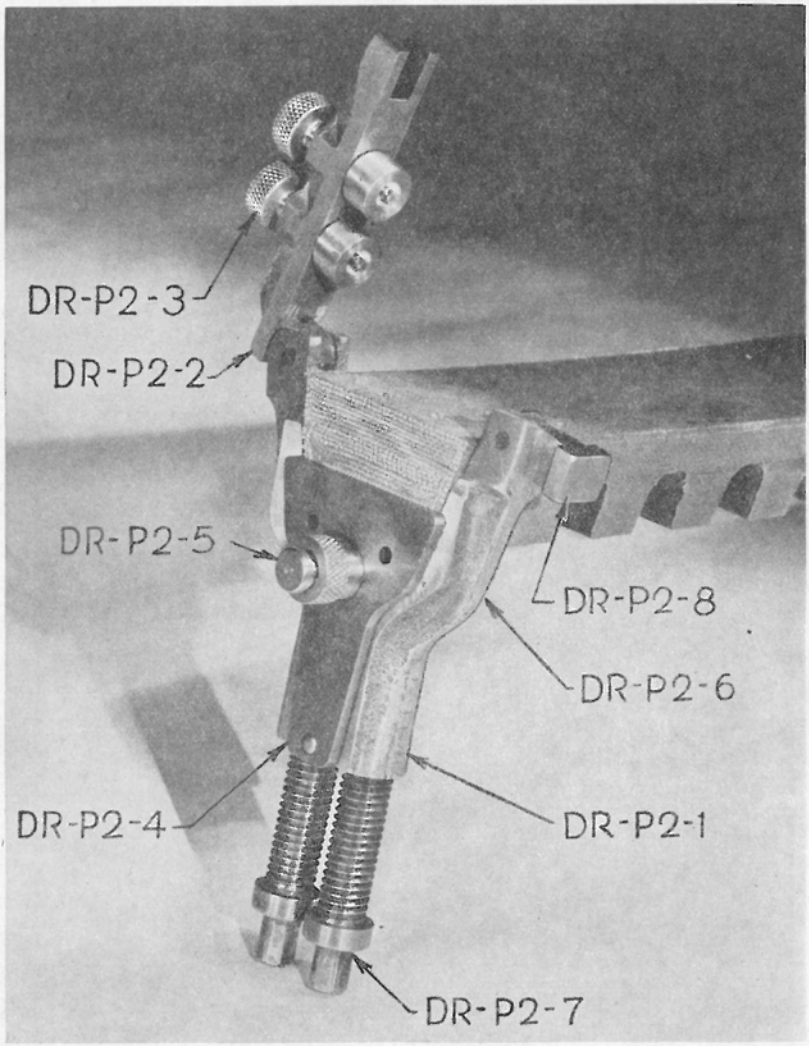

Fig. 18

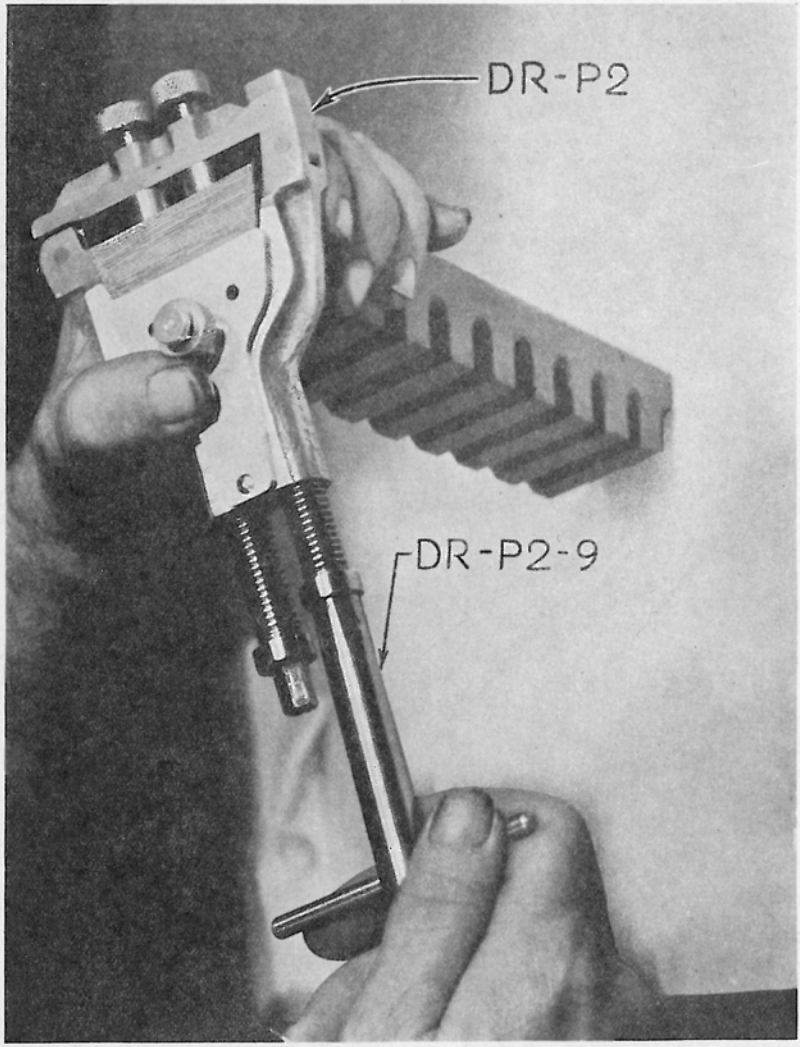

Fig. 19

PUNCHING HOLES IN BELT

Figs. 18 and 19)

Insert the belt in punch after raising the gate of punch (DR-P2-2). Be sure that end of belt is inserted in side of punch opposite clamp screw DR-P2-5. Close the gate and secure latch DR-P2-8. See that belt is straight in punch before tightening clamp screw DR-P2-5. After this tighten down the two top screws DR-P2-3. These screws back up the punches when punches are screwed down through the belt. Screw down both punches, alternating from one punch to the other until both punches have been screwed down to limit of stop collar. After both punches are screwed down to stop collar, holes are punched and punches can be backed out. Be sure that holes are clear of slugs.

APPLYING FASTENER TO BELT

The fastener part No. DR-K2 (fig. 4 and fig. 20) is composed of 8 parts. A 4-strap part No. DR-K2-1, a 3-strap part No. DR-K2-2, male rocker pin No. DR-K2-3, female rocker pin No. DR-K2-4 and 4 screws No. DR-K2-5. The hook on bottom

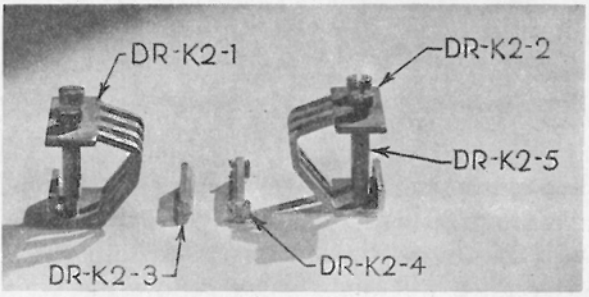

Fig. 20

plate of fastener is provided with tapped holes for the screws. Slip the 4-strap part of fastener over tooth on one end of belt and the 3-strap part of fastener over tooth on other end of belt. The turned up bottom plate on each part of fastener must hook over bottom of tooth. See Figure No. 4. Match up the holes in plates with holes in belt. Insert the screws in holes in top plate. Turn the screws by hand until the threaded portion of screw is thru top plate so as not to damage the threads. After threaded portion of screw is through top plate screws may be driven down thru belt by tapping screw heads

lightly with a hammer or pliers. See Fig. 21. When screws reach bottom plate, screws will have to be turned with a screw driver. Turn the screws down snugly against top plate of fastener. Do not screw down too tight as this will cause belt to bulge out on the sides and also distorts fastener. On the other hand, screws must not be loose. If the point of the screws does not immediately enter the holes in the bottom

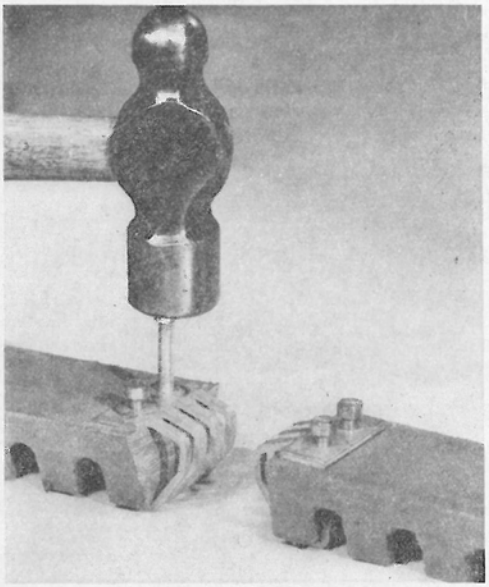

Fig. 21

plate then extra pressure must be applied to the screws to force the screw in the tapped hole. The screw points are conical in shape so that they will find their way into the tapped holes.

INSTALLING BELTS

Pull or push driven pulley against spring and toward axle. This may be done with a block and tackle in the same manner as is done when applying flat belts. Place the belt around pulleys and place both halves of fastener together. See that the straps of fasteners are meshed correctly. Hold the fastener together with one hand and with the other hand place the grooved or female pin into the loop formed by the fastener straps. This pin is provided with a lip on each end which should fit over the outer straps of the 4-strap fastener. Next

insert the male pin into the groove of the female pin. Tap lightly with a light hammer or pliers until male pin slips over side plate of female pin. See Fig. No. 4.

TENSION

After belt has been applied and fastened together, pull the driven pulley back into belt so that belt will become taught. Tighten the spring so that there will be an initial tension of between 200 and 225 lbs. per belt. After the pulleys have turned over a few times the belt will become "seated" causing the driven pulley to move back and thereby reducing the tension to about 185 lbs. In the case of multiple 2" belts, such as for the larger generators and for air conditioning equipment, the initial tension required may be as high as 250 lbs. per belt. The tension required per belt depends on the load characteristics. For general purposes the minimum and maximum tension per belt should be 170 lbs. and 250 lbs. respectively. It is important to remember that a new belt or an old belt applied or reapplied should have a higher initial tension than the normal operating tension. The normal operating tension of each belt should be between 175 and 185 lbs.

INSPECTION — CARE AND MAINTENANCE

Dayton-Roderwald Truck Hung Drive (rigid mounting)

1. See that the lock nuts on generator adjusting screw are always tight. A loose generator rattles and the noise can be distinctly heard inside the car. Inspection should be made every 1,000 to 2,000 miles, merely as a safeguard.
2. Inspect rivets and bolts holding equipment to truck. This should be done after the first 50,000 miles and every 3,000 to 5,000 miles thereafter.
3. Inspect fabric disc universal joints. See that studs and nuts are tight. When fabric layers become separated or torn and when studs show signs of pulling out, fabric discs should be replaced. With fair wear and tear these discs should not require replacing under 200,000 car miles. In extremely cold climate and where much snow and ice is encountered, fabric discs may have to be replaced after 100,000 car miles.

4. Maintain generator alignment with driven pulley. This will prolong the life of the fabric discs of couplings.

5. See that swinging bearing on tension device swings freely at all times. Water will corrode the fulcrum pin. When pin sticks remove same and polish with emery cloth.

6. The bearings on which the swing bearing is suspended are provided with alemite fittings. Grease these bearings every 1,000 to 2,000 miles in wet or winter weather. In dry weather greasing is necessary only every 5,000 to 10,000 miles.

7. The Driven pulley shaft rotates in two ball bearings inside a grease sealed bearing. The grease in this bearing is good for 200,000 car miles. Inspection of grease should be made every 200,000 car miles.

8. Remove ice or snow that may pack in between spring coils and which prevents the free movement of the spring.

9. Do not use a hammer in turning the spring adjusting screw handles — use a long monkey wrench or pipe wrench which will give sufficient leverage to turn screws.

10. Remove all ice from tension device so that same will not interfere with operation of belt.

11. Remove ice from top of end sill and brake beam so that belt will always have the maximum clearance.

12. Inspect axle pulley and see that same has not become loose on axle. The axle pulley should always be in alignment with driven pulley, due consideration being given to position of axle in journal boxes.

13. As belt becomes worn it causes the driven pulley to move away from end sill and decreases the tension. This can be noticed by watching the alignment of drive shaft. When driven pulley has moved back more than ½" the tension on belt should be increased accordingly. If necessary, shorten belt one tooth.

14. In winter time, belts require slightly more tension than they do under summer operating conditions.

15. Condition of fastener and teeth at fastener should be checked frequently after 75,000 miles. Should the pins and straps show a decided wear, fastener or pin, or both should be replaced. The end tooth of the belt, if cracked, should be cut off and new holes put into the next tooth from end of belt.

16. Where the belt as a whole is in good condition, but shows extreme wear at any particular section, the bad section should be cut out and replaced with a new section of belt and fastener.

17. Eventually after long continued service, the belt will show cracking between the teeth, but a cracked belt in dry or warm weather is still good for many thousands of miles. However, in winter time a cracked belt should be removed and put aside for summer time operation in order to get the maximum life from each belt.

18. To "motor" the generator, relieve the tension on belt and push driven pulley toward end sill to remove belt, or disconnect 3-point bracket from generator adapter coupling and move same on drive shaft. Generator can then be "motored".

OTHER TYPE DRIVES (Gear Boxes, etc.)

The present railroad regulations governing inspection and maintenance of gear boxes, splines and universals will prevail here. The care and inspection of the belts and pulleys are the same as outlined above.

Figs. 22 and 23

Show cross-sectional views of drive. All part numbers are indicated. Page 22 carries complete parts list.

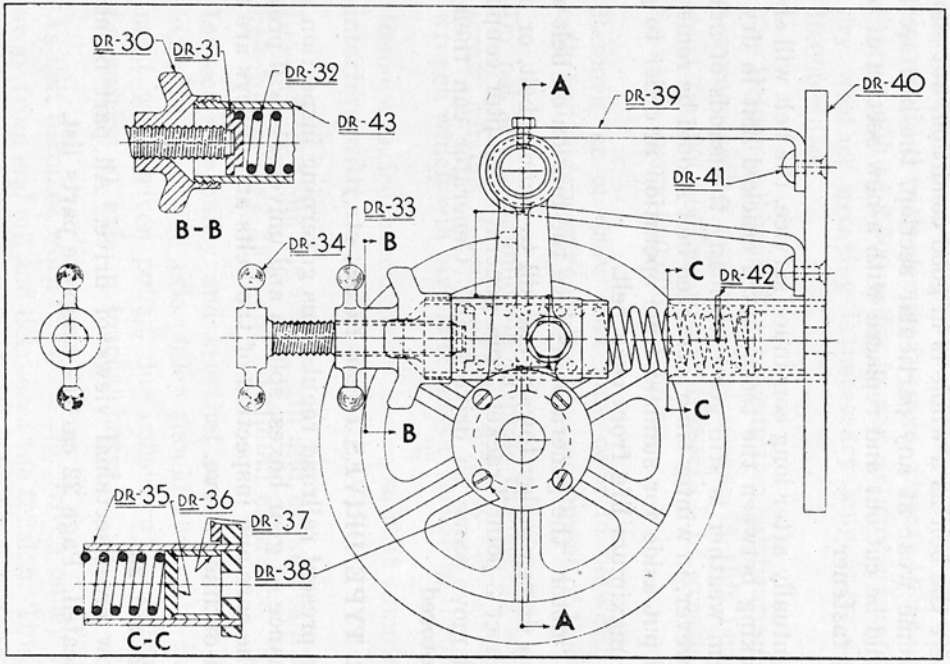
DR-30
DR-31
DR-32
DR-43
B-B
DR-33
DR-34
B
A
DR-39
DR-40
DR-41
C
DR-42
C
B
DR-35
DR-36
DR-37
DR-38
C-C
A

Fig. 22

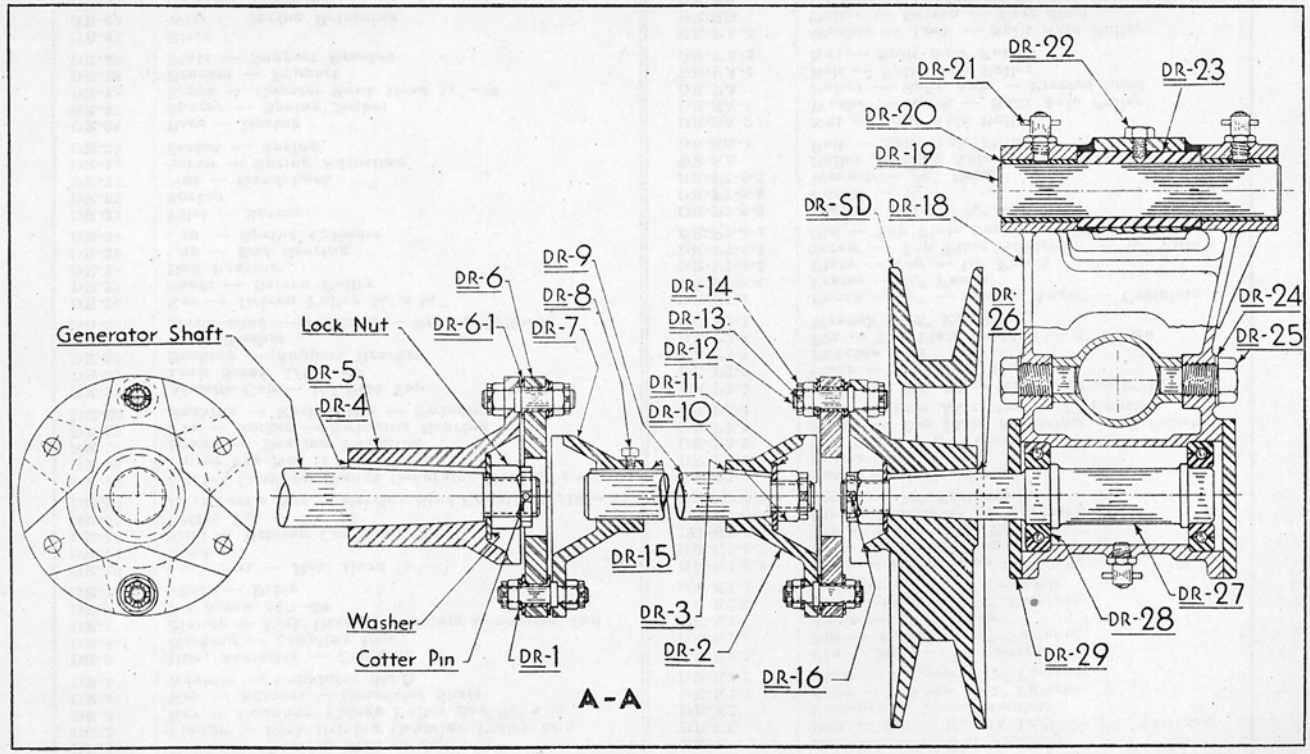
DR-22
DR-21
DR-23
DR-20
DR-19
DR-SD
DR-18
DR-9
DR-6
DR-8
DR-14
DR-13
DR-12
DR-11
DR-10
DR-7
DR-6-1
Lock Nut
Generator Shaft
DR-5
DR-4
DR-26
DR-24
DR-25
DR-15
DR-3
DR-2
DR-16
DR-29
DR-28
DR-27
Washer
Cotter Pin
DR-1
A-A

Fig. 23

PARTS LIST

Number	PART NAME
DR-1	Washer — Driving Stud — Coupling
DR-2	Flange — Fork Driving Coupling Pulley End
DR-3	Key — Coupling Flange Pulley End 3/8" x 1/4"
DR-4	Key — Adapter — Generator Shaft
DR-5	Adapter — Generator Shaft
DR-6	Disc. Assembly — Coupling
DR-6-1	Bushing — Coupling Disc
DR-7	Flange — Fork Driving Coupling Generator End
DR-8	Set Screw 1/4"—20
DR-9	Shaft — Drive
DR-10	Lock Nut — Hex. Head 7/8"—9
DR-11	Washer
DR-12	Stud — Driving Coupling
DR-13	Cotter Pin — No. 13
DR-14	Hex. Castle Nut — Driving Stud Coupling 7/16"—14
DR-15	Key — Coupling Flange Generator End 3/8" x 1/4"
DR-16	Cotter Pin No. 11
DR-18	Frame — Bearing Swinging
DR-19	Pin — Rocker — Swinging Bearing
DR-20	Bushing — Rocker Pin — Swinging Bearing
DR-21	Alemite Cup — 1/8" Pipe Tap
DR-22	Lock Screw 5/16"—18
DR-23	Bushing — Support Bracket
DR-24	Lock Washer
DR-25	Screw Stud — Fulcrum — Spring Cylinder
DR-26	Key — Driven Pulley 3/8" x 1/4"
DR-27	Shaft — Driven Pulley
DR-28	Ball Bearing
DR-29	Cap — End Bearing
DR-30	Cap — Spring Cylinder
DR-31	Pilot — Spring
DR-32	Spring
DR-33	Nut — Hand Lock
DR-34	Screw — Spring Adjusting
DR-35	Socket — Spring
DR-36	Base — Spring
DR-37	Spacer — Spring Socket
DR-38	Screw — Counter Sunk Head 1/4"—20
DR-39	Bracket — Support
DR-40	Plate — Support Bracket
DR-41	Rivet
DR-42	Wire — Spring Retaining
DR-43	Cylinder — Spring

Number	PART NAME
DR-F	Belt — 2"—V—For Fastener
DR-CL	Belt — 7/8" — Double Angle — For Fastener
DR-K2	Fastener — 2" — Complete
DR-K2-1	Plate — 4 Loop — 2" Fastener
DR-K2-2	Plate — 3 Loop — 2" Fastener
DR-K2-3	Pin — Male — 2" Fastener
DR-K2-4	Pin — Female — 2" Fastener
DR-K2-5	Screw — 2" Fastener
DR-K2-6	Screw and Nut — 2" Fastener
DR-K7-8	Fastener — 7/8" — Complete
DR-K7-8-1	Plate — Single Loop — 7/8" Fastener
DR-K7-8-2	Plate — Double Loop — 7/8" Fastener
DR-K7-8-3	Pin — Male — 7/8" Fastener
DR-K7-8-4	Pin — Female — 7/8" Fastener
DR-K7-8-5	Screw — 7/8" Fastener
DR-P2	Punch — 2" Complete
DR-P2-1	Frame — 2" Punch
DR-P2-2	Top Plate — 2" Punch
DR-P2-3	Screw — Top Plate Adjusting — 2" Punch
DR-P2-4	Plate — Side Adjusting — 2" Punch
DR-P2-5	Screw — Side Plate Adjusting — 2" Punch
DR-P2-6	Plate — Side — 2" Punch
DR-P2-7	Punches — 2"
DR-P2-8	Pin — Top Plate Locking — 2" Punch
DR-P2-9	Wrench — 2" Punch
DR-P7-8	Punch — 7/8" — Double Angle — Complete
DR-P7-8-1	Frame — 7/8" Punch
DR-P7-8-2	Plate — Top — 7/8" Punch
DR-P7-8-3	Screw — Top Plate Adjusting — 7/8" Punch
DR-P7-8-4	Pin — Top Plate Locking — 7/8" Punch
DR-P7-8-5	Plate — Side — 7/8" Punch
DR-P7-8-6	Punch — 7/8"
DR-P7-8-7	Wrench — 7/8" Punch
DR-SA	Pulley — Split Axle — Cast Steel
DR-SA-1	Bolt — Split Axle Pulley
DR-SA-2	Nut — Split Axle Pulley
DR-SA-3	Washer — Lock — Split Axle Pulley
DR-PA	Pulley — Split Axle — Pressed Steel
DR-PA-1	Bolt — Split Axle Pulley
DR-PA-2	Nut — Split Axle Pulley
DR-PA-3	Washer — Lock — Split Axle Pulley
DR-SD	Pulley — Driven — Cast Steel
DR-BS	Bushing — Corrugated Steel — Split Axle Pulley
DR-BR	Bushing — Rubber — Axle Pulley

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