THE PENNSYLVANIA RAILROAD

Locomotive Maintenance Instructions L-40-A

ISSUED PHILADELPHIA, PA.
DECEMBER 20, 1941

Instructions for the Operation and Maintenance of Standard Stokers

(These Instructions supersede Locomotive Maintenance Instructions L-40 dated 10-12-27 and Locomotive Maintenance Instructions L-52, dated 2-13-37)

GENERAL

1. The following rules and instructions for the operation, care and maintenance of locomotives equipped with Standard stokers, should be carefully read by all employes, whose duties require them to operate or maintain locomotives thus equipped. In case any of the instructions are not thoroughly understood by an employe, he shall request information from his immediate superior, in order that all details may be thoroughly understood by him.

There are four general types of Standard stokers known as Type B, Modified B, HT. and LT.

PRINCIPLES TO BE OBSERVED IN STOKER FIRING

2. Combustion is best when the fire is thin, because the hottest fire is found roughly 4" above the bottom of the fuel bed. With Pennsylvania coals, the temperature at this point is about 2600 deg. F. The thicker the fire the lower the flame temperature, and the gases at the top of a thick 12" fire may be 500-600 deg. cooler. A thin fire saves coal and makes a freer steaming engine.

A good stoker fire is thin enough to be self cleaning. The grates and ashpans do not become filled up with cinders.

Correct stoker firing is reflected in the steam pressure. If the pressure is sensitive to the rate of firing, the fire is in good condition. If pressure changes very slowly, the fire is too heavy.

Black smoke from the stack indicates that the fire is not in proper condition.

The only rule for stoker jet adjustment is careful watching of the fire. Varying conditions may call for changes in firing, but the nature of the change cannot be predicted by rule. The main steam gage tells correctly when conditions are right inside the firebox.

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GENERAL DESCRIPTION

3. The stoker consists of a simple two-cylinder horizontal engine operating at low speed and completely enclosed. The cylinders are lubricated from the lubricator, while the eccentrics, crank shaft, wrist pins, guides, and other wearing parts of the stoker engine are lubricated by the splash system, providing the oil level is maintained in the engine bed.

4. The valve motion is effected by a single eccentric for each valve forged integral with the shaft.

5. To reverse the engine, a hand operated valve is placed in the steam piping, its movement interchanges the functions of steam and exhaust ports, which eliminates the necessity for double eccentrics and reverse gear.

6. The reversing gear is a hollow spool piston connected to a handle for the hand movement of the reversing valve to operate the stoker engine in forward or reverse position.

7. The reversing lever rod in cab or on tender deck where stoker engine is on tender should be down for normal running operation. When pulled completely up—a lift of 2⅝"—the stoker engine will be reversed. On the older reversing valves the handle should be up for normal running and down for reversing. When notch in the rod engages plate on top of cab floor in either old or new style, the valve is in neutral position and stoker engine will not operate.

8. The engine crank shaft is connected to the main drive gear located at rear end of conveyor on tender by a drive shaft. When stoker engine is on locomotive, there is a male and female slip joint in the section between locomotive and tender. The rear section of crank shaft on tender has two bearings which act as supports and guides, and is connected to the drive gear by a male and female slip joint.

DESCRIPTION OF TYPE B STOKER

9. The main drive shaft is connected to the rear of the tender portion of conveyor screw by a male and female slip joint. The front end of the conveyor screw portion is supported and maintained uniform by a bearing located between the screw and paddle.

10. The intermediate conveyor screw is located between the locomotive and tender. The rear end is connected to the tender conveyor screw by a universal joint, the front end connected by a male and female slip joint to universal joint containing two paddles. The front section of the conveyor screw located on the locomotive is connected to the universal joint ahead of the intermediate conveyor screw by a short section of conveyor screw drive shaft of manganese steel and rests on a bearing of the same material. There is a thrust washer applied at this point. The front end of this section of

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drive enters a female opening in the front conveyor screw while the rear end enters a female opening in the universal joint which provides for a slip joint at both ends (though pinned together).

11. The intermediate conveyor shell consists of two sections known as the front half and rear half which act as a slip joint, this design together with the slip joint in the intermediate section of the drive shaft requires no attention insofar as the stoker is concerned when the tender is separated from the locomotive. In coupling up, the tender must be pinched forward and the driving section of the intermediate conveyor shaft entered into the socket of the driving section at the same time the rear section of the conveyor conduit is entered into the forward section, then as the tender is pinched forward the shank of the paddle should be entered into the socket of the intermediate screw. Care must be exercised to make sure that the fin in the conveyor screw enters the groove in the shank of the paddle.

12. Coal flows into the tender conveyor trough and is carried by the conveyor screw to the crusher plate at front end of tender conveyor trough which breaks down oversized lumps to a size suitable for efficient firing. After passing through this zone, the coal, with the Type B or Modified Type B stoker, is carried to the termination of the conveyor screw (approximately in line with the mud ring), then by means of an elbow of gradual curvature to straight conduit parallel with the door sheet of the firebox. There are no movable parts in the elbow and its extension. The coal is forced through this conduit in sufficient quantities, governed by speed of stoker engine, to meet the locomotive requirements. It is then distributed over fire space by the proper manual adjustment of the distributor jets which are located in firebox on top of the back portion of vertical conduit and operated by one-half (½) inch control valves located on back boiler head at left of firebox door. The vertical conduit and distributor pipes in firebox are protected from heat by what is termed the protecting grate which surrounds the vertical conduit.

DESCRIPTION OF MODIFIED TYPE B STOKER

13. The Modified Type B Stoker differs from the Type B only in that the following parts, Fig. 2, are eliminated:

Front conveyor trough hanging bearing, Part 1039.
Front conveyor trough hanging bearing bushing, Part 1040.
Front conveyor screw drive shaft, Part 1041.
Front conveyor screw drive shaft washer, Part 1042.
Front conveyor screw drive shaft washer—Center, Part 1043.
Front paddle and clevis, Part 1047.
Intermediate clevis and paddle, Part 1057.
Rear clevis and paddle, Part 1061.
Inside rear bowl bearing and bushing, Part 1071.

With the elimination of these parts, the conveying system of the Modified Type B is in effect one continuous screw divided into three sections: The tender conveyor screw 1153 couples direct through

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a universal joint to the intermediate conveyor screw 1152, which in turn couples direct to the front conveyor screw 1151 through a universal joint, constituting the conveying system. The tender conveyor screw is fastened to the main drive shaft 1162 with two 5/8" bolts, in order to prevent the screw from slipping forward whenever the stoker is reversed; this forward pull is cared for by the hanging bearing in the Type B. In order to relieve the additional thrust imparted upon main drive shaft thrust button 1091 (due to the removal of bearings in the conveyor system) manganese thrust washers part numbers 1156 and 1157 are applied to the rear end of the tender conveyor screw and the hub of the main drive gear housing, respectively.

The driving gear ratio for Type B is 4 to 1. With Modified Type B, this ratio is changed to 6½ to 1.

DESCRIPTION OF HT STOKER

14. The operation of the conveyor trough and driving engine of the Type HT stoker is similar to the Type B and Modified Type B stoker.

The HT stoker has the forward two sections of conveyor screw inclined and the conveyor trough on the engine is so arranged as to deliver coal at the firedoor instead of inside.

15. With the HT stoker, coal is brought to the distributor at the firedoor. Valves 1 and 5, Fig. 4, control the distribution of coal to the left and right back corners, respectively, through two sets of two holes each on the left and right sides of the jet plate. Valves 2 and 4 control additional distribution of coal to the left and right corners, when necessary, through two sets of 4 holes on the left and right front half of the jet plate. Valve 3 controls additional distribution of fine coal over the entire grate, except the two back corners, when necessary, through the single row of four holes located below the jets for the front corners. The pressure on these jets should be adjusted carefully by hand, watching the fire closely to see that even distribution is being obtained. The right and left vanes, No. 10, Fig. 3, adjustable by means of hand screws, No. 11, are for controlling the amount of coal delivered to the back corners and after obtaining proper distribution it should not be necessary to change their setting.

When necessary to renew distributing table No. 16, Fig. 3, or air sealing apron, No. 17, remove safety pins, No. 18, on each side of jet plate. Unhook the table and remove through firedoor opening. The sealing apron can then be detached by removing the bolts located on each side of distributing table skirt. When replacing same, apply bolts in distributing table, slip the apron into position and partly tighten nuts. Then place the unit on the jet plate, adjust apron to door sheet and fasten securely. *Do not fail to replace safety pins.* To replace jet plate, remove distributing table in the manner previously described, disconnect jet pipes, then remove two holding screws, No. 19, located at forward end of elevator pipe and draw the plate forward through firedoor opening.

DESCRIPTION OF LT-1 STOKER

16. The type LT-1 stoker is a conversion of the Duplex type stoker, displacing the elevator and hopper units, but retaining the driving engine and conveyor reverse mechanism, as well as the

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tender unit. The new parts applied to the locomotive are similar to those of the HT type stoker. See Circular L-32 for instructions covering the Duplex stoker parts.

DAILY INSPECTION

17. Inspect the stoker on arrival at terminal. See that the conveyor is practically free from coal and slide plates pushed back so opening is at front. Start the stoker engine, noting that it operates properly in forward and reverse position, paying particular attention to the following.

(a) See that the automatic drain valve located in the steam supply line to the stoker engine is operating properly.

(b) See that the stoker cylinder gaskets and piston rod packings are steam tight.

(c) Examine steam jets to see that they are not stopped up or jet pipes leaking, or jet casting moved from its proper location.

(d) Note that oil level in engine bed is in line with pet cock in side of engine bed, and that oil seal packing around valve stems is not leaking.

(e) Inspect oil pipes for broken or loose connections.

(f) See that there is a small flow of steam through the jets after inspection has been completed.

MONTHLY INSPECTION AT CERTIFICATE PERIOD

18. Drain oil from engine bed, wash out with hot water and apply new oil to level of pet cock in side of engine bed. Be sure oil seal packing around valve stems is tight and pet cocks are securely screwed in place.

(a) Examine all distributor jets and note they have the proper opening of 5/32". See that the ½" jet pipes are not leaking and the jet casting secured in its proper location. The distributor jet hood must be maintained for protection to the jet casting and pipes.

(b) All oil pipes should be disconnected at unions and cleaned.

(c) Inspect gear housing in rear of tender and apply fresh grease if necessary, using No. 1 cup grease.

(d) Examine drive shaft bearings for wear.

(e) See that stoker engine is tight on bracket and bracket on frame, also that all other parts of stoker are properly secured. Make sure that all bolts in the universal joint of conveyor drive shaft are in place and tight, and that nuts are secured with spring lock washers and riveted over. Be sure that parts of slip joints are of proper length to avoid dropping apart on sharp curves.

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(f) Tighten gaskets on both ends of cylinders also main valve cylinder heads. Unless these nuts are tightened periodically the gaskets may cut.

(g) Examine main connecting rod brasses for lost motion.

(h) Start the stoker engine, noting that the engine and stoker operates properly in forward and reverse positions.

(i) While running, note that all cylinder head gaskets and piston rod packings are steam tight.

(j) See that the automatic drain valve located in the steam supply line to the engine is operating properly.

(k) If excessive steam pressure is required to operate stoker light, determine if exhaust pipe to front end is open. If no trouble is found due to an obstruction in the exhaust pipe and operating parts are free, trouble will be found due to broken or worn valve, piston rings or cylinders; also examine main crank shaft bearings.

(l) Make sure the main steam valve in turret is closed before any repairs are started on the stoker.

(m) See that there is a small flow of steam through the jets after inspection has been completed if there is fire in the firebox.

(n) See that drain cocks at the bottom of the jet pipes and at reversing valve are open when locomotive is dead.

19. SEMI-ANNUAL ENGINEHOUSE INSPECTION AND MAINTENANCE

(a) When stoker parts are dismantled for repairs at any time other than class repairs, the limits prescribed in Circular L-33-A should be followed to the extent necessary to keep the parts in service until the next class repairs.

(b) In addition to daily and monthly attention to Standard stokers, each locomotive must have a special examination made of stoker at alternate quarterly inspection periods, and a record of the inspection recorded on Form M. P. 278. The necessary servicing and work will be performed as outlined below:

(c) Remove cylinder heads and check fit of piston rings in cylinder. Renew rings if they do not fit cylinder walls within .010″ clearance.

(d) Renew piston rod and valve stem packing if necessary.

(e) Repack gear case with standard No. 1 cup grease.

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(f) Inspect tender screw. Renew screw if flight or hub diameter is reduced over ½" or thickness of flights reduced over 40 percent or flights reduced over 7/16" below standard. Check slide plates and make them work free in conveyor trough opening.

(g) Renew universal joint parts if lost motion between parts exceeds ¼". Be sure that spring lock washers are in place under all nuts and bolt ends are riveted over the nuts.

(h) Check friction in engine and shafts and back-lash in gears by operating them by hand with an 18" wrench before connecting up universal joints. Examine all conveyor screw drive bolts and renew if loose or worn.

(i) Remove valve chamber head and renew valve rings if they do not fit valve chamber walls within .005" clearance. Examine reversing valve and replace any defective rings.

(j) Drain engine bed, wash out with turpentine substitute and examine connecting rod and eccentrics. Remove excessive clearance in connecting rod crosshead or main bearings.

(k) Renew defective protection grates, firing tables and distributor jet hoods, or jets with holes enlarged to 7/32".

(l) Gauge point of front screw and renew or adjust to conform to position shown on trac. F-407866 within the limits between the front of screw and the elbow of plus ¾" minus zero.

(m) Renew front hanging bearing bushing if lost motion exceeds 5/16".

WHEN LOCOMOTIVE IS IN SHOP

20. The stoker engine should be removed and sent to repair shop where it must be dismantled, examined and parts repaired or renewed. After repairs have been completed, the stoker engine must be completely assembled, placed on locomotive, and given the same careful test and inspection as outlined under MONTHLY INSPECTION AT CERTIFICATE PERIOD.

FOR ENGINEMEN, FIREMEN AND HOSTLERS

21. Before starting stoker, fill the four-compartment oil cup located in bulkhead of tender cistern with engine oil, and apply a few drops to the universal and slip joints. These parts when in service should be oiled once every eight (8) hours unless the bearings indicate that they are running dry. Note if engine bed has sufficient oil (oil should show when the pet cock on side of engine bed is opened). Lubricator should feed about 3 drops per minute to stoker engine while running.

(a) Inspect the visible parts to see that the stoker is in good condition.

(b) If closed, open the distributor jet valves, then slowly open the main control valve of distributor to gradually force out any condensation that may be in the distributor pipes. Next, open the main engine steam valve in the turret, then the small throttle valve to the stoker engine

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gradually to allow all condensation to escape through the automatic drain valve, then place the reversing rod handle into normal operating position by placing the control lever in the cab in down position. See if the engine operates in reverse position. After the control lever has again been placed in normal operating position give the stoker engine sufficient steam to run at the speed desired.

(c) The large (or booster) throttle valve should be kept closed except when necessary to crush hard lumps of coal, then it may be opened to rapidly increase steam pressure in stoker cylinders, as soon as the heavy duty is performed the booster valve should be closed and stoker operated with the small steam throttle valve.

(d) After the stoker has been started and coal begins to appear at the jets, adjust the pressure on the distributor jets so as to get a hot clear thin fire. Supply valve to jet manifold should be wide open. Throttle the stoker engine so it will supply just enough coal for the work being done by the locomotive. Care should be exercised not to feed too much coal, for the fire should be carried much lighter than with hand firing. When the train is standing, or drifting on long grades, the stoker engine should be shut off, and the fire kept in proper condition by hand firing.

(e) When taking charge of the locomotive see that fire is clean and in good condition and build fire by hand. Stoker should be run sufficiently before leaving storage track to see that it is operating properly, after which stoker should not be used until leaving yard with train. Start with clear bright thin fire free from clinkers. Avoid overloading firebox. *Starve* the fire.

(f) Do not allow rock, iron, wood, waste, or other foreign material to be fed into the stoker if it can be detected in the coal and removed before it enters the conveyor trough. Do not use slide hooks or firing tools in such a way as to risk getting them caught in conveyor screw.

(g) Before taking coal en route, or at terminals, see that all tender slides are pushed back so opening is in front.

(h) The valve to the manifold should be left cracked when the locomotive is drifting, or standing while on the road or at terminals.

(i) Stoker slide plates must be closed a sufficient distance from the end of the run in order that the coal in the conveyor may be economically used and the engine arrive on the pit with the conveyor as nearly empty as possible.

GENERAL SUGGESTIONS

METHOD OF PACKING PISTON AND VALVE STEMS

22. Both piston and valve have two packing glands (Fig. 1), one on the engine case (soft packing) to prevent loss of oil, and one on the cylinders (semi-metallic packing) to prevent escape of steam. To pack the piston rod stuffing box, turn the stoker engine so that the crosshead connected to the piston which is to be packed is at the back end of the stroke, then with spanner wrench

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provided for this purpose screw the entire gland (A) out of the engine bed, sliding it back on the rod. The gland (B) of the steam stuffing box (E) can now be slid back through the opening in the engine bed and packing applied to the stuffing box (E), then slide gland against the packing and screw the engine bed gland (A) back until the projecting lugs bear firmly against the gland (B). Any steam leak from the piston can be taken up by screwing in gland (A). The soft packing in gland (A) is contained in cavity (D) and kept tight by gland (C).

TO KEY UP CONNECTING RODS

23. Brasses in the back end of the connecting rods are fitted brasses. If it is necessary to reduce them remove the top nut on the key keeper, remove the key and slide the strap back, reducing the brasses in the usual way. In replacing, adjust the keeper nuts correctly, being sure that they are securely tightened.

TO RENEW VALVE RINGS

24. Before disconnecting the valve stem, set a pair of dividers to the marks on the valve stem and valve rod. Then slack off the valve stem lock nut, screw the stem out of the clevis and pull the valve out of the valve chamber. The valves are of the built-up type like any locomotive piston valve; therefore, after the valve has been removed take off the front nut, separate the valve, renew rings and put the valve together in the usual way. In applying, see that the points of the dividers drop into the marks to which they have been previously set, otherwise the valves will be out of adjustment.

TO SET VALVES

25. (a) Remove both valve chest covers.

(b) Rotate crankshaft until one of the valves has moved to extreme outward position in the valve chamber. The distance from the face of valve packing ring to the face of the valve chest bushing should measure $1\frac{11}{32}$" for standard 7" x 7" engine, or $1\frac{21}{32}$" for new outside packed engine. Then turn the crankshaft over until valve is at extreme inward position. The distance from the face of valve packing ring to the face of the valve chest bushing should measure $2\frac{3}{32}$" for standard 7" x 7" engine, or $2\frac{7}{16}$" with outside packed engine.

(c) If the valve travel does not come within these limits, it is evident there is excessive lost motion in the eccentric strap or in the connection between the eccentric rod and valve rod, or between the valve ring and its groove. This lost motion should be taken up and the valve set according to above instructions.

(d) If, after taking up any lost motion found to exist, the above events are not obtained, it will then be necessary to adjust valve stem in coupling.

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TO DISCONNECT STOKER LOCOMOTIVE AND TENDER UNITS—TYPE B STOKER

26. Block underneath intermediate conveyor shells on cradle and tender frame. Separate tender from the locomotive. The intermediate conveyor shells slip apart at telescoping joint, and the intermediate clevis and paddle slips out of the square socket in intermediate conveyor screw.

In coupling up, the tender must be pinched forward and the driven section of the intermediate drive shaft entered into the socket of the driving section at the same time that the rear section of the conveyor housing is entered into the forward section. Then as the tender is pinched forward the shank of paddle 1057 should be entered into the socket of intermediate screw 1058. The shank of paddle 1057 has a groove cast in one side, a lug being cast on one side of the intermediate screw socket, and care should be taken in entering paddle shank that the groove corresponds with this lug or tit. This is to insure the proper relationship between the flight of the intermediate screw and the paddle.

TO REMOVE FRONT CONVEYOR SCREW—TYPE B STOKER

27. Separate locomotive from tender as instructed in Par. 25, remove intermediate conveyor shell-front half, take out the six bolts that fasten the front conveyor trough hanging bearing to front conveyor trough, and remove the hanging bearing together with front screw from the conveyor; the front conveyor screw drive shaft can then be disconnected from the front paddle and clevis on the floor.

TO REMOVE INTERMEDIATE CONVEYOR SCREW—TYPE B STOKER

28. To remove intermediate screw, separate the tender from the locomotive as instructed in Par. 25; remove the four 5/8" bolts that hold the outside rear bowl together, and swing same open on the hinges; then remove intermediate conveyor shell-rear half, and the rear bowl covers; take out the universal joint bolt which connects intermediate screw to rear clevis and paddle.

TO REMOVE TENDER CONVEYOR SCREW—TYPE B STOKER

29. Separate the tender from the locomotive as instructed in Par. 26. Remove intermediate conveyor shell-rear half, and outside rear bowl. Disconnect intermediate screw from rear clevis and paddle by taking out universal joint bolt, and remove rear clevis from square end of tender screw. Then remove inside rear bowl, and pull the tender screw forward.

TO DISCONNECT STOKER LOCOMOTIVE AND TENDER UNITS—MODIFIED TYPE B STOKER

30. Block underneath intermediate conveyor shells on both locomotive and tender frame. Separate the tender from the locomotive. The intermediate conveyor shells slip apart at telescoping joint. As front screw is being pulled out of the housing, care should be taken that it does not drop and cause damage as the tender is being pulled back.

Before engine and tender are recoupled, be sure that the vertical housing, front elbow and front conveyor trough are empty, as serious damage will result if coal is left in these bushings and is

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packed ahead of the front screw. Also be sure that all fine coal is removed from the female portion of the drive shaft.

In coupling up, the tender must be pinched forward, and the driven section of the intermediate drive shaft entered into the socket of the driving section at the same time that the rear section of the intermediate housing is entered into the forward section.

The front screw clearance of 2" specified on tracing F-407866 is important and must be maintained.

TO REMOVE FRONT CONVEYOR SCREW—MODIFIED TYPE B STOKER

31. Separate locomotive from tender as instructed in Par. 30, remove universal bolt in universal joint which connects front screw with intermediate screw.

TO REMOVE INTERMEDIATE CONVEYOR SCREW—MODIFIED TYPE B STOKER

32. Separate tender from locomotive as instructed in Par. 30. Disconnect front screw at universal joint from the intermediate; remove the four 5/8" bolts that hold the outside rear bowl together and swing same open on the hinges; then remove intermediate conveyor shell-rear half, and the rear bowl covers; take out the universal joint bolt at the universal joint which connects the intermediate screw with the tender screw.

33. In recoupling the screws care should be taken that screw flights mate up so that a continuation of the flight is maintained as shown by markings. A star is cast on the front end of the tender screw and the back end of intermediate screw near the jaw. These stars should be opposite each other when screws are properly coupled. An arrow is cast on the front end of the intermediate screw and back end of front screw. These arrows should be opposite each other when screws are properly coupled.

TO REMOVE TENDER CONVEYOR SCREW—MODIFIED TYPE B STOKER

34. Separate the tender from the locomotive as instructed in Par. 30. Remove intermediate conveyor shell-rear half and outside rear bowl. Disconnect intermediate screw at universal joint by taking out universal joint bolt. Remove the keeper bolts which hold the screw to the square end of main drive shaft, and pull the screw forward. Care should be taken when removing the tender screw that the manganese thrust washers applied between rear end of tender screw and hub of main drive gear housing are not lost.

DRAWBAR INSPECTION—TYPE HT

35. First it should be noted that it is not necessary to disconnect any conveying screws of the HT stoker when making drawbar inspection.

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36. Before moving the tender away from the locomotive, first operate the stoker for a time sufficient to remove all coal from elevator pipe. Then remove ball joint cover, No. 20, Fig. 3, on the elevator pipe, No. 21. It will be necessary to raise the front trough, No. 24, several inches to permit its withdrawal from the elevator pipe bowl after which the tender can be pinch barred backward the required distance. Care should be taken to support the elevator screw, No. 25, if it is withdrawn entirely from the elevator pipe and a jack or block should be placed several inches below the back trough, No. 26, to support it when the tender is pinched backward.

37. In recoupling, insert and guide the elevator screw and front trough into the elevator pipe while pinch barring the tender into place. The elevator pipe ball joint cover or clamp can then be replaced and secured in position.

38. When moving the tender in either direction, care should be exercised that the elevator screw does not bind in the elevator pipe. If this condition occurs, turn the screws slightly in either direction to obtain sufficient clearance.

39. While the tender is being pinch barred toward the locomotive, the driven section of the drive shaft, No. 27, should be guided into the driving section No. 28, which is connected with the stoker engine.

INSTRUCTIONS FOR DISCONNECTING STOKER FOR DRAWBAR INSPECTION "LT-1" STOKER

40. Before moving the tender away from locomotive, first operate the stoker for a time sufficient to remove all coal from the elevator pipe. Then block elevator screw in its normal position; remove upper section of the ball joint clamp, No. 20, Fig. 5, and ball joint handhole covers, No. 21, after which the screws can be disconnected by removing universal joint bolt, No. 22. Raise and block conveyor trough in a position to clear lower section of ball joint clamp. The tender can now be separated from locomotive and, if desired, elevator screw can be removed from bottom of elevator pipe.

41. In recoupling the screws, the flight of the universal joint link, No. 23, should form a continuous flight between the conveyor and elevator screws.

42. When moving the tender towards the locomotive, the driven section of the flexible drive shaft, No. 26, should be guided into the driving section, No. 27, located on the locomotive.

REMOVING OBSTRUCTIONS

43. If the stoker stops, open the booster throttle valve. If this has no effect reverse the stoker engine a few times, and if it makes one or two turns and then stops it indicates that a piece of foreign matter, such as iron, has caught in the stoker. Continue to alternately operate the stoker forward and in reverse to try to work the obstruction through; if, after repeated efforts the stoker will not work, close the stoker throttle valves and place the operating lever in neutral position (center notch), then look for obstruction first at the crusher then in the horizontal conveyor and remove it. Stoker engine should not be run in reverse more than three full turns of tender screw to prevent damage to rear of trough.

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44. If the obstruction cannot be removed and stoker started readily, the fire should be kept up by hand. The coal can be thrown just ahead of jets, which will take care of it if lumps are broken small enough.

45. If one or more of the jet valves stop up, close all the jet valves but the one controlling the stopped holes. Open this valve wide and try to blow out the obstruction. If the obstructed holes cannot be opened in this manner, leave the jet valve closed as before, close the main valve, remove bonnet and valve stem from the valve controlling the obstructed hole then open the main valve, the vacuum created should carry out the obstruction, if this method fails the holes will have to be cleaned out with a tool.

H. W. JONES,
Chief of Motive Power.

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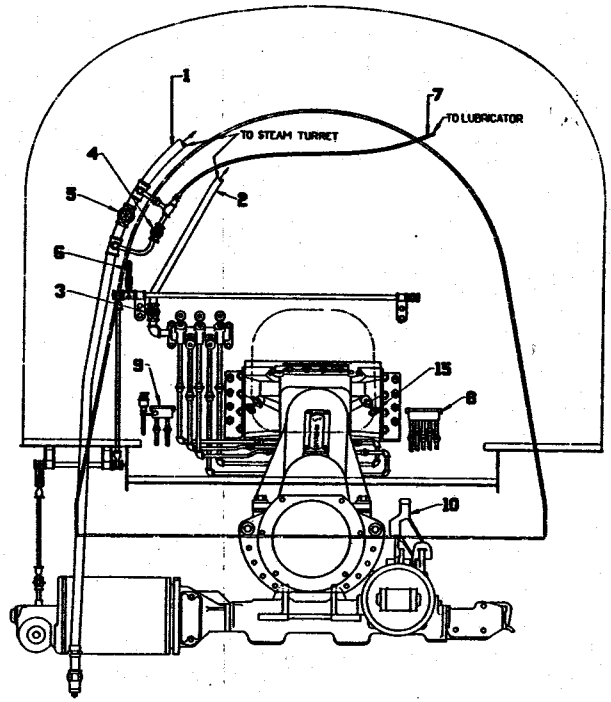

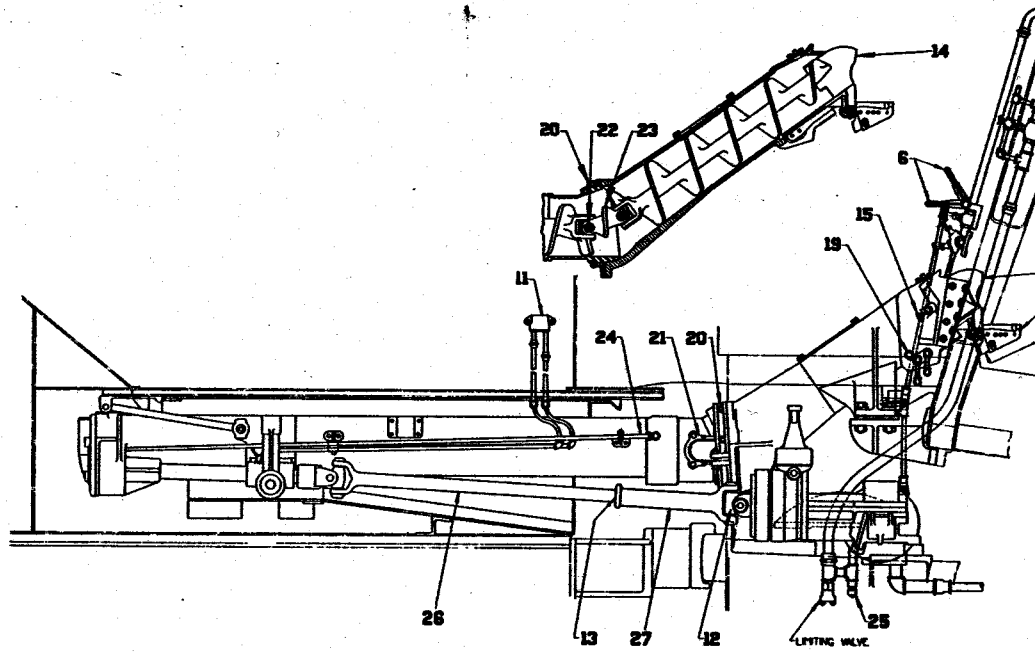

FIG. 5. TYPE LT-1 STOKER

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DWG 1-4-90

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THE PENNSYLVANIA RAILROAD

REVISION OF PARAGRAPH 21 (d)

LOCOMOTIVE MAINTENANCE INSTRUCTIONS NO. L-40-A

INSTRUCTIONS FOR THE OPERATION AND MAINTENANCE OF STANDARD STOKERS

Philadelphia, Pa.
December 1, 1943.

The following should be substituted for Paragraph 21 (d) of the circular, as revised August 5, 1942:-

21 (d) - After the stoker has been started and coal begins to appear at the jets, adjust the pressure on the distributor jets so as to get a hot clear thin fire. Supply valve to jet manifold should be wide open. Throttle the stoker engine so it will supply just enough coal for the work being done by the locomotive. Care should be exercised not to feed too much coal, for the fire should be carried much lighter than with hand firing. When the train is standing, or drifting on long grades, the stoker engine should be shut off, and the fire kept in proper condition by hand firing.

H. W. Jones
Chief of Motive Power.

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