

Model SD15-11D

Site Dumper

Operation Manual

PREFACE

Model SD15-11D dumper, a diesel-powered car with hydraulic forward tipping skip, is commonly used in many branches for short or medium transportation, such as in construction, roadbuilding, mine, water conservancy, and other industry and agriculture, particularly suitable for conveying concrete, stone, sand, soil, ore, grain, fertilizer and other bulk materials.

The features of Model SD15-11D dumper is its compact construction, light operation, maneuverable steering, economical and reliable service, as well as easy maintenance.. In addition, the dumper is equipped with hydraulic tipping skip and complete electrical system.

Proper operation and service are essential to prolong life and satisfactory performance of dumper. This manual provides operating instruction and information concerning lubrication and service as required for more efficient use of this dumper. A separate manual is furnished for the engine of this dumper. Be familiar with the instructions in both manuals before attempting to operate the engine and the dumper.

Along with the development of the product and according to the users opinion, the dumper will be improved continuously. Therefore, after a time, a part of the content this Manual may be inconsistent with the object.

IMPORTANT INSTRUCTIONS

1. New dumper should go through with running-in process accordingly
before taking up loads for

Normal operation, otherwise its service life will be shortened.

2, Fuel of specified grade is to be used, and before being poured into the
fuel tank, it should be sufficiently precipitated and thoroughly filtered.

3, Never drive the dumper down a slope at high speed.

4, Never make a sharp turn at high speed.

CONTENTS

Chapter 1	Main Specification	1
A.	General	1
B.	Engine	2
C.	Transmission	2
D.	Wheels and Steering System	3
E.	Hydraulic System	3
F.	Electrical System	3
G.	Main Injection Capacities	4
Chapter 2	Operation of Dumper	5
A.	Controls and Instruments	5
B.	Running-in Process of New Dumper	7
C.	Operation	8
Chapter 3	Adjustment of Dumper	12
A.	Adjustment of Clutch	12
B.	Adjustment of Main Drive	13
C.	Adjustment of Axial Clearance of Front Axle Shaft	15
D.	Adjustment of Brake	16
E.	Adjustment of Steering Gear	18
F.	Adjustment of Bearing of Rear Wheels	19
G.	Adjustment of Toe-in of Rear Wheels	20
H.	Adjustment of Seat	20
Chapter 4	Hydraulic System	23
A.	Pump	24
B.	Control Valve	25
C.	Cylinder	26
D.	Notice to Operation the Hydraulic System	27
Chapter 5	Electrical System	28
A.	Storage Battery	28
B.	Generator and Regulator	28
C.	Starter	29
D.	The Others	30
Chapter 6	Maintenance of Dumper	32
A.	Oil, Fuel and Water to be used for Dumper	32
B.	Maintenance of Dumper	33
Chapter 7	Trouble and its Cause Remedies	38
Appendix:		
I.	Schematic Diagram of Transmission System	42
II.	List of Bearings	43
III.	List of Oil Seal	44

Chapter 1 Main Specifications

A. General

1. Model	SD 15 - 11 D
2. Overall dimensions(mm)	
Length	2975
Width	1600
Height (to steering wheel)	1450
(to roof)	2100
3. Skip capacity	
Water level (liter)	576
Struck level (m ³)	0.750
Heaped (m ³)	0.970
4. Unloaded weight (kg)	
(with fuel, oil and water)	1250
5. Payload (kg)	1500
6. Wheel base (mm)	1500
7. Wheel tread (mm)	
Front	1318
Rear	1295
8. Ground clearance (mm)	205
9. Minimum turning radius (m)	<4
10. Traveling speeds (km/hr)	
1 st gear	5.5
2 nd gear	11
3 rd gear	22
Reverse gear	4.8

B. Engine

(Refer to “Operation Manual for Diesel Engine” for further details)

1. Model	S 1100NM
2. Type	Horizontal, single cylinder, four stroke, condenser, electric start
3. Rated power for 12 hrs (HP)	15
4. Rated speed (rpm)	2200

C. Transmission

1. Clutch type	Single-disk, constant-contact, dry type
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2. Gearbox type	Gear transmission with 3 forward speeds and 1 reversed speed
3. Transmission ratio of gearbox	
1 st gear	3.97
2 nd gear	2.04
3.rd gear	1
Reverse gear	4.89
4. Propeller shaft	Open, universal-joint tube with needle bearing
5. Main drive	Spiral bevel gear
6. Transmission ratio of main drive	6.833
7. Differential	Bevel gear type
8. Axle shaft	Semifloating type
9 Brake	Drum type with mechanical control

D .Wheels and Steering System

1. Frame type	Channal beams welded
2. Front axle	Driving axle
3. Rear axle	Steering axle
4. Tyre sizes	
Front	7.50-16 (8 layers)
Rear	5.00-15
5. Tyre inflation pressure (kgf/cm ²)	
Front wheel	4.6
Rear wheel	2.5
6. Rear wheel alignment	
Toe-in (mm)	4-8
Kingpin inclination angle	6°
Camber angle	1°
7. Steering gear	Worm-and-double-roller type
8. Steering gear ratio (at medium position)	18.15
9. Steering trapezium	Front-mounted type

E. Hydraulic System

1. Model of pump	CBN-E306
2. Model of control valve	ZFS-L10CYT-0
3. Model of cylinder	SG1-E50x200
4. Working pressure (kg/cm ²)	140
5. Time to tip the skip (Sec.)	8

E. Electrical System

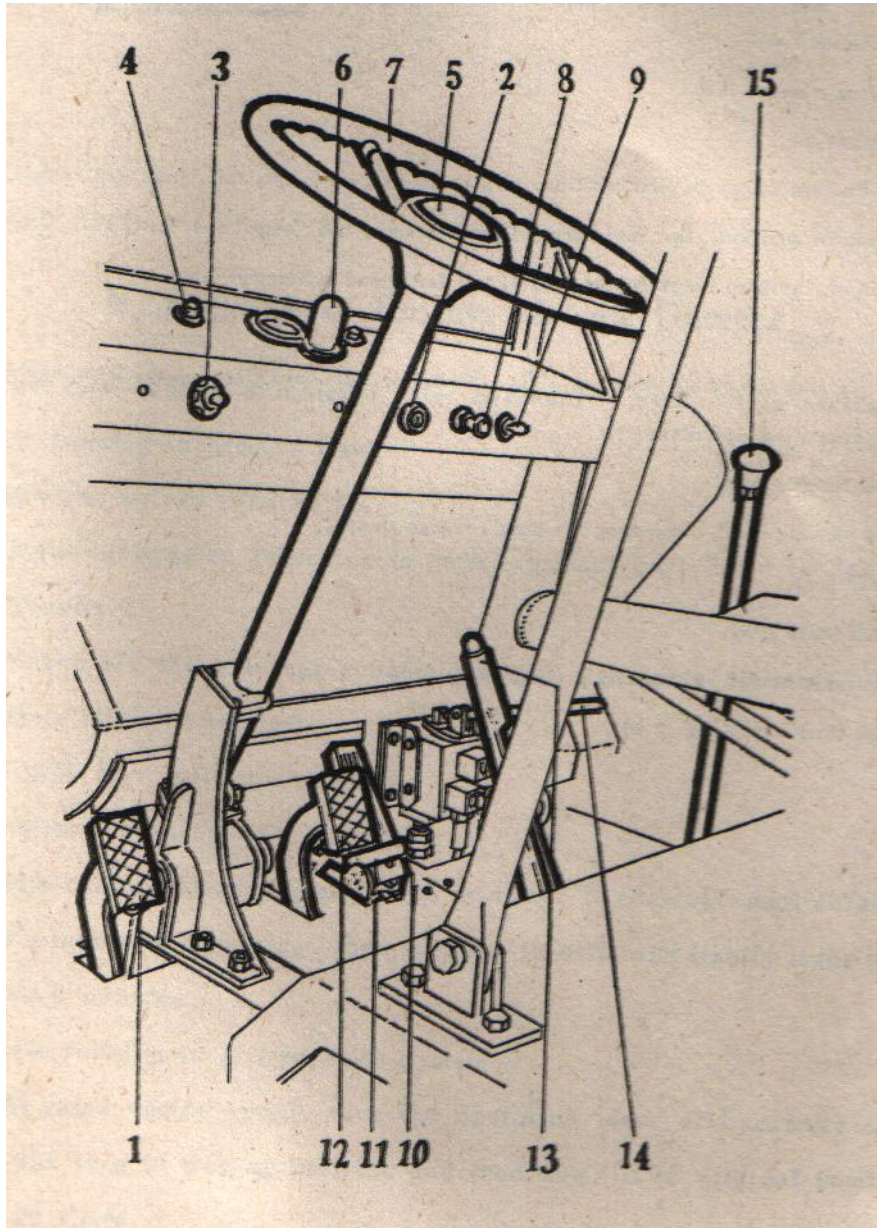
1. Earthed pole	Grounded positive pole
2. Line voltage (V)	12
3. Battery	
Model	6-Q-75, one cell
Voltage (V)	6
Capacity (a-h)	75
Level of electrolyte	10-15mm over plates
4. Dynamo	F-29B
Voltage (V)	12
Power (W)	150
5. Starter	2Q2AB
Voltage (V)	12
Power (HP)	2
6. Regulator	FT81D-13/12ZN/1
Adjustable voltage (V)	12.2-13.2
Adjustable current (a)	13.80-14.8
7. Lighting	Two head lamps, two front signal lamps, two turn signal lamps, two tail lamps, one instrument lamp

G. Main Injection Capacities (liter)

1. Fuel tank	16
2. Engine cooling system	18
3. Engine lubricating system	3.6
4. Air filter oil pan	0.2
5. Gearbox	1.16
6. Driving axle	2.3
7. Steering gear	0.26
8. Hydraulic tank	5

Chapter 2 Operation of Dumper

A. Controls and Instruments



1. Clutch pedal

Used for the control of clutch. Depressing the pedal, the clutch is disengaged.

2. Main switch

Insert the key into the switch and turn either or left for closing the circuit.

3. Start button

4. Turn signal lamps

5. Horn button

6. Instrument lamp

7. Steering wheel

8. Light switch 1

Pull the switch to first position, turn on two signal lamps, tail lamps and instrument lamp; to second position, the head lamps (lower beam), tail lamps and instrument lamp; to third position, the head lamps (upper beam), tail lamp and instrument lamp.

9. Light switch II.

Turning the switch to left or right, the left or right turn signal lamp, front signal lamp and tail lamp flash simultaneously.

10. Foot throttle pedal

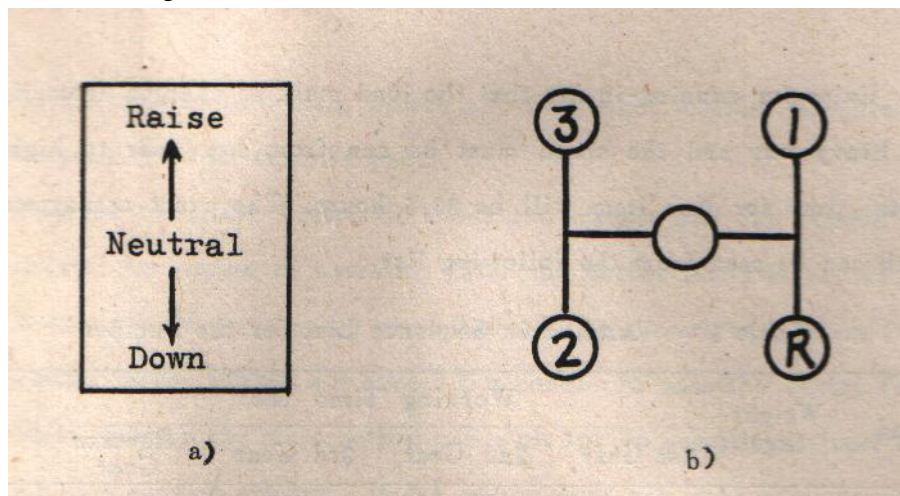
11. Stop throttle pedal: depressing the pedal, engine stopped.

12. Brake pedal

13. Hand brake lever.

14. Control lever for hydraulic skip (Fig.2 a)

15. Gear shift lever (Fig.2 b)



B. Running-in Process of New Dumper

Before new dumper or dumper after overhaul is used, it is necessary to carry out running-in process first.

1. Preparation before running-in:

- (1) Make lubrication according to each lubricant part listed in Table 3 of Chapter 6.
- (2) Check all the external connections and tightening elements. Tighten them, if it is necessary.
- (3) Check tyre inflation pressure.

2. Sequence of running-in:

- (1). Idle running-in of engine for 15 minutes. It controls small throttle for 5 minutes at beginning, then medium throttle and finally large throttle for 5 minutes.
- (2) Idle running-in of hydraulic system
At rated engine speed, turn the operation lever of hydraulic skip to raise the skip to tipping position and then down it to original position at least 20 times.

(3) Running-in under load

Rules for running-in are that the load must be charged from light one to heavy one and the speed must be run from low gear to high gear Total time for this item will be 30.5 hours. The exact arrangement for each can be seen from the following list:

Table 1 Running-in Sequence List for the Dumper.

Load	Weight (kg)	Working Time (hr)				Total (hr)
		1 st Gear	2 nd GAear	3 rd Gear	Reverse Gear	
No Load		1	1	1	0.5	3.5
1/2 Load	500	3	4	3		10
3/4 Load	750	5	6	6		17
Total (hr)		9	11	10	0.5	30.5

During running-in, observe and listen to the working conditions of engine transmission system, Wheels steering system and hydraulic system carefully, If any abnormal phenomenon is found, stop the dumper immediately and find the causes to remedy them.

3. Work after running-in:

- (1) Exhaust the lubricant in each body of transmission system and crankcase of engine when it is heat. Wash and clean them again.
- (2) Make lubricant according to Table 3 of Chapter 6.
- (3) Check all the parts of the dumper thoroughly. If it is necessary, carry out adjustment and remedies.

C. Operation

1. Starting of the engine

a. Preparations for starting the engine

- (1) Check the dumper according to the shift maintenance.
- (2) Set the gear shift lever to neutral position.

b. Normal starting

- (1) Insert the key into main switch and turn right to close the circuit.
- (2) Depress the foot throttle pedal.
- (3) Depress the start button to close the circuit and the starter motor drives the engine to operate. After the engine has started, the start button should be released immediately. The successive working time of starter motor should not exceed 5 seconds. In case the engine fails to start, release the start button and wait for 10 seconds at least before making another attempt. If the engine dose not start after three successive attempts, detect and dispel the trouble before re-starting.
- (4) Release the throttle pedal, run engine at idle speed for 3-5 minutes and then slowly increase the speed of engine gradually. The dumper should not be set going until the engine warms up.

c. Starting the engine in winter

- (1) Fill the cooling system with hot water of 60-80° C, if the engine dose not start, fill with hot water repeatedly.
- (2) Fill the crankcase with heated engine oil of 80° C.
- (3) In decompressing state, turn the crankshaft several rounds with starting handle.

- (4) Insert a rolled soft paper into the starting-aid plug. After the rolled paper has ignited, the plug is then screwed into the cylinder head to assist starting.
- (5) Insert the key into the main switch and turn right to start position.
- (6) Depress the clutch pedal. Disengage the clutch completely.
- (7) Depress the throttle pedal.
- (8) Pull up the decompressing lever and depress the start button. When starter motor drive the engine at higher speed, push down the decompressing lever immediately, and the engine will be started.
- (9) The dumper will not be set to drive before the engine has warmed up.
- d. Under special conditions the engine may be started by starting handle.(refer to “Starting” in “Operation Manual of Engine”).

2. Driving of the dumper

- (1) Depress the clutch pedal and shift to the required gear.
- (2) Push the horn button, pay attention to vicinity around.
- (3) Release the hand brake lever.
- (4) Remove foot slowly from the clutch pedal, at the same time increase the throttle setting progressively to set the dumper going smoothly.

3. Operation

- (1) Always set the dumper going with first gear, and change to second or third gear only after the dumper has speeded up. Never attempt to set it going with third gear, otherwise the friction plates of clutch may be burned due to overheating.
- (2) Disengaging of the clutch should be rapid and engaging of it should be smooth. After the clutch is entirely engaged, the foot should be removed from the pedal at once. When the dumper is running, never adopt the measure of half-engaging clutch to lower the speed.
- (3) In case of poor road surface (such as sand soil road after raining, or melted bituminous road), the driving should be shifted to low gear and violent acceleration has to be avoided as far as possible.
- (4) The dumper should be accelerated gradually and avoid depressing the throttle pedal down to bottom suddenly.
- (5) Never operate the dumper down a slope with high speed, and that it is strictly prohibited to fast coast down slopes in neutral gear with the dumper in gear and the clutch pedal disengaged. Avoid emergency braking, otherwise the danger of the dumper forward may be occurred.
- (6) When the dumper tips material at the edge of a trench, safety obstacles have to be placed. Off the trench 10 meters, the dumper should be slowed down to the safety obstacles for tipping, otherwise the dumper will run the risk of tipping itself into the trench..
- (7) Avoid constantly overloading of the engine.
- (8) In driving, attention should be paid now and then to observe if the meters and indicators as well as the operating condition and the sound produced by the engine and other components are normal. In case any of them is abnormal, stop the dumper right away to check and remove the troubles.

4. Stopping

a. Stopping of the dumper

- (1) Minimize the throttle to lower the speed of dumper.

- (2) Depress the clutch pedal, set the gear shift lever to neutral position.
- (3) Release the clutch pedal, let the engine run idle at low speed.
- (4) The dumper should be braked with hand brake lever when stopping on slope or uneven road to assure a steady parking.

b. Stopping of the engine

- (1) After unloading, let the engine run idle for a while to lower the temperature of oil and water. Never stop the engine at high temperature.
- (2) Depress the stop throttle pedal to cut off the oil supply for stopping the engine

Notes:

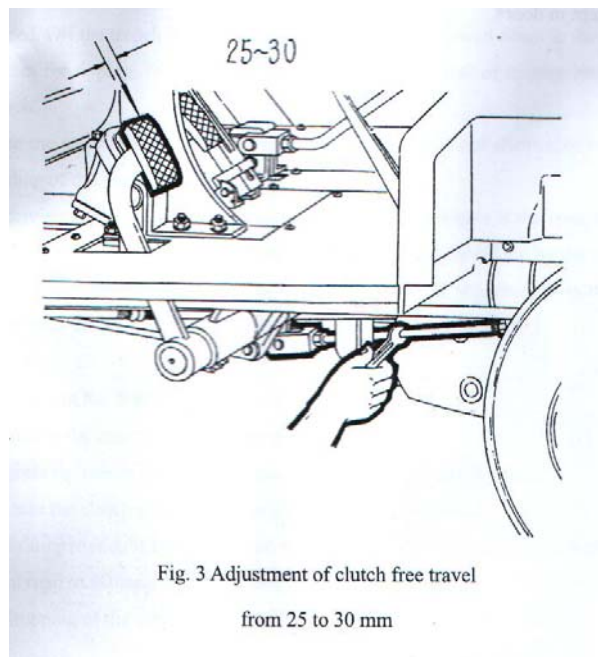
- (1) If a dumper is to be put out of service in winter, the cooling water must be drained out completely to prevent subsequent cracking of radiator and cylinder due to freezing.
- (2) If the dumper is to be put out of service for a long period, connecting wire of the battery should be taken off. In cold winter, the battery should be taken down and kept within doors.

Chapter 3 Adjustment of Dumper

A. Adjustment of Clutch

1. Adjustment of free travel of the clutch pedal

In order to ensure no slip occurred in clutch when power is transmitted, a definite clearance between throw-out bearing and throw-out lever should be kept. This clearance responds to 25-30 mm free travel of the clutch pedal. In the process of operation, due to the wear of friction plate, the clearance between throw-out bearing and throw-out lever will be diminished or vanished, therefore free travel of the clutch pedal has to be checked and adjusted periodically.



Adjustment clutch free travel is realized by altering the length of the clutch pull rod. By

lengthening the clutch pull rod, the free travel of clutch pedal will be decreased and vice versa.

2. Adjustment of the position of clutch throw-out lever

On mounting clutch it has to be assured that the distance between lateral surface of clutch throw-out lever head to the contact surface of driving plate and friction plate is 54mm. The lateral surface of three clutch throw-out lever heads should be in the same plane and their deviations less than 0.15mm, which can be adjusted by rotating the adjusting nut of lever (Fig.4). After adjusting, punch such two burrs. That they can just be inserted into the notch of adjusting bolt of lever to prevent loosening

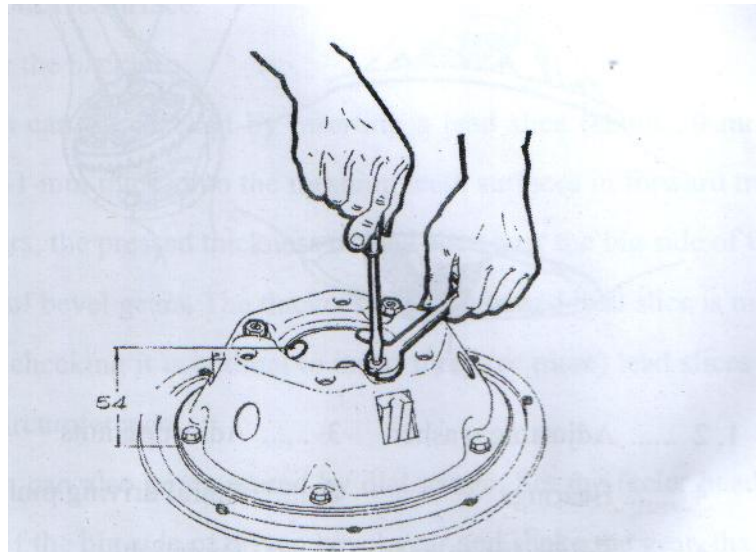


Fig. 4 Adjustment of position of clutch throw-out lever

B. Adjustment of Main Drive

B. Adjustment of Main Drive

The main drive (consisting of a pair of bevel gears, a speed down mechanism of the dumper) transmits large torque in operation. In order to ensure its reliable work, the mounted spiral driven gear must be matched in pair and should not be interchanged.

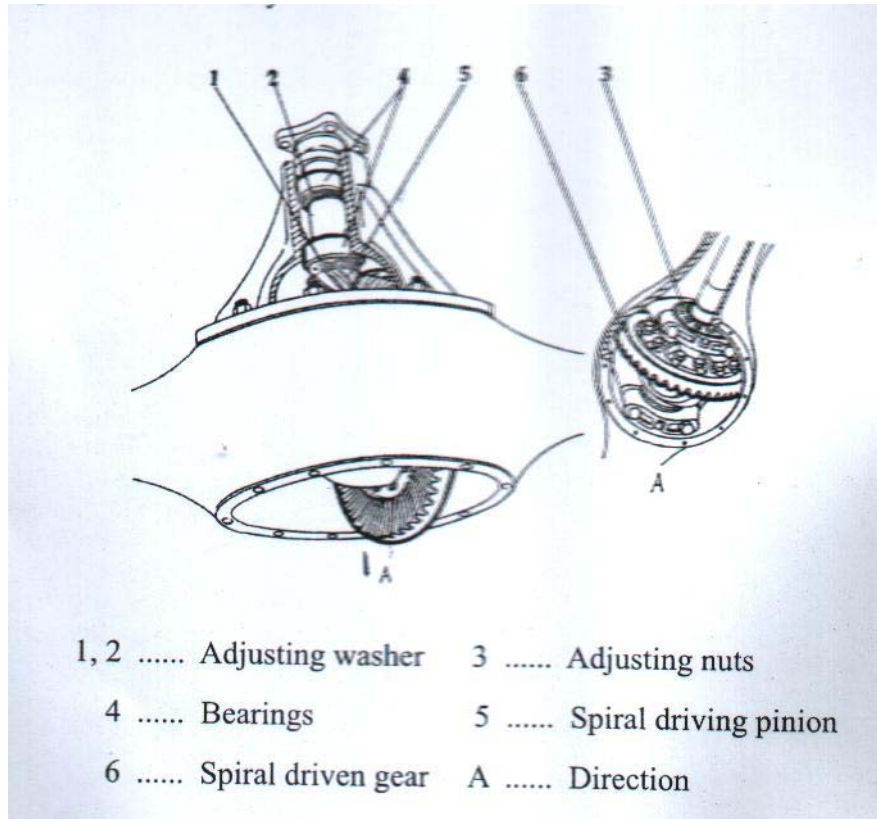
1. Mounting and adjusting of the spiral bevel driving pinion

When mounting the spiral bevel driving pinion, its two supporting conical bearings should be adjusted with adjusting washer 2. Increase the thickness of washer, the axial clearance of bearing will be increased. On the contrary, decrease the thickness of washer, the axial clearance will be decreased. It is required to adjust the axial clearance of two conical bearings to zero, i.e. there will be no axial clearance and the bearings will rotate freely.

2. Checking and adjusting of the backlash and impression area

In order to ensure the correct meshing of spiral driving pinion and driven gear, backlash and impression area of spiral driving pinion should be adjusted. The impression area of spiral driving pinion should be slightly deviated from the middle of the tooth surface to the tip with a length of impression area not less than 40% of tooth height of impression area not less than 40% of tooth

height. The correct backlash is 0.15-0.3mm It can be adjusted by adjusting washer 1 on spiral bevel pinion and adjusting nuts 3 of conical bearings on both ends of differential housing.



(1) Checking the impression area

The impression area can be checked by the method of color painting. In checking, cover a layer of red lead paint on the spiral driven bevel gear and rotate the gears. The print stucked on the spiral driving pinion is then the impression area.

When the dumper goes forward, the concave surface of the teeth of driving bevel pinion bears the. Therefore the red lead paint should be spread on the convex surface of the spiral driven bevel gear. When the dumper goes backward, the convex surface bears the force, therefore, on the contrary the red lead paint should be covered on the concave surface.

(2) Checking the backlash

Backlash can be checked by inserting a lead slice (about 50mm long, 5mm wide and 0.5-1mm thick) into the meshing teeth surface in forward traveling. After rotate the gears, the pressed thickness of lead slice near the big side of the teeth is just the backlash of bevel gears. The thickness of the pressed lead slice is measured with a calibrater. In checking it is optimal to insert three (or more) lead slice evenly spaced on the gear circumference.

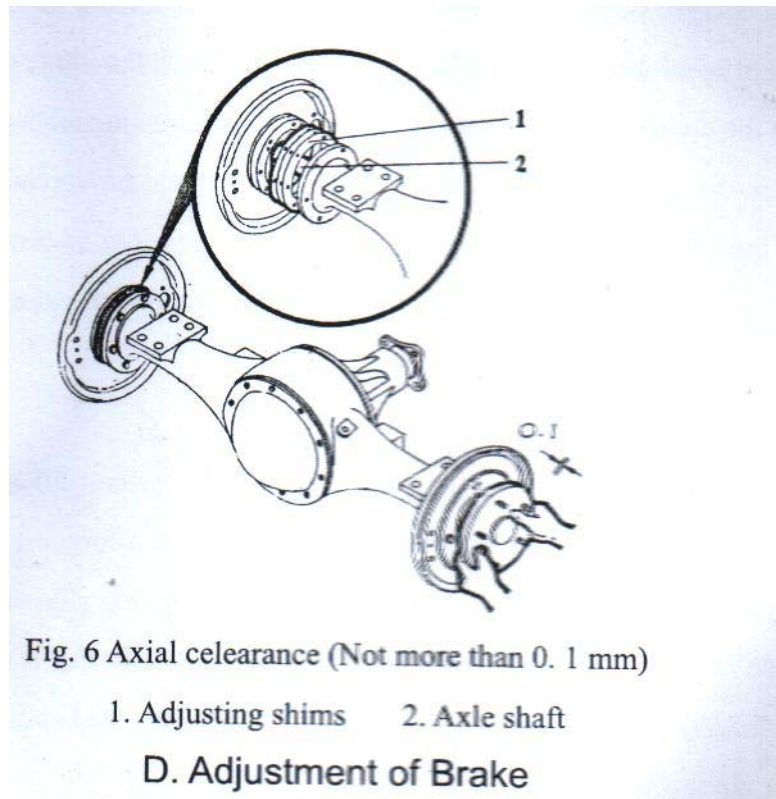
Backlash can also be measured by dial gauge. Set the feeler head of dial gauge on the front of the big side of driven bevel gear and shake the gear, the value of backlash can be read off.

C. Adjustment of Axial Clearance of Axle Shaft (Fig. 6)

During assembling the axle shaft, not more than 0.1mm axial clearance is to be required for Ensuring the normal work of the axle shaft. It is adjusted by means of increasing or decreasing the thickness of the adjusting shims 1 (Fig. 6). When decreasing the thickness of the shims, the

axial clearance of the axle shaft will be correspondingly decreased, and vice versa. During adjusting, the number of shims on both ends should be ensured to be equal, the difference of their thickness should be not more than 0.5mm.

The axial clearance of the axle shaft can be measured either by micrometer or by depth gauge.



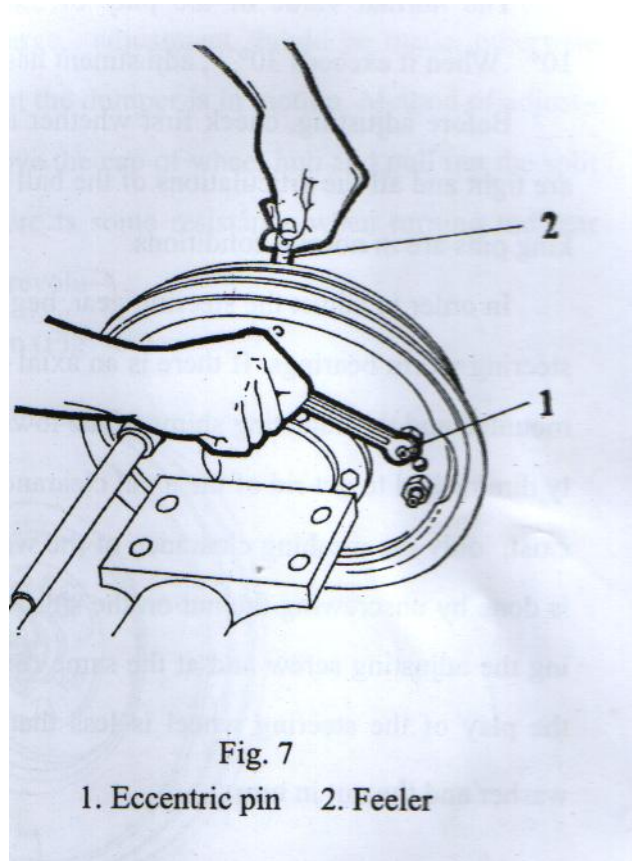
D. Adjustment of Brake

1, Adjustment of clearance between brake shoes and brake drum.

When the brake shoes are at the original release position, a proper clearance between the drum and the friction linings of the shoes should be kept. Too small a clearance will not be liable to ensure the full releasing of the brake. An excessive large clearance will result in so big a play of the pedal that the driving operation becomes inconvenient

The normal clearance should be kept in a range of 0.2-0.5mm. When adjusting, loosen the locking nut and turn the eccentric pin 1. The adjustment is performed by use of varying the eccentricity of the eccentric pin.

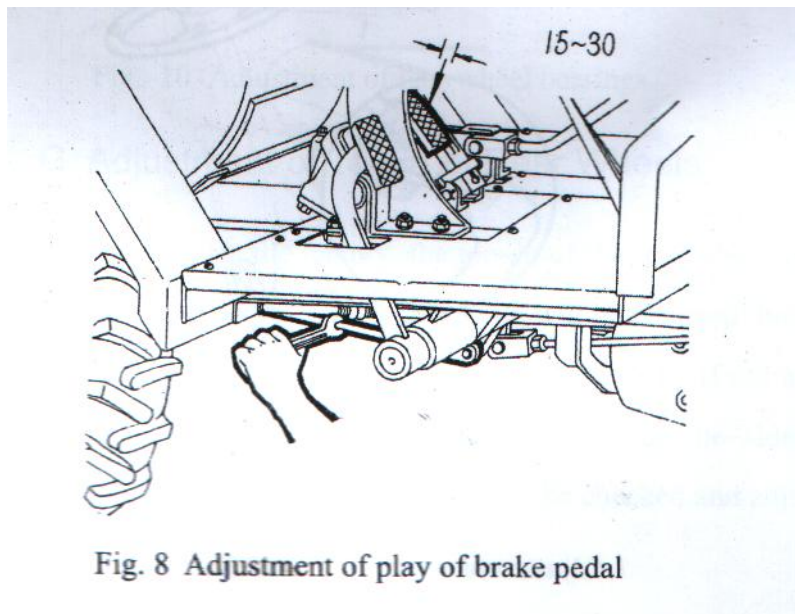
For the measurement, insert feeler 2 through a long hole on the side of the brake drum (Fig.7) After adjusting, lock the nut.



2. Adjustment of play of brake pedal:

As the friction of the brake wear down, the play of the brake pedal will increase to such a degree as to cause the braking less efficient. The normal play of the pedal should be adjusted to the range of 15-30mm.

The adjustment of play is performed by changing the length of pull rod of the brake pedal. By shortening the pull rod, the play will be decreased. When elongating, the play will be increased (Fig. 8)

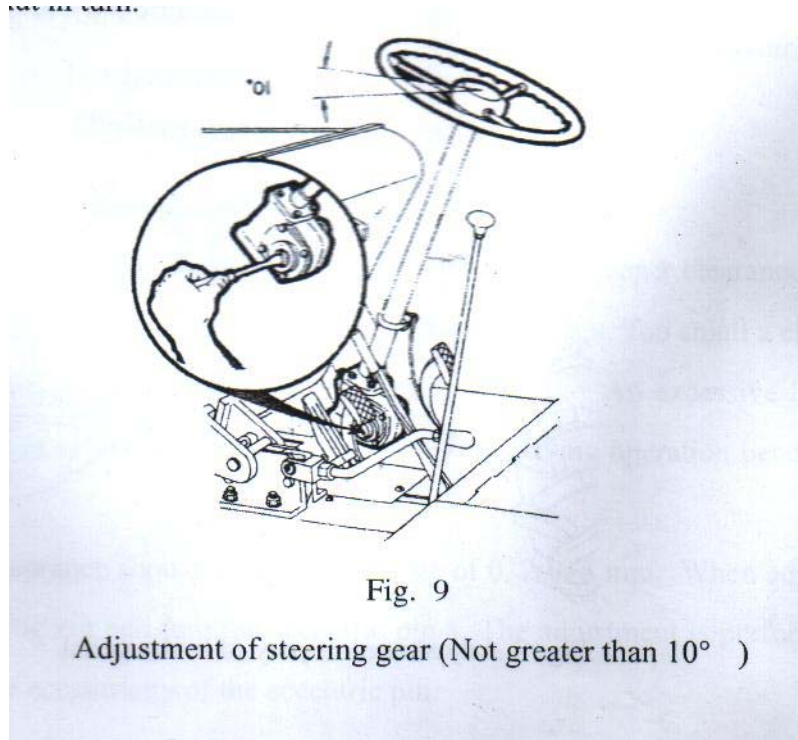


E. Adjustment of Steering Gear

The normal value of the play of steering wheel should be not greater than 10° . When it exceeds 30° , adjustment has to be made.

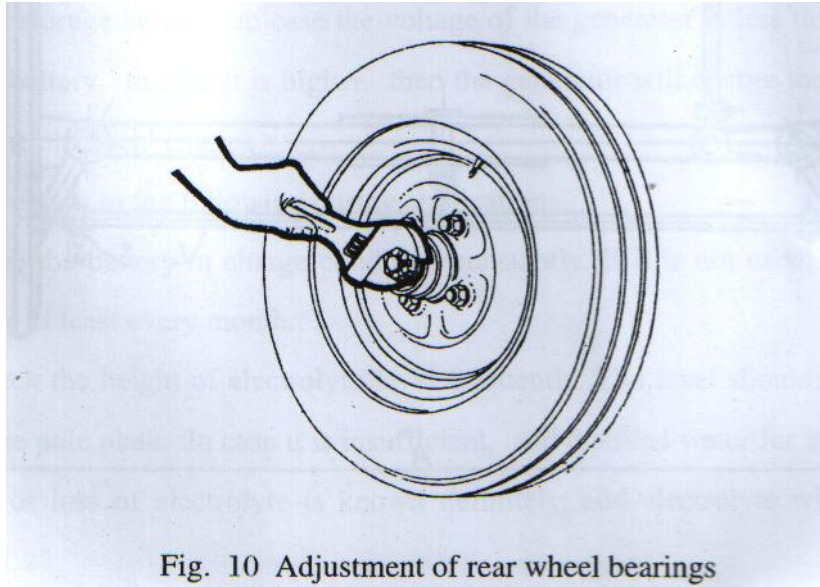
Before adjusting, check first whether all the bolts for securing the steering gear are tight and all the articulations of the ball and socket joints and the steering knuckle king pins are in normal conditions.

In order to adjust the steering gear, begin with checking the axial clearance of the steering worm bearings. If there is an axial clearance, the steering gear should be dismantled and the adjusting shims of the lower end of steering gear housing properly diminished to get rid of the axial clearance of the worm. If axial clearance does not exist, only the meshing clearance of the worm and the roller has to be adjusted. This is done by unscrewing the nut on the side cover, getting out the locking washer, turning the adjusting screw and at the same time trying to turn the steering wheel, until the play of the steering wheel is less than 10° (Fig9) Then put on the locking washer and the nut in turn.



F. Adjustment of Bearings of Rear Wheels

The axial clearance of the rear wheel bearings are generally in the range of 0.05-0.2mm. In case it is excessive large, adjustment should be made. Otherwise swing of the rear wheel will occur, when the dumper is in motion. Method of adjustment: First jack up the rear wheel, remove the cap of wheel hub and pull out the split pin. Tighten the adjusting nut until there is some resistance when turning the rear wheel. Unscrew the nut back $1/30$ - $1/8$ revolution again. Then replace the split pin (Fig 10)



G. Adjustment of Toe-in of Rear Wheels

G. Adjustment of Toe-in of Rear Wheels

When a new dumper leaves the factory, the toe-in of the rear wheels is ensured to be a range 4-8mm. During operation, the toe-in will be changed due to deformation and wear of the parts of steering mechanism and rear axle. If not adjusted in time, it will result in inconvenience of steering and increasing the one-sided wear on the surface of the rear tyres. Therefore, the toe-in must be checked and adjusted regularly.

Method of adjustment: Park the dumper on the even ground and set it in the rectilinear position. Loosen the bolts 2. adjust the length of the tie rod 1 so as to make the backward wheel tread A of the rear wheel is 5-7mm more than the forward wheel tread B. Then tighten the bolts 2 (Fig, 11)

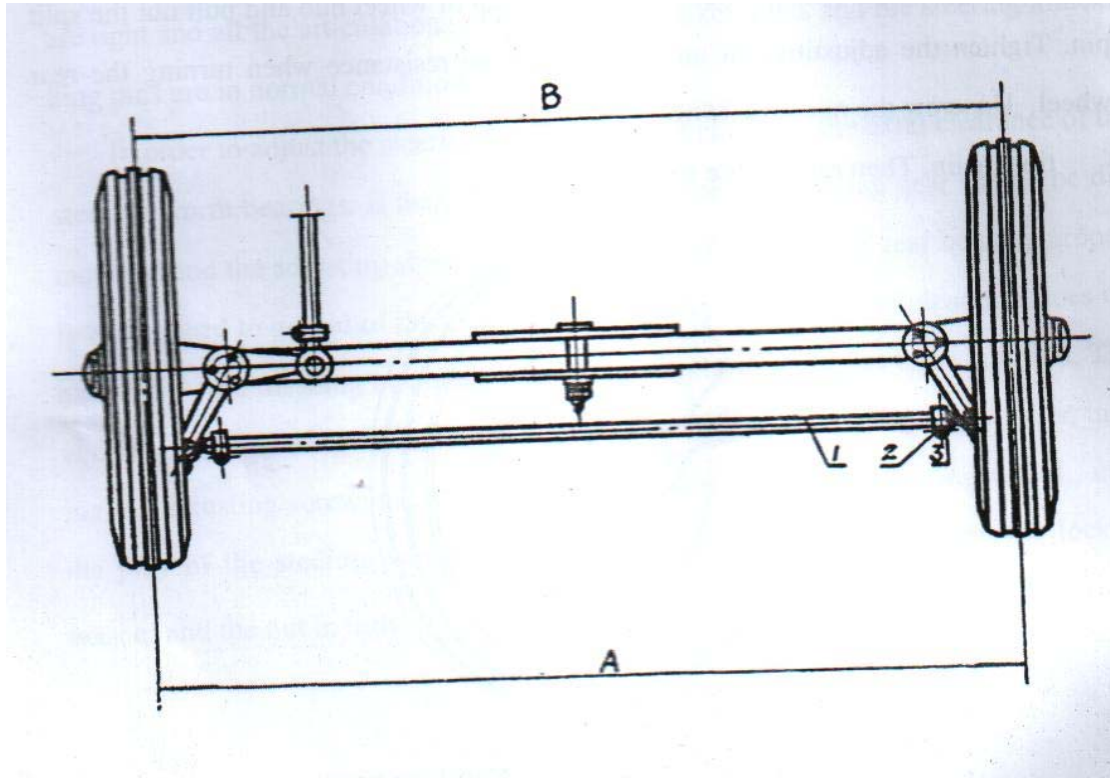


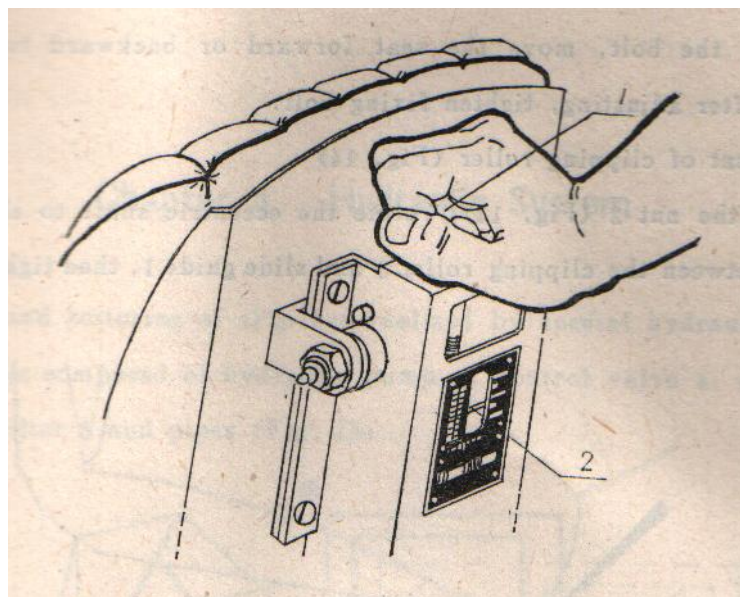
Fig. 11 Adjustment of toe-in

$$A - B = 5 - 7 \text{ mm}$$

1. Tie rod 2. Bolts 3. Clampers

H. Adjustment of Seat

1. Adjustment of seat according to the weight of driver (Fig. 12)

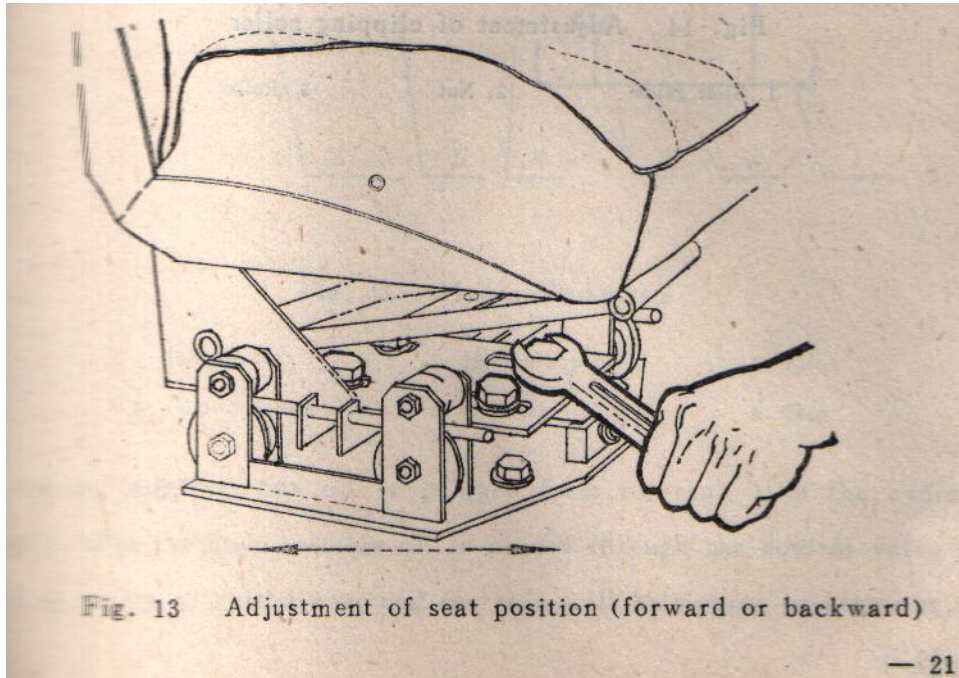


1. Handle

2. Indicator

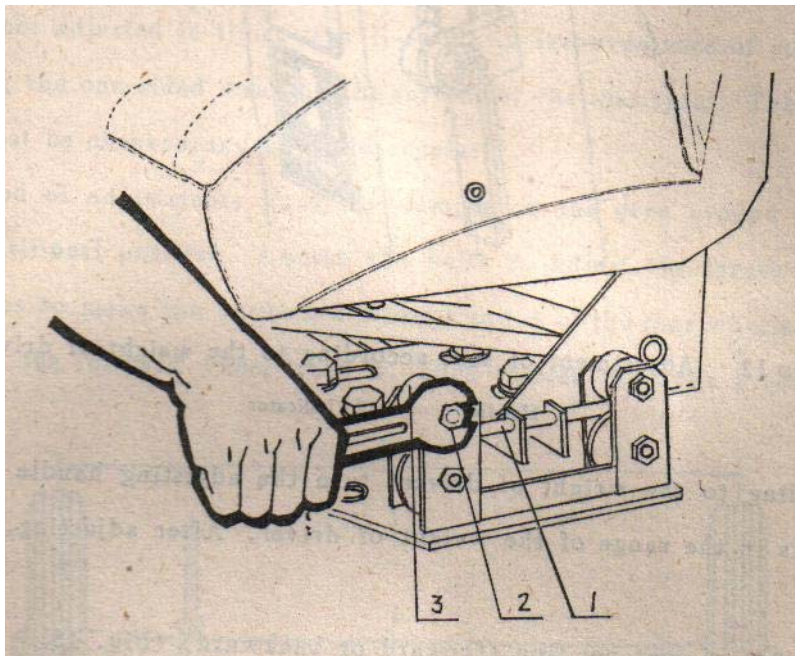
According to the weight of driver, turn the adjusting handle until the indicator is in the range of the weight of driver. After adjusting, lock the nut.

2..Adjustment of seat position (forward or backward) (Fig.13)



Loosing the bolt, move the seat forward or backward to a suitable position. After adjusting, tighten fixing bolt.

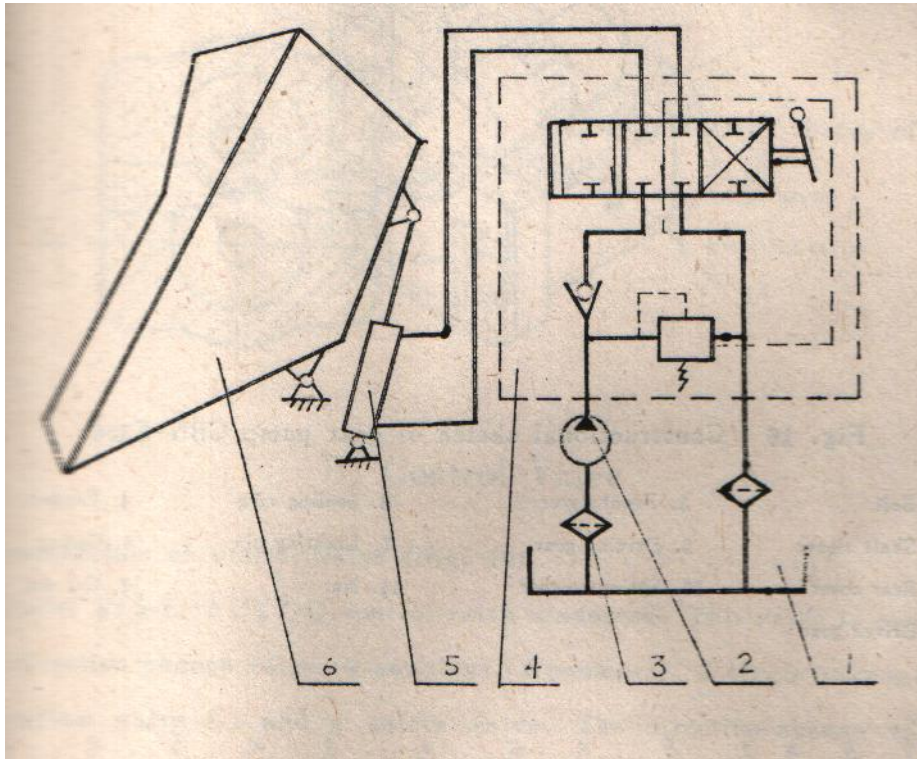
3. Adjustment of clipping roller (Fig14)



Loosen the nut 2 (Fig14), rotate the eccentric shaft to eliminate the clearance between the clipping roller 3 and slide guide 1, then tighten the nut.

Chapter 4 Hydraulic System

Tipping and restoring of skip are realized by special hydraulic system. This system is composed of hydraulic pump 2, control valve 4, cylinder 5, oil tank 1, filter 3 and pipes (Fig15)



During working, the oil is pumped from oil tank 1 to the hydraulic pump 2, then the high pressure oil is passed through the control valve 4 to working cavity of cylinder 5, and the skip will be tipping or restoring.

A. Pump

1. Construction of pump

Series-3 gear pump is adopted. Model: CBN-E 306. Displacement: 6mil/rev. Its construction is as shown in Fig 16 and Fig 17

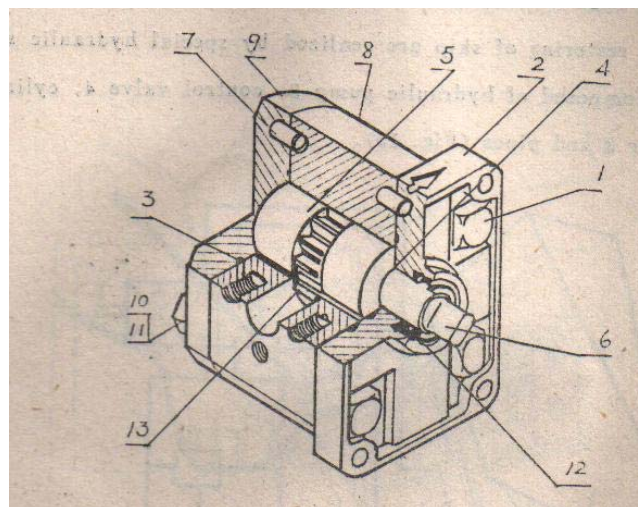
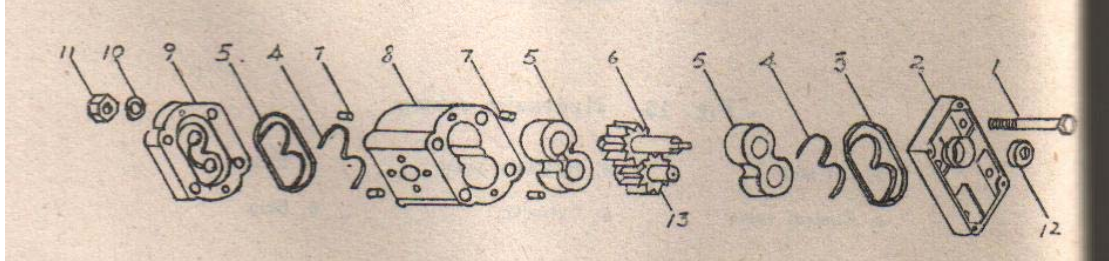


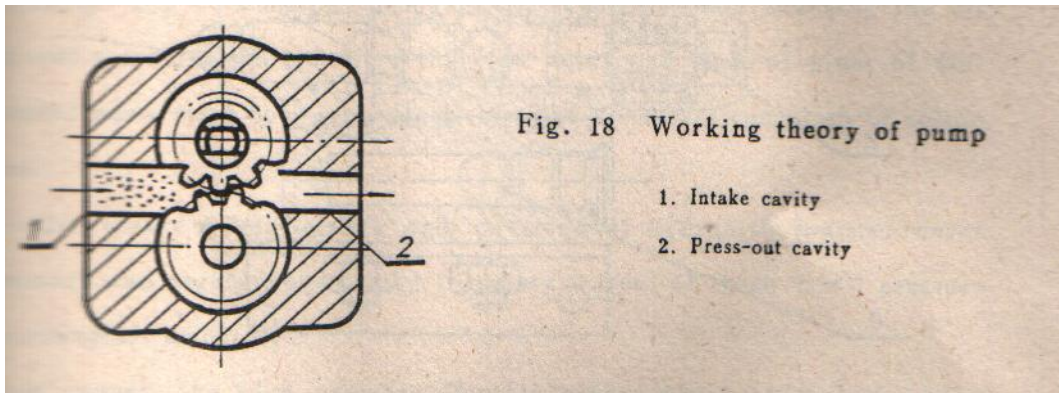
Fig 16. Constructional Sketch of gear Pump CBN-E306

- | | | | |
|-----------------|------------------|----------------|-------------|
| 1.Bolt | 2. Front Cover | 3.Sealing Ring | 4.Fender |
| 5.Shaft Sleeve | 6.Driving Gear | 7.Locating Pin | 8.Casing |
| 9.Rear Cover | 10.Spring Washer | 11.Nut | 12.Oil Seal |
| 13.Driven Gear. | | | |



2. Working theory of gear pump.

During the gear pump is working, the driving gear drives the driven gear to rotate. When each pair of meshing gear teeth demeshes from intake cavity, its volume is increased and vacuum in it is formed.. Therefore, under the air pressure the oil in tank passing through the pipe flows to the intake cavity and fills up the hollow space of gear teeth, then it is brought to the pressout cavity. The high pressure oil in the press-out cavity will be pressed out to the pipe during the gear teeth are entered in mesh.

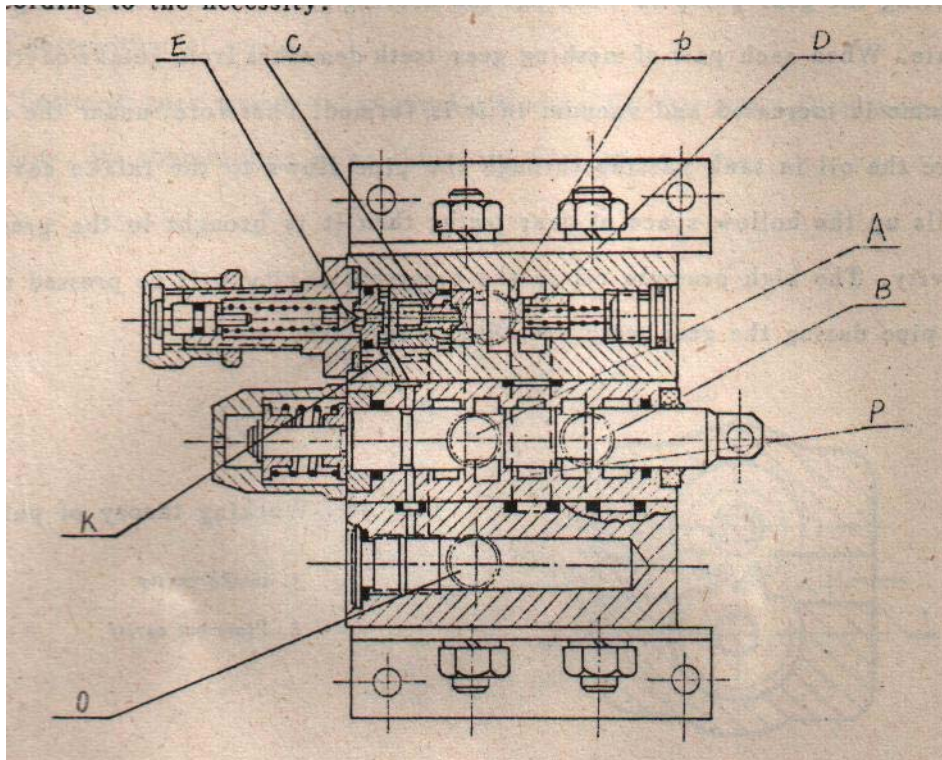


B Control Valve

1. Construction of control valve (Fig. 19)

Model ZFS-L10 CYT-O control valve is adopted. This valve is composed of a direction-change valve C, and a safety valve. The direction-change valve is controlled by a lever and 3 positions (tipping, neutral and restoring) can be obtained. When the oil pressure in the hydraulic system is over 140kg/cm², the safety valve E will be opened automatically to avoid overload of system.

3. Working theory of control valve (Fig.19)



The oil from pump passes through the inlet p of control valve, pushes the single pass valve D open, and then flows to the cavity P of direction-change valve. Operating the lever of direction-change valve, the valve will move to left or to right, and the oil will flow to the working cavity A or B according to the necessity.

When the valve is in neutral position, the ring shape groove on the left end of the valve, the small hole on the left side of valve casing and the inclined hole K of overflow valve construct a passage, therefore the oil in inlet p can flow to the damping hole in core of overflow valve. This moment a pressure difference in front and behind of the hole is formed, and the overflow valve will opened. The oil will pass through the return valve O and flow back to the oil tank. Therefore, the hydraulic system is unloaded in neutral position.

C. Cylinder

SG1-E50x200E-E double action oil cylinder is adopted. Two cylinders are connected parallel. Diameter of piston is 50mm, its stroke is 200mm

D. Notice to Operating the Hydraulic System

In hydraulic system, some main parts are precise, therefore correctly to use and to maintain them are important measures to ensure their working performance and prolong their service life.

1. Inject hydraulic oil according to the stipulation strictly.
2. Check the oil leakage in every hydraulic part constantly. The oil temperature must be in the range of 50-80° .
3. In general, don't dismantle the hydraulic system. When changing the oil

seal and removing the troubles, the pipe joints and ends of pipes of dismantled parts must be wrapped and blocked up with clean cloth or cotton yarn.

4. In order to avoid impropriety and overload of hydraulic system, never dismount and regulate the spring in safety valve, if there isn't pressure inspecting instrument.
5. When connect the high pressure flexible pipes, never twist and scrape them, never touch them with combustible materials. Must keep their surface clean.
6. In order to avoid the skip tipped never operating the lever of control valve when the dumper is in transporting condition

Chapter 5 Electrical System

D. C 12V (positive pole to be grounded) electrical system is adopted

A. Storage Battery

Two storage batteries with type 3-Q-70 are used in series to make 12 volts. Its function is to supply electricity to starter, when the engine is started when the engine is running at normal condition, power will be supplied to electrical equipment from storage battery, in case the voltage of the generator is less than the voltage of the battery. In case it is higher, then the generator will charge the battery to reserve some electrical energy.

Pay attention to the following during application:

1. Keep the battery in charge condition constantly. If it is not used, charge the battery once at least every month.
2. Check the height of electrolyte level frequently. The level should be 10-15mm over the pole plate. In case it is insufficient, add distilled water for supplement. If leakage or loss of electrolyte is known definitely, add electrolyte with specific gravity of 1.28.
3. Check whether vent hole of battery is blocked or not constantly. Remove soil and dirt attached on the external surface clean away overflow electrolyte and coat with thin layer of calcium base grease on electrical pole to prevent from corrosion.
4. Do not use starter excessively.
5. Mounting of battery should be firm to avoid damage due to shock.

B. Generator and Regulator

1. Direct current generator:

On the generator there are written words, which are marked as "ARMATURE" and "FIELD" for two posts and as "EARTH" for earthing bolt. They should be connected with posts of relay regulator on which it will be marked with the same letters as before, likewise it is suitable for "EARTH" bolt.

Pulley of generator is driven by pulley of engine through B-belt. Two ends of generator are fixed on the frame of generator by bolts, and the other brace on generator is used to adjust the

tension of V-belt. Suitable tension of V-belt of generator will be as follows: When press down the belt with force of 3-5kg at middle part of belt, the sag should be 10-15mm.

2. Relay regulator:

Relay regulator consists of cutter, voltage regulator and current limiter.

On the relay regulator there are three posts marked as “ARMATURE”, “FIELD” and “CELL” and one earthing bolt. “ARMATURE” and “FIELD” posts and earthing bolt at lateral side of base of relay regulator should be connected with the corresponding posts and bolt on generator. “CELL” post is connected with “—” sign post of ammeter, while “+” sign post of ammeter is connected with negative pole of battery.

If abnormal work of regulator is found or after the dumper has been running for 1000 hours, it should be adjusted by the skilled electrician

C. Starter

Type of starter is 2QAB, 12V, 2HP. Starter is used to start the engine with the power supplied from battery. The displacement of gear of starter is actuated in electromagnetic form and the starter has unidirectional roller type clutch which can prevent the armature of starter from damage along with high speed revolution of engine after starting.

D. The Others.

1. Fuse box

When some troubles as overcurrent, etc, are occurred in the electrical circuit, fuses can be melted automatically so as to ensure safety in work of electrical equipments.

There are five grades of fuses in the general assembly of BX503 fuse box application and working current of each grade are shown in the following list:

Table 2

Grades	1	2	3	4	5
Application	General fuse	Electrical circuit for charging	Head lamp, tail lamp	Steering signal lamp	Brake lamp, horn
Working current (A)	30	20	6	6	10

If any abnormal condition is found in electrical circuit, check the corresponding fuse box immediately whether it is broken or not. According to the grade of fuse which is found to be broken, check the elements which have been protected. After the trouble is remedied, pull out the fuse plate, move away the moving installed head, take down spare fuse about 60mm from up end of fuse plate and wind up the fuse tightly in the static installed head. Then move back the moving installed head and insert the fuse plate into original position of fuse box again.

2. Ammeter

Ammeter is used to indicate whether the battery is charged or discharged, When the battery is charged by the generator, the indicator deviates toward “+” ;on the contrary, toward “-” and zero indication expresses no current in the battery.

3. Electrical lock:

Electrical lock controls the overall electrical system. After inserting the key into lock hole, all the power supplies of electrical equipments are switched on, when the key is turned to right side. On the contrary, when the key is turned left side, the same supplies as before are switched on except the starter. In order to protect the starter, it requires that key of electrical lock must be turned to left side immediately, after the engine is started.

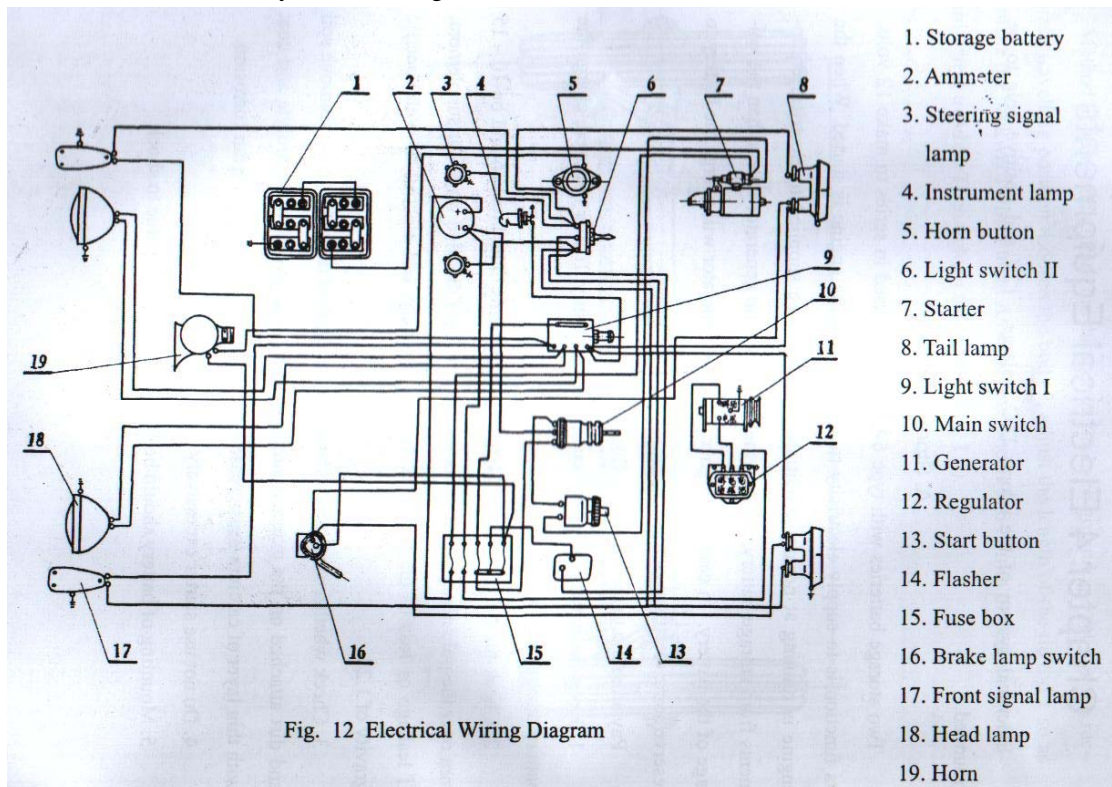


Fig. 12 Electrical Wiring Diagram

Chapter 6 Maintenance of Dumper

A. Oil, fuel and Water to be Used for Dumper

1. Lubricants to be used for all parts of the dumper should correspond with the requirements of Table 3, For the gearbox, driving axle and steering gear assemblies, the replenished lubricant should level up to the height of the cone screw hole on the housing side (on the side of gearbox and the front of driving axle housing cover) or the replenishing lubricant hole (on the front of steering gear)

For renewal of the lubricant of above-mentioned assemblies, it must be made at once before the temperature of the parts does not yet start to drop, after the dumper is stopped.

Lubrication of the engine is to be proceeded in accordance with the prescription on the specification of the engine.

2. Points to be observed in the use of fuel:

Strict use of the cleanest diesel oil is the foremost factor to prevent the engine from troubles. Clean diesel oil will reduce the wearing between the fitting surfaces of the fuel injection pump and nozzle, and thus ensure the normal work of the mechanisms. Therefore, in the use of fuel, following points have to be observed:

- (1). The staining with dirt of the diesel oil can be hardly avoided after several transportation.
Diesel oil has to be precipitated for more than 48 hours before use
- (2) Felt, gauze or old cotton cloth are not allowed to be used to wipe utensils for holding fuel as well as all the connecting pipe nipples.
- (3) Fuel has to be filtered strictly before put into use.

3. Cooling water

Clean soft water such as rain water, running water and river water should be used for cooling. Water out of well and fountain containing rather more impurities can not be used for the sake of avoiding the increase of the water scale.

B. Maintenance of Dumper

The dumper should be checked and maintained at regular intervals. According to intervals of operation, maintenance is classified into grades as follows:

1. Shift maintenance: once after every 8-10 hours of operation.
2. First grade maintenance: once after 50 hours of operation.
3. Second grade maintenance : once after every 200 hours of operation.
4. Third grade maintenance : once after every 600 hours of operation.

Job in each grade will be stated respectively as follows:

1. Shift maintenance

- (1) Clean the body and the chassis
- (2) Check water level in radiator. Refill if necessary.
- (3) Check fuel level in tank. Refill if necessary.
- (4) Check oil level in oil pump of engine. Fill to level of medium mark on dipstick if necessary.
(After engine was stopped 30min.)
- (5) Check and remedy any leakage of gas, water and oil or fuel at various junctions.
- (6) Check inflation pressure of tyres.
- (7) Check and tighten main clamping bolts and nuts, particularly those for propeller shafts, front and rear axles (U-bolt), steering linkage, brake linkage, wheels, cylinder, steering arm, etc.
- (8) Check whether driver's tool kit are complete.
- (9) In case of operating a dumper in more dusty atmosphere, it is necessary to clean the air filter.
When the environmental air condition is comparatively clean, cleaning of the air filter and change of oil in accordance with first grade maintenance.

2. First grade maintenance

- (1) Finish shift maintenance

- (2) Check and adjust suitable tension of V-belt of generator.
- (3) Clean the filtering screen in the fuel tank
- (4) Check the level of electrolyte in the storage battery, Fill up with distilled water if necessary.

At the same time, check whether the vent plug of storage battery is breathing.

(5) Lubricate according to Table 3.

3. Second grade maintenance

- (1) Finish first grade maintenance.
- (2) Check valve clearance, Adjust them if necessary.
- (3) Wash oil pump and oil strainer of the engine, and renew oil in the oil pump.
- (4) Screw of the screw plug from the crankshaft. Clean the cavity of the crankpin and two oil passages in the crankshaft with fresh fuel.
- (5) Clean the filter cartridge of fuel filter with clean fuel. Replace the filter cartridge if it is worn.
- (6) Renew grease in the rear wheel hubs. Check the rear wheel bearings to keep optimum clearance.
- (7) Lubricate according to Table 3.

4. Third grade maintenance

- (1) Finish second grade maintenance.
- (2) Clean the fuel tank.
- (3) Dismantle the cylinder head. Remove carbon deposit on the cylinder head and the piston top, and clean them. Check the valve tightness. Lap the valves together with the valve seats if necessary.
- (4) Check the clamping and locking of the connecting rod bolts.
- (5) Wash the cooling water passage as follows: pour into the water passage a solution of 25% hydrochloric acid (HCl), keep it for 10 minutes or so and then wash down with fresh water, Repeat again if not thoroughly cleaned.

Note: the radiator must be removed from the engine before cleaning.

- (6) Check the free travel of the steering wheel. Adjust it if necessary.
- (7) Check and adjust the brakes.
- (8) Check the free travel of clutch pedal. Adjust it if necessary.
- (9) Check and adjust the rear wheel toe-in.
- (10) Check and adjust the tightness of the driving and driven bevel gear bearing as well as the axial play of axle shafts.
- (11) Renew gear oil in the gearbox, the driving axle and the steering gear.
- (12) Renew grease in the driving wheel bearings. Lubricate according to Table 3.
- (13) Wash tank, intake filter and return filter of hydraulic system.
- (14) Wash outer surface of the storage battery with lukewarm water and clean it. Check the battery voltage and the specific gravity of electrolyte. If the battery is found abnormal discharging, it should be repaired at once and charged with external power source
- (15) Inspect the contact faces of carbon brushes on the dynamo. Correct or replace them if necessary.
- (16) After all maintenances and adjustments on the whole dumper are done, make short-time run-in to check whether all control mechanisms function properly.

Table 3 Lubrication chart

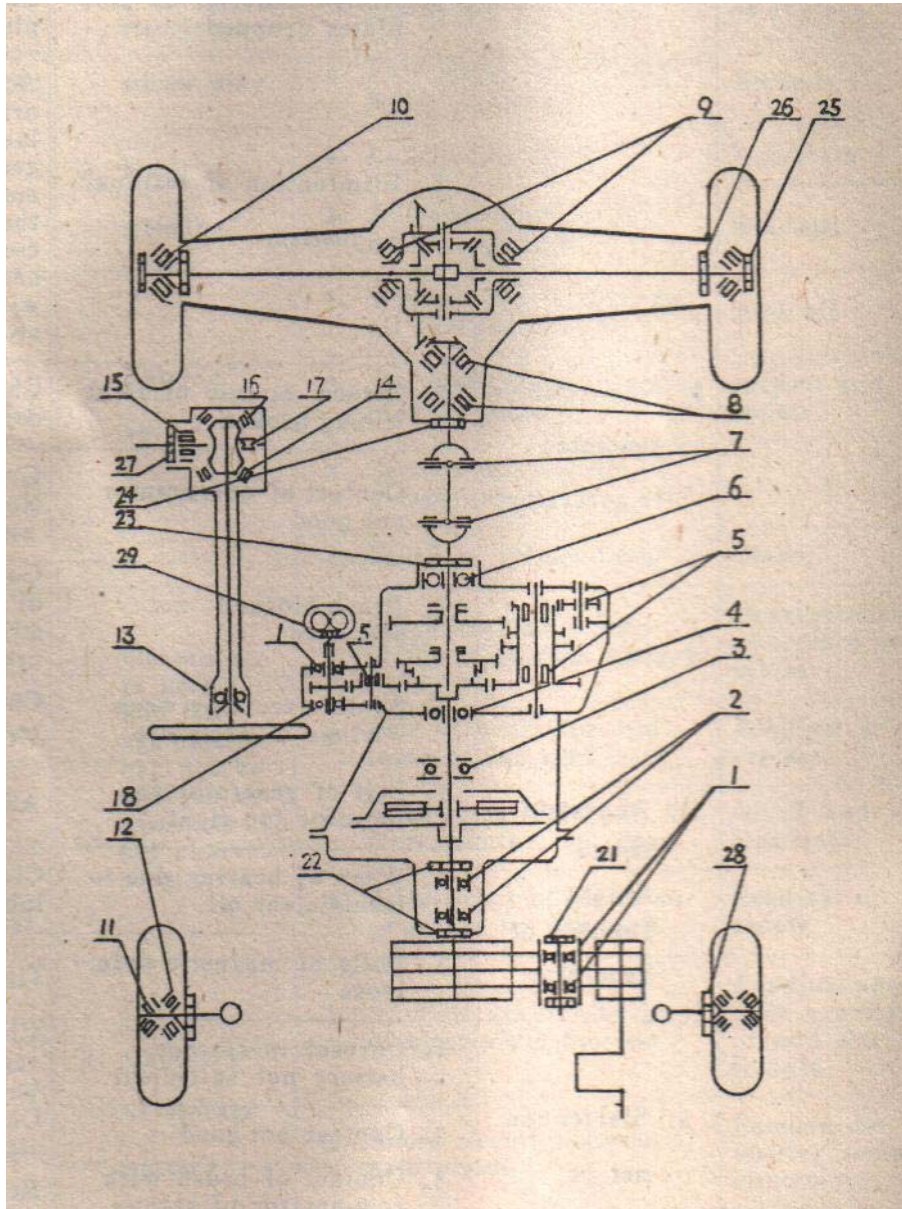
Item No.	Lubrication Spot	Point of Lubrication	Qty	Lubricant	Interval of lubrication (hr)
1	Belt tensioner& its pivot	Grease nipple	2	Bearing oil No. 3	600
2	Bearing in clutch cover	„	1	Calcium base grease	600
3	Steering ball joint	„	4	„	50
4	Clutch release fork shaft	„	2	„	50
5	Steering knuckle king pin	„	4	„	50
6	Brake pedal shaft	„	1	„	50
7	Medium lever pivot support of brake	„	2	„	200
8	Pedal shaft seat	„	1	„	50
9	Front wheel bearing	„	2	„	600
10	Fixed pin of cylinder	Grease nipple	4	„	50
11	Gearbox	Filler plug	1	Summer gear oil used in summer; Winter gear oil used in winter	600
12	Driving axle	„	1		600
13	Steering gear	„	1		600
14	Cam shaft bushing of brake	„	2	Calcium base grease	200
15	Universal-joint trunnion	Grease nipple	2	„	50
16	Telescope yoke of propeller	„	1	„	50
17	Rear wheel hub	„	2	„	200
18	Leaf spring pin	Grease nipple	2	Calcium base grease	50
19	Oil pump of engine		1	Diesel engine oil	200
20	Air filter pan		1		50
21	Hydraulic tank		2		600

Chapter 7 Trouble and Its Cause Remgdies

Position	Trouble	Probable cause	Recommended remedies
A. Engine		Reference to “Operation Manual for S195 Diesel Engine”	
B. Clutch	1. Slipping	1.Free travel of clutch pedal too small	Readjust
		2. Pressure springs slackened	Replace
		3. Dirt or dirty oil on friction faces of the clutch facings	Clean
		4.Clutch facings excessively worn	Replace
	2. Vibrating in engagement	1. Splines excessively worn	Replace clutch shaft or sleeve
		2. Clamping bolts worked loose	Tighten
		3.Dirt or dirty oil friction faces of the clutch facings	Clean
		4. Adjustment of three release levers improper	Readjust
	3. Incompletely disengaged	1. Free travel of clutch pedal too large	Readjust
		2.Adjustment of three release levers improper	Readjust
C. Gearbox	1. Abnormal noise	1. Gears seriously worn or excessive gear backlash	Replace
		2. Bearing seriously worn	Replace
		3., Clamping bolts worked loose	Tighten
		4. Lack of lube	Supply lube
		5. Spline excessively worn	Replace gear or shaft
	2. Trip dog (meshing gears slip to neutral position)	1. Retaining spring of shifting fork shaft slackened or failed	Replace
		2. Positioning notches in shifting fork shaft excessively worn	Replace shifting fork shaft
		3. Internal spline of gear or splined shaft excessively worn	Replace gear or shaft
	3. Gears	Tooth ends of gear burred	Remove the burrs or replace gear

	difficult to be engaged		
D Driving axle	1. Abnormal noise in driving	1. Meshing point of spiral bevel gears abnormal	Adjust or replace
		2. Bearing seriously worn or loosed	Replace or readjust
		3. gears seriously worn	Replace
	2. Abnormal noise in braking	1. Brake anchor plate bended	Repair or replace
		2. brake lining rivets loosed	Repair
		3. Brake drum damage	Repair or replace
	3. Yaw in braking	1. Oil on friction faces of brake lining	Clean
		2. Adjustment of clearance between brake drum and brake shoes improper	Readjust
		3. Inflation pressure in left and right tyres uneven	Uniformize
	4. Braking ineffective	1. Clearance between brake drum and brake lining improper	Readjust
		2. Dirt or dirty oil on friction faces of brake lining	Clean
		3. Brake lining excessively worn	Replace
	E. Steering system	1. Steep increase	1. Axial play of worm too large
2. Backlash between worm and roller too large			Readjust or replace
3. Ball joints excessively worn or damaged			Replace
2. Hard steering		1. Lubrication poor	Lubricate
		2. Adjustment of ball joints improper	Readjust
F. Hydraulic system	Raising skip impossible	1. Without oil in tank or oil surface too low	Add oil
		2. Air leakage in intake pipe of dumper	Inspect and repair
		3. Serious oil leakage in pump inner	”
		4. Block of intake filter	Clean
G. Electrical	1. Generator is normal,	1. Sulphuration on pole plates of storage battery	Desulphurizing or replace pole plates

system	but storage battery can not be charged or low rate for charging	2. Belt of generator too loose or damaged	Readjust or replace
		3. Connecting wire not firm, contact not good	Check and eliminate
		4. Adjustment of regulator improper or damaged	Readjust or repair
	2. Capacity of storage battery insufficient	1. Specific gravity or level of electrolyte too low	Readjust specific gravity or add electrolyte
		2. Short circuit between pole plates	Remove deposits: replace electrolyte
		3. Sulphuration of pole plates	Desulphurizing or replace pole plates
		4. Contact of conductor not good	Check and eliminate
		5 Active material on pole plates dropped	Replace pole plates
	3. No current generated in generator	1. Elimination of residual magnetism	According original polarity of generator magnetize by the way to connect two ends of field wiring with storage battery
		2. Return circuit of field wiring broken	Check and connect
		3. Contact of commutator not good	Grind it with No.0 or No.00 emery paper
		4. Brush blocked, not sensitive	Correct size of brush, adjust spring pressure
		5. Short circuit between wiring of armature	Check and repair
	4. Abnormal sound during running of generator	1. Belt of generator too loose or too tight	Adjust
		2. Wear of bearing due to insufficient	Clean and add lube
		3. Bolts of magnetic pole loose	Tighten
	5. Starter can not be started	1. Current in storage battery not sufficient	Charge or replace storage battery
		2. Contact not good	Check and eliminate
		3. Contact of brush with commutator of starter not good	Repair or replace brush
4. Short circuit or broken circuit between armature and field wiring		Repair	



List of bearings (Refer to Fig. of Appendix I)

Item No.	Type	Position	Qty
1	204	Tension pulley & pump transmission case	3
2	207	Driving shaft of clutch	2
3	688911	Release bearing sleeve of clutch	1
4	50208	First shaft of gearbox	1
5	64904	Gear on mid-shaft	2
	64903	Intermediate gear to pump	1
6	307	Second shaft of gearbox	1
7	Needle bearing, without inner ring	Universal joint trunnion	8
8	7607	Driving bevel pinion	2

9	7210	Differential housing	2
10	7510	Ends of axle shaft	2
11	7205	Steering stub axle end	2
12	7206	Internal side of steering stub axle	2
13	796905	Upper end of steering shaft tube	1
14	977907	Upper end of steering worm	1
15	922205	Steering pitman arm shaft	1
16	977907k	Bottom end of steering worm	1
17	776701	Steering roller	1
18	205	Pump transmission case	1

List of oil seal (Refer to Fig. of Appendix)

Item No.	Type	Position of assembling	Qty
1	35x56x12	Tension pulley	2
2	55x75x12	Driving shaft of clutch	2
3	50x70x12	Second shaft of gearbox	1
4	50x80x12	Driving bevel pinion	1
5	60x80x13	Outer end of axle shaft	2
6	45x62x12	Inner end of axle shaft	2
7	32x44x10	Steering gear housing	1
8	50x68x12	Steering stub axle	2
9	17x30x10	GAear pump	1