

SINGLE COPY

NO

INSTRUCTION BOOK

FOR

MCCOLMICK-DEFRING

"20"

TRACTOR

CONTAINS

REVISED INSTRUCTIONS

AND

REVISED PARTS LIST

CONTAINED IN

TRACTOR WORKING COMPANIES

OF THE

TRACTOR WORKING COMPANIES

TRACTOR

TRACTOR

TRACTOR

TRACTOR

TRACTOR

Notes: (1) Changes should be made in the copy of Sample Sheet
placed with the order.

(For additions, see page 17.)

CORRECTION

On page 17, the Specifications for "Heavy and Light Duty Oil" should be cancelled and the following substituted:

Use SAE No. 20 or No. 30 oil in cold or cool weather and SAE No. 40 or No. 50 oil in warm or hot weather.

of Anti-Freezing Solutions

(See Table below under this heading on page 17.)

Concentration (% by volume)	Freezing Point (°F)	Freezing Point (°C)	Density (lb./cu. in.)		
			at 60°F (15.6°C)		Specific Gravity
			at 60°F (15.6°C)	at 60°F (15.6°C)	
0%	0	0	0	32	1.000
10%	-2	-19	-3	26	1.016
20%	-7	-21	-9	16	1.031
30%	-11	-12	-16	3	1.045
40%	-13	0	-24	-11	1.058
50%	-16	-15	-35	-31	1.070

longer used

should be used in
cold weather as it will
not freeze.

On page 11, the following items should read:

1	17750DA	Seat cushion back.
2	17750AX	Seat cushion, complete.
13	17750DL	Track frame pivot bracket (11 ft.)
14	17750DX	Track roller shaft, complete.
24	17750DY	Gear shifter lever, complete.
37	17750DA	Fuel tank shut-off valve and drain

On page 12, the following items should read:

45	163750X	Camshaft gear oil pipe, complete.
65	163750X	Governor and magneto shaft with coupling.
66	163750Y	Governor and magneto shaft, complete with coupling (part not used).
67	163750D	Governor and governor shaft bracket.

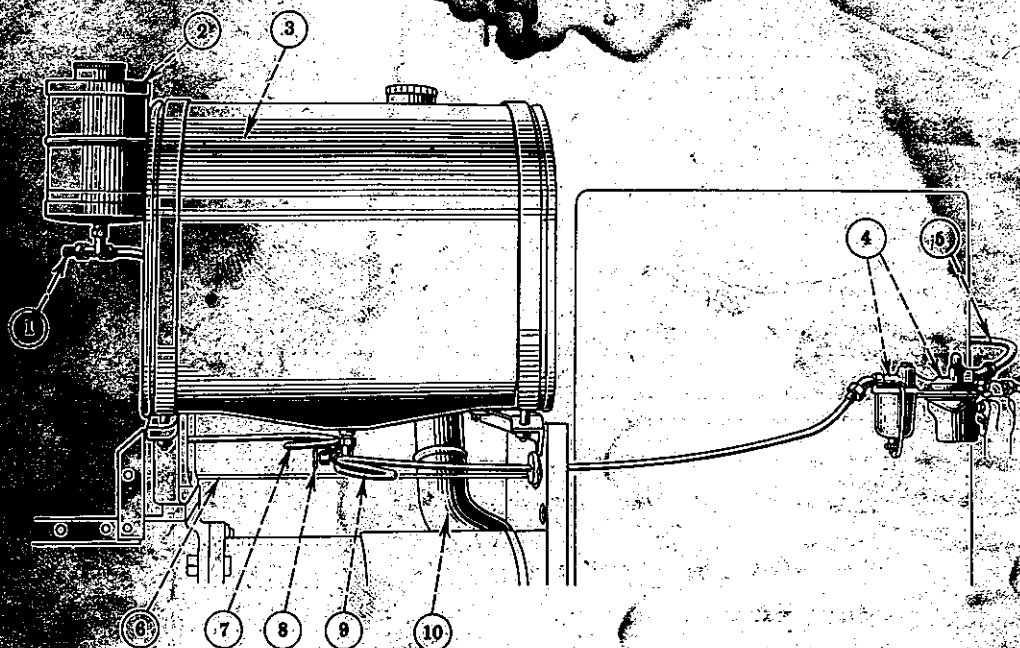


Illustration No. 1

Fuel tank, carburetor and connections, shut-off valves, etc.

Ref. No.	DESCRIPTION
1	Gasoline tank shut-off needle valve.
2	Gasoline tank.
3	Fuel tank.
4	Fuel pump and strainer.
5	Pipe (fuel pump to carburetor).
6	Throttle rod.
7	Gasoline pipe (gasoline tank to fuel tank).
8	Fuel tank shut-off needle valve.
9	Pipe (fuel tank to fuel pump).
10	Exhaust elbow and pipe.

STARTING, OPERATING, LUBRICATION, GENERAL

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Paste this sheet down solid on page 115.

BELT PULLEY AND POWER TAKE-OFF ATTACHMENT (Continued)

IHC Part No.	DESCRIPTION
662DB	Pulley carrier cap.
819D	Belt pulley, 15 $\frac{1}{2}$ x 7" (standard).
821D	Belt pulley, 12 $\frac{1}{2}$ x 8" (special).
878D	Belt pulley, 8 $\frac{1}{2}$ x 8" (special).
1836D	Belt pulley gear box.
1838D	Belt pulley carrier.
1839D	Belt pulley gear box bearing retainer.
1840D	Power shaft bearing retainer.
1866D	Belt pulley gear box carrier.
4624D	Power shaft felt washer.
4647D	Belt pulley drive shaft nut.
10516D	Belt pulley shaft nut.
10739D	Power shaft.
10739DA	Power shaft bearing.
11499D	Power carrier felt washer.
11513DA	Power carrier oil seal washer and retainer.
12138DA	Power shaft bearing separator with rollers.
12369D	Pulley carrier cap gasket.
13206DA	Belt pulley shaft bearing.
13206DA	Belt pulley drive shaft bearing, inner.
13207D	Belt pulley shaft bearing cup (part of 13206DA).
13207D	Belt pulley drive shaft inner bearing cup (part of 13206DA).
13211DA	Belt pulley shaft bearing cone (part of 13206DA).
13211DA	Belt pulley drive shaft inner bearing cone (part of 13206DA).
13224D	Belt pulley drive shaft bearing, outer.
13225D	Belt pulley drive shaft outer bearing cup (part of 13224D).
13229D	Belt pulley drive shaft outer bearing cone (part of 13224D).
14186D	Power shaft bearing lubricator (Zerk).
14187D	Belt pulley shaft bearing lubricator (Zerk).
15762D	Belt pulley drive gear (19 teeth).
15762D	Pulley coupling inner ring (16 teeth).
15762D	Pulley coupling outer ring (16 teeth).
15762D	Belt pulley shaft.
15762D	Belt pulley drive gear (23 teeth).
15762D	Pulley coupling outer ring hub.
15762D	Pulley carrier bearing spacer.
15762D	Pulley carrier shim.
15762D	Pulley carrier bearing spacer shim.
15762D	Pulley gear box carrier shim.
15762D	Pulley gear box bearing retainer shim.
15762D	Power shaft bearing retainer gasket.
15762D	Pulley carrier shim.
15762D	Pulley carrier bearing spacer shim.
15762D	Pulley gear box carrier shim.
15762D	Pulley gear box bearing retainer shim.
15762D	Pulley drive shaft.
15762D	Power shaft bearing outer race.

PRELIMINARY INSTRUCTIONS

Examine the **TRAC|RAC|OR** carefully and see that all oil holes are cleaned of paint and dirt—if any threaded oil holes are found and no grease or pipe connections, look at the oiling diagram. If connection is shown, and not in place, it was probably lost in transit and should be replaced before starting up.

Preparations for Starting

Close kerosene and gasoline shut-off needle valves.
(See illustration No. 1.)

Fill fuel tank with clean kerosene.
(See illustration No. 1.)

Fill gasoline tank with gasoline.
(See illustration No. 1.)

Carefully strain all fuel and be sure it is free from water.

Gasoline is necessary only when starting and when warming up the engine.

Fill radiator with clean water within 3 inches of the top and keep it well filled. Soft or rain water should be used if it can be readily obtained.

See that engine has the proper amount of oil in crankcase.
(See illustration No. 6.)

See that all lubricating connections are filled with lubricant approved for use in Alemite-Zerk compressor and gat gun.
(See specifications on page 9.)

See that oil in transmission is up to level of plug located in rear of main frame.
(See illustration No. 9.)

See that oil in sprocket housings is up to level of oil plugs located in sides of gear case covers.
(See illustration No. 9.)

TRAC|RAC|ORS shipped Domestic and Canada have a supply of oil in all parts. All oil has been drained from transmission and crankcase of **TRAC|RAC|ORS** shipped Export. Complete instructions for oiling are shown on "Lubrication Chart." (See pages 10 and 11.)

Before Starting Engine

Put gear shifting lever in neutral position.
(See illustrations Nos. 2 and 8.)

Open throttle by pushing control handle on left, forward about four notches in guide.
(See illustration No. 2.)

Open gasoline shut-off needle valve.
(See illustration No. 1.)

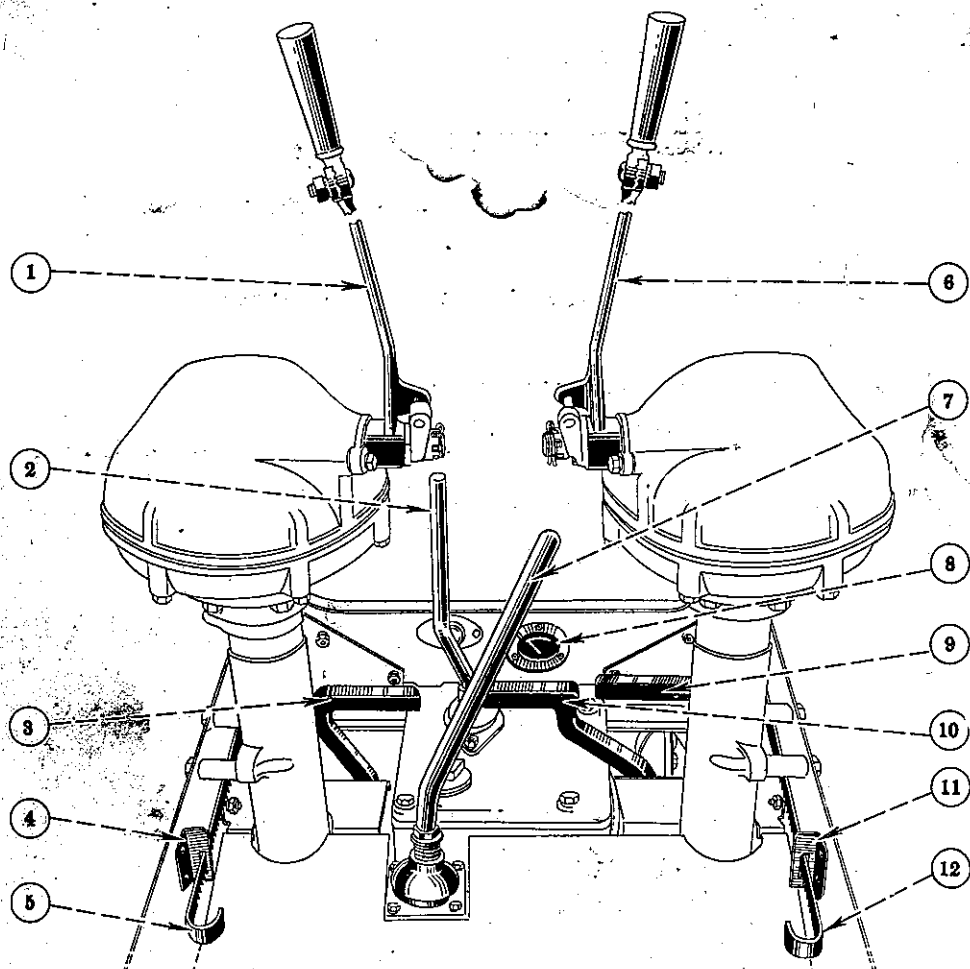


Illustration No. 2

Spark and throttle controls, gear and clutch shifter levers, clutch and brake pedals.

Ref. No.	DESCRIPTION
1	Steering clutch lever, L. H.
2	Pulley and power take-off lever.
3	Brake pedal, L. H.
4	Throttle control handle guide.
5	Throttle control handle.
6	Steering clutch lever, R. H.
7	Gear shifter lever.
8	Oil pressure gauge.
9	Clutch pedal.
10	Brake pedal, R. H.
11	Spark control handle guide.
12	Spark control handle.

Throttle Control

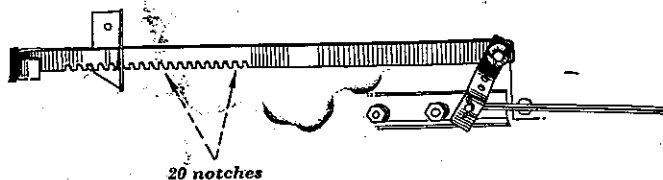


Illustration No. 3—Throttle control handle (left hand side).

Idling position—pull handle back as far as possible.

Starting position—put handle in guide about four notches up from idling position.

Running position—push handle forward as far as possible.

Spark Control

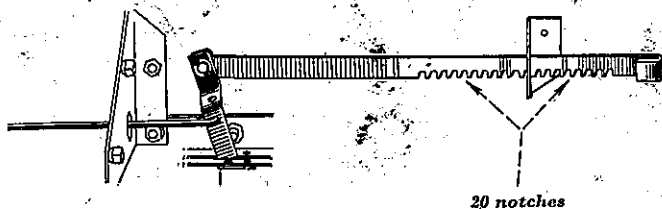


Illustration No. 4—Spark control handle (right hand side).

Fully retarded—pull handle back as far as possible. (Magneto grounded.)

Starting position—put handle in guide about three notches up from full retard position.

Idling position—same as "Starting Position."

Running position—push handle forward as far as possible.

Note: The position of the adjusting nut and clevis located on forward end of control rod (see illustrations Nos. 23 and 74) will vary the position of the control handle notches in the guides. This may vary the positions one or more notches either way.

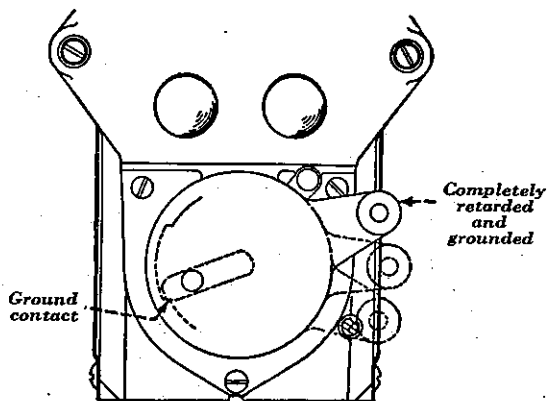


Illustration No. 5—International E4A Magneto.

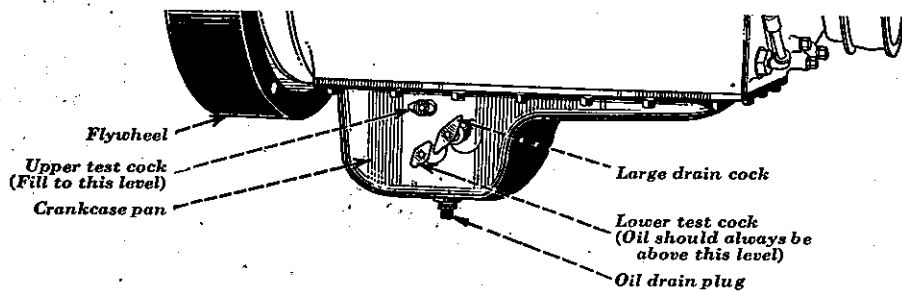


Illustration No. 6

GOVERNOR—Continued

On page 75, the following item should read:

- 34 | 15399DAX | Governor throttle assembly, complete.

On page 79, the following items should read:

- | | | | | |
|----|--|----------|--|------------------------------|
| 2 | \| | 16376DAX | \| | Cord float (fuel bowl). |
| 1 | \| | 1723DAX | \| | Left hand valve. |
| 12 | \| | 14511DAX | \| | Float valve assembly. |
| 17 | \| | 1703DAX | \| | Fuel bowl, less float valve. |

On page 80, the following item should read:

- 9 | 16055DA | Fuel tank shut-off needle valve.

On page 82, the following item should read:

- 10 | 17975DXX | Oil cup clamp rod, complete with nut

On page 84, the following items should read:

- | | | | | |
|----|--|----------|--|------------------------------------|
| 1 | \| | 13143DAX | \| | Oil filter (Purolator type, B-29). |
| 15 | \| | 15953DCX | \| | Oil filter outlet pipe, complete. |

On page 85, the following items should read:

- | | | | | |
|---|--|-----------|--|--------------------------|
| 1 | \| | 13725DA | \| | Case gasket. |
| 6 | \| | 113602DAX | \| | Base, complete. |
|  | \| | 13730DAX | \| | Base assembly, complete. |

On page 91, the following items should read:

- | | | | | |
|---|--|----------|--|---------------------------------|
| 5 | \| | 2074DAX | \| | Main frame, complete. |
| 8 | \| | 16349DAX | \| | Clutch shifter shaft, complete. |

On page 92, the following items should read:

- | | | | | |
|----|--|----------|--|---------------------------------|
| 5 | \| | 10379DAX | \| | Crankshaft, complete with wick. |
| 13 | \| | 14613DA | \| | Release lever. |
| 15 | \| | 16349DAX | \| | Clutch shifter shaft with keys. |

On page 93, the following items should read:

- | | | | | |
|---|--|----------|--|---------------------------------|
| 1 | \| | 111374DA | \| | Gear shifter lever spring. |
|  | \| | 1030DA | \| | Gear shifter lever ball socket. |
|  | \| | 17702DA | \| | Gear shifter lever pin. |
|  | \| | 17744DAX | \| | Gear shifter lever, complete. |

CORRECTIONS—Continued

On page 98, the following items should read:

5	.....	Oil seal diaphragm (order 17691DX).
8	.....	Oil seal diaphragm ring (order 17691DX).
9	17691DX	Sprocket housing oil seal pressure plate, inner, complete.
9	2017DX	Track frame (R.H. or L.H.), complete.
38	{ 2003DB	Track frame pivot bracket, L.H.
	{ 2009DB	Track frame pivot bracket, R.H.

On page 99, the following items should read:

52	.....	Planetary idler thrust washer pin, outer (order 17655DX).
56	17647D	(<i>Cancel—part not used</i>).
57	.....	Planetary idler thrust washer pin, inner (order 17655DX).
63	.....	Worm gear dowel bolt (order 17655DX).
73	.....	Worm gear carrier bushing (order 17655DX).

On page 101, the following item should read:

57	2074DAX	Main frame, complete.
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On page 105, the following items should read:

1	{ 2003DB	Track frame pivot bracket, L.H.
	{ 2009DB	Track frame pivot bracket, R.H.
4	2017DX	Track frame (R.H. or L.H.), complete.
10	16537DX	Track roller shaft and side, complete with oil seal.
11	17377D	Track roller side (order 16537DX).

On page 109, the following items should read:

16	| 2017DX |	Track frame (R.H. or L.H.), complete.
21	| 2074DAX |	Main frame, complete.

On page 111, the following item should read:

15	2017DX	Track frame (R.H. or L.H.), complete.
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On page 112, the following items under "Seat and Fenders" should read:

2	17303DA	Seat cushion back.
3	| 17315DAX |	Seat cushion, complete.
4	| 16350DB |	Seat cushion side.

On page 113, the following items should read:

.....	| E 1021 |	(<i>Cancel—part not used</i>).
.....	| 7695TM |	(<i>Cancel—part not used</i>).

On page 114, cancel Illustration No. 89.

On page 115, cancel entire page.

} Attachment
never used.

ADDITIONS

(Should be pasted on pages indicated.)

On page 71, add the following:

Miscellaneous parts not indicated in Illustration No. 58:

IHC Part No.	DESCRIPTION
1688D	Platform hand hole cover.
1988DX	Bull gear cover, complete.
1990D	Throttle control ball crank.
2074DAX	Main frame, complete.
10635DA	Power shaft cap.
10675D	Engine hood, left.
10676D	Engine hood, right.
10689D	Hood door hinge rod.
10691D	Power shaft cap gasket.
10698D	Bull gear cover gasket.
10751DX	Engine hood support, complete.
10753D	Hood hinge rod.
10879D	Hood door latch.
10880D	Hood door latch catch.
12693D	Bull gear cover cap screw ($\frac{3}{4}$ x 1 $\frac{1}{4}$).
13096D	Throttle control rod ball joint.
17727D	Throttle control ball joint rod.
17728D	Throttle control handle.
17736DX	Throttle control ball crank, complete.
17741D	Throttle control rod clevis pin.
17743D	Throttle control rod.
17745DX	Hood sheet, rear, complete.
17749D	Throttle control handle guide, L.H.
17797D	Platform support, front.
17809D	Platform.
17816D	Choke rod.
17818DX	Hood side door, L.H., complete.
17823D	Fan housing sheet.
18493D	Gaskets (package).
3058TA	Hood door latch eye spring.

STARTING CRANK

IHC Part No.	DESCRIPTION
326DX	Starting crank bearing, complete.
4571D	Starting crank bushing.
4572D	Starting crank ratchet.
10623DX	Starting crank, complete.
10957D	Starting crank hook.
14186D	Starting crank bearing lubricator (Zerk).
6825H	Starting crank spring.
3741T	Starting crank bushing pin.
G 3754	Starting crank ratchet pin.

ADDITIONS—Continued

On page 75, add the following:

Miscellaneous parts not indicated in Illustrations Nos. 59 and 60.

IHC Part No.	DESCRIPTION
822C	Cylinder sleeve packing ring (rubber).
497DAX	Crankcase front cover.
1453D	Speed change lever.
1496D	Oil discharge bracket.
1606D	Piston ring ($\frac{1}{16}$ " over-width).
1611D	Valve seat insert.
4097DA	Cylinder head stud nut.
4999D	Oil pump impeller gear pin.
10189D	Piston ring ($\frac{1}{16}$ " over-width).
10310DB	Camshaft center bearing.
10336D	Pump impeller gear, driven (12 teeth).
10338D	Oil pump screen.
10344D	Pump impeller gear, driver (12 teeth).
10346D	Oil pump screen holder.
10368D	Oil pump shaft.
10395D	Valve housing.
10499D	Crankcase breather pipe ($\frac{7}{8}$ " long).
10644D	Engine support, front.
10944D	Camshaft gear shim.
10954DA	Cylinder head drain trough.
11252D	Camshaft gear shim.
11425D	Oil filler screen.
12105D	Bell housing felt strip.
12231D	Valve lever collar pin.
12261D	Cylinder sleeve shim.
12293DA	Connecting rod bearing shim.
12743D	Speed change lever shaft.
12769D	Connecting rod and cap.
13055D	Crankshaft pinion key.
14415D	Oil pressure valve cover.
14416D	Oil pressure valve cover gasket.
14423D	Set of 4 cylinder sleeves, pistons and cylinder head gaskets.
14762D	Crankcase pan, complete.
14872D	Cylinder head stud, long.
15338D	Crankcase oil drain valve guard.
15340D	Oil pressure valve body gasket.
15341DX	Oil pressure valve, complete.
15950D	Oil pump gasket.
16058D	Valve spring lock.
16206D	Oil pump, complete.
16373D	Magneto drive shaft oil flinger.
16734DX	Crankshaft, complete ($\frac{1}{16}$ " undersize).
17241D	Inlet and outlet pipe half union.
18331D	Valve stem retainer.
18332D	Valve spring seat.
18336D	Valve ($\frac{1}{16}$ " oversize).
18337D	Exhaust and intake valve.
20583D	Camshaft gear oil pipe connector nut.
20584D	Camshaft gear oil pipe connector sleeve.
20685D	Camshaft gear oil pipe connector.
G 3102	Crankcase breather nipple street ell.
G 3398	Crankcase oil drain valve guard seal.
G 6193	Crankcase breather pipe ($\frac{9}{16}$ " long).
1671TC	Connecting rod shims (package).
3395T	Speed change lever pin.
3395T	Throttle shaft coupling pin.
6220T	Oil pump shaft bushing pin.
7220T	Camshaft gear key.
8029T	Oil pump shaft collar pin.
8298TCX	Connecting rod bearing, complete.

ADDITIONS—Continued

On page 76, add the following:

Miscellaneous parts not indicated in Illustration No. 61.

THC Part No.	DESCRIPTION
470DA	Fan bracket.
10334D	Fan blade.
10386D	Fan pulley cap gasket.
11585D	Fan adjuster spring.
11586D	Fan adjuster bolt.
13055D	Fan adjuster drive gear.

On page 77, add the following:

RADIATOR AND WATER TANK

Miscellaneous parts not indicated in Illustration No. 62.

THC Part No.	DESCRIPTION
4083D	Water tank hand hole cover clamp.
4142D	Water tank hand hole cover clamp gasket.
10429D	Water tank hand hole cover gasket.
10586D	Water tank lower shim.
10629D	Radiator gasket plate, front.
10630D	Radiator gasket plate, rear.
10631D	Radiator outlet hose.
10633D	Radiator overflow pipe, upper.
10634D	Water tank lower stud.
10646DA	Radiator gasket.
10690D	Radiator outlet elbow gasket.
10774D	Radiator inlet gasket.
10808D	Water tank (lower) washer.
10832D	Radiator overflow pipe clip.
10833D	Radiator overflow pipe, lower.
12174D	Radiator tube.
13047DA	Water tank drain winged cap.
17358D	Radiator, complete (Domestic).
G-327H	Radiator drain pipe.

On page 78, add the following:

Miscellaneous parts not indicated in Illustration No. 63.

THC Part No.	DESCRIPTION
1086D	Exhaust manifold elbow.
11801D	Baffle plate stud.
11834D	Manifold valve stop.
14865D	Combination manifold stud.
14868D	Combination manifold nut lock.
15994D	Combination manifold baffle gasket.
17371D	Manifold valve stop stud.
17372D	Manifold valve stud.
17719D	Overhead exhaust pipe.
15860H	Exhaust elbow gasket.

ADDITIONS—Continued

On page 79, add the following:

Miscellaneous parts not indicated in Illustration No. 64

IHC Part No.	DESCRIPTION
14556DA	Station outlet assembly.
14579DA	Fuel bowl cover assembly.
14579DAX	Fuel bowl cover and adjusting screw assembly.
14590D	Drain cock needle assembly.
14596D	Throttle stop screw.
14597D	Idle throttle stop screw.
14900DXX	Throttle shaft assembly, complete.
17354D	Fuel bowl assembly, complete with 1703DX.
17937DXX	Starting shutter shaft assembly, left hand.
18377D	Float valve gauge.

On page 80, add the following:

Miscellaneous parts not indicated in Illustration No. 65

IHC Part No.	DESCRIPTION
10743DA	Fuel tank felt lining.
11347D	Fuel pipe cushion retainer.
11343D	Fuel pipe cushion.
14869D	Fuel bowl shield.
16323DA	Fuel tank strap lining.
16445D	Fuel pipe clip felt.
16446D	Fuel pipe clip.
16718D	Fuel pipe coupling nut.
16719D	Fuel pipe coupling nipple.
17241D	Fuel pipe half union.
18005DXX	Fuel pipe, complete (fuel pump to carburetor).
FUEL PUMP, Etc.	
13698DB	Fuel pump ("A.C." Model "E") (see 18052D).
16370D	Fuel pump shaft.
16374D	Fuel pump gasket.
16660DXX	Fuel pump bracket oil pipe.
17184D	Fuel pump elbow.
17239D	Fuel pump overflow pipe half union.
18052D	Fuel pump (Stewart-Warner Model 506C) (see 13698DB).
18103DXX	Fuel pump breather and overflow pipe, complete.

On page 81, add the following:

Miscellaneous parts not indicated in Illustration No. 66

IHC Part No.	DESCRIPTION
433D	Governor gear (28 teeth).
1242D	Oil filler strainer.
12215D	Governor rod support bracket stud.
12700D	Governor connecting rod pin.
12724D	Governor rod support bushing.
17183D	Governor oil pipe three-way restricted tee.
3895T	Governor throttle lever pin.
6403T	Governor ball carrier dowel.
7225T	Governor gear key.

ADDITIONS—Continued

On page 83, add the following:

Miscellaneous parts not indicated in Illustration No. 68.

THC Part No.	DESCRIPTION
14864DX	Air intake shield, complete.
15436D	Air filter bracket end piece.
17190D	Air filter top reinforcing plate.
17779D	Air filter top gasket.
M11943	Air filter screen.

On page 84, add the following:

Miscellaneous parts not indicated in Illustration No. 69.

THC Part No.	DESCRIPTION
16714D	Oil gauge pipe adapter.
16715D	Oil gauge pipe coupling nut.
16716D	Oil gauge pipe coupling nipple.
17239D	Oil pressure gauge pipe half union.
16924H	Oil pressure gauge.

On page 90, add the following:

Miscellaneous parts not indicated in Illustration No. 74.

THC Part No.	DESCRIPTION
17722DX	Spark and throttle control lever, complete.
17723D	Spark and throttle control handle lever bracket.
17729D	Spark control handle.
17738D	Spark control bell crank shaft.
17740DX	Spark control bell crank bracket, complete.
17750D	Spark control handle guide, R.H.C.

On page 92, add the following:

Miscellaneous parts not indicated in Illustration No. 76.

THC Part No.	DESCRIPTION
674D	Clutch grease tube coupling.
1624DA	Clutch housing cover.
12106D	Clutch housing felt strip side.
13199D	Clutch release bearing oil tube elbow.
14137D	Clutch throw-out bearing lubricator (Zerk).
14678D	Clutch housing felt strip.
15668D	Clutch shifter rod fork.
15945D	Clutch release bearing collar pin.
17840DX	Clutch housing, complete.
15041H	Clutch shifter rod fork pin.

ADDITIONS—Continued

On page 95, add the following:

Miscellaneous parts not indicated in Illustration No. 78.

IHC Part No.	DESCRIPTION
695DA	Pulley drive shaft thrust flange.
10522DA	High and reverse speed shifter fork.
10534DA	Pulley drive gear clutch.
10539D	Reverse shaft.
10618D	Gear shifter lever guide.
10620D	Reverse pinion bushing.
10625D	Transmission case felt washer.
10626D	Transmission case felt washer retainer.
10693DA	Transmission case gasket, front.
10695DA	Transmission case gasket, side.
10718DA	Transmission case dowel pin.
10824D	Pulley drive clutch poppet spring.
12180D	Gear shifter lever guide cap screw lock.
12319D	Bevel pinion shaft nut.
12320D	Bevel pinion shaft nut lock.
12321D	Bevel pinion shaft key.
12693D	Transmission case cap screw (4 x 14).
15696D	Transmission case side plate.
17724D	Transmission rear gasket.
18301D	Gear shifter lever swivel bearing gasket.
18930D	Transmission case side plate gasket.

On page 99, add the following:

Miscellaneous parts not indicated in Illustrations Nos. 79 and 80.

IHC Part No.	DESCRIPTION
10963D	Bevel gear shaft bearing cage cap screw ($\frac{1}{2}$ x 2).
15731D	Sprocket drive gear housing gasket, large.
15732D	Sprocket drive gear housing gasket, small.
17731D	Sprocket drive case cap screw.
17855D	Sprocket drive gear case cover dowel pin.
20109D	Sprocket drive shaft cap gasket.
17253H	Sprocket drive shaft roller bearing cup, inner.

On page 101, add the following:

Miscellaneous parts not indicated in Illustration No. 81.

IHC Part No.	DESCRIPTION
13129D	Brake pedal shaft lubricator (Zerk).
16312D	Brake cam bushing felt washer.
17134D	Steering clutch shaft sleeve screw.
17703D	Brake cam pilot bushing.
17710D	Brake cam bushing.
17794DX	Brake pedal stop, L.H., complete.
17795DX	Brake pedal stop, R.H., complete.
15041H	Brake rod yoke pin.
15641H	Brake rod rear adjustable yoke.
7699TMM	Steering clutch lever stop key.
20095V	Clutch facing rivet.

ADDITIONS—Continued

On page 105, add the following:

Miscellaneous parts not indicated in Illustration No. 83.

I.H.C. Part No.	DESCRIPTION
17851D	Track roller, complete.

On page 107, add the following:

Miscellaneous parts not indicated in Illustration No. 84.

I.H.C. Part No.	DESCRIPTION
17603D	Track, less shoes (L.H. or R.H.)
17949D	Track, L.H., less shoes
17950D	Track, R.H., less shoes
17951D	Track, L.H., complete with shoes
17952D	Track, R.H., complete with shoes
17953D	Track, L.H., complete with shoes
17954D	Track, R.H., complete with shoes
18470D	Track pivot shaft bracket-dowel pin
19408D	Track shield spacer, short
19806D	Track shield spacer, long
20232D	Track link master pin lock wire

Used on a few machines only.—give Trac Tractor number when ordering.

On page 109, add the following:

Miscellaneous parts not indicated in Illustration No. 85.

I.H.C. Part No.	DESCRIPTION
13129D	Track spring yoke lubricator (Zerk)
15592D	Front axle pivot support
17735D	Front axle pivot support locking pin
17838D	Track spring adjusting rod nut
17839D	Front axle pivot to bolster bolt
17854D	Front axle pivot support rear cap screw, long

On page 112, add the following:

Miscellaneous parts not indicated in Illustration No. 87.

I.H.C. Part No.	DESCRIPTION
17798D	Seat side spacer
17831D	Seat, complete
17831DX	Seat, complete with fenders
17831DY	Seat, complete with fenders and cushions

On page 113, add the following:

I.H.C. Part No.	DESCRIPTION
12254D	Valve clearance gauge
E/A-289X	Magneto wrench gauge
H 156	Oil can
H 753M	Cold chisel

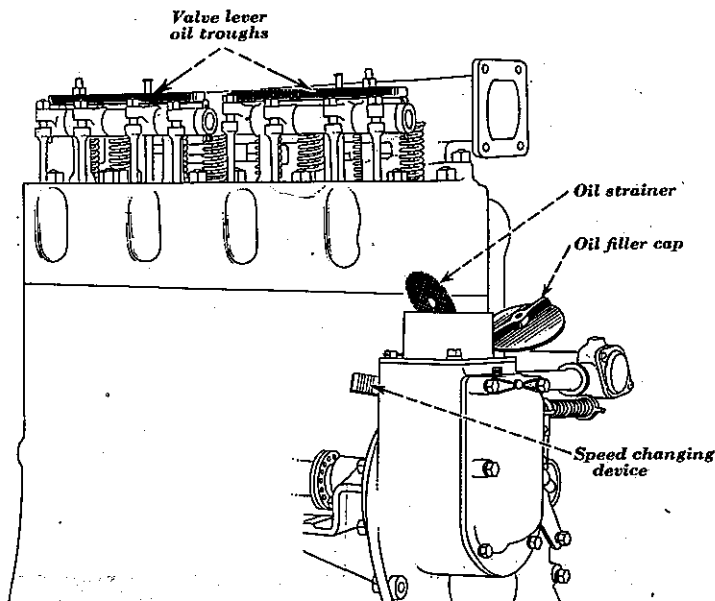


Illustration No. 7
Crankcase oil filler, governor, etc.

To Start Engine

Prime cylinders with gasoline.
(See illustration No. 23.)

With spark fully retarded and the choker valve completely closed, crank engine rapidly three or four revolutions. Then move spark control handle to starting position. (See illustrations Nos. 2 and 4.) Move choker valve nearly one-half open and crank engine. As soon as engine starts, the choker valve should be opened to where the engine runs without missing and as engine warms up the choker valve should be moved into wide-open position.

(See illustration No. 23.)

After Engine Starts and is Warmed Up

Spark and throttle control handles must be adjusted for proper advance for load to be handled.

(See illustrations Nos. 3 and 4.)

After gasoline shut-off needle valve has been closed tight, quickly open kerosene shut-off needle valve, but never have both valves open or even partly open at the same time. If both shut-off valves are open at the same time, kerosene will mix with gasoline, making it unsatisfactory for starting.

(See illustration No. 1.)

To Start **TRAC|RAC|OR**

Place right foot on clutch pedal and press down firmly, holding in this position; this disengages the clutch. *Clutch must always be disengaged when shifting gears.*

(See illustration No. 2.)

Move gear shifting lever to required position.

(See illustrations Nos. 2 and 8, and instructions below.)

Gently release pressure on clutch pedal; this engages clutch and causes tractor to move.

(See illustration No. 2.)

Gear Shifting

Always disengage clutch before making a gear shift.

- Neutral.....hand lever in a vertical position.
L. Low speed forward.....move hand lever to left and forward.
I. Intermediate speed forward.....move hand lever to left and back.
H. High speed forward.....move hand lever to right and forward.
R. Reverse.....move hand lever to right and back.

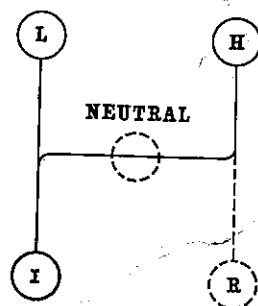


Illustration No. 8

Showing different positions of gear shifting lever.

To Stop **TRAC|RAC|OR**

Disengage clutch. Press down firmly on clutch pedal, then move gear shifting lever to neutral position.

(See illustrations Nos. 2 and 8.)

To Stop Engine

Keep gasoline shut-off needle valve closed.

(See illustration No. 1.)

Close kerosene shut-off needle valve and run engine until all kerosene is used out of carburetor and fuel pipe, in order to insure having pure gasoline in the system when starting up again.

(See illustration No. 1.)

The automatic grounding switch on the magneto should be used only in emergencies, when the engine must be stopped quickly.

(See illustration No. 5.)

LUBRICANT

Lubricant approved for use in Alemite-Zerk compressor, gat gun, transmission, differential, etc., should conform to the following specifications:

Oil used under this specification must be properly refined petroleum oil. It shall not contain grit, sediment, acid, alkali, soap, resin, excessive moisture or any substance not derived from petroleum.

The flashing point, Cleveland Open Cup, shall not be below 350°F.

The viscosity, Saybolt Universal at 210°F., shall be between 140-150 Seconds.

Lubricant shall have a cold test 0°F., A.S.T.M. method of testing.

Pour test shall be 5°F., plus, higher than cold test.

The water and sediment shall not exceed 0.5% by volume.

The lubricant shall not corrode any metal used in the construction of the machine.

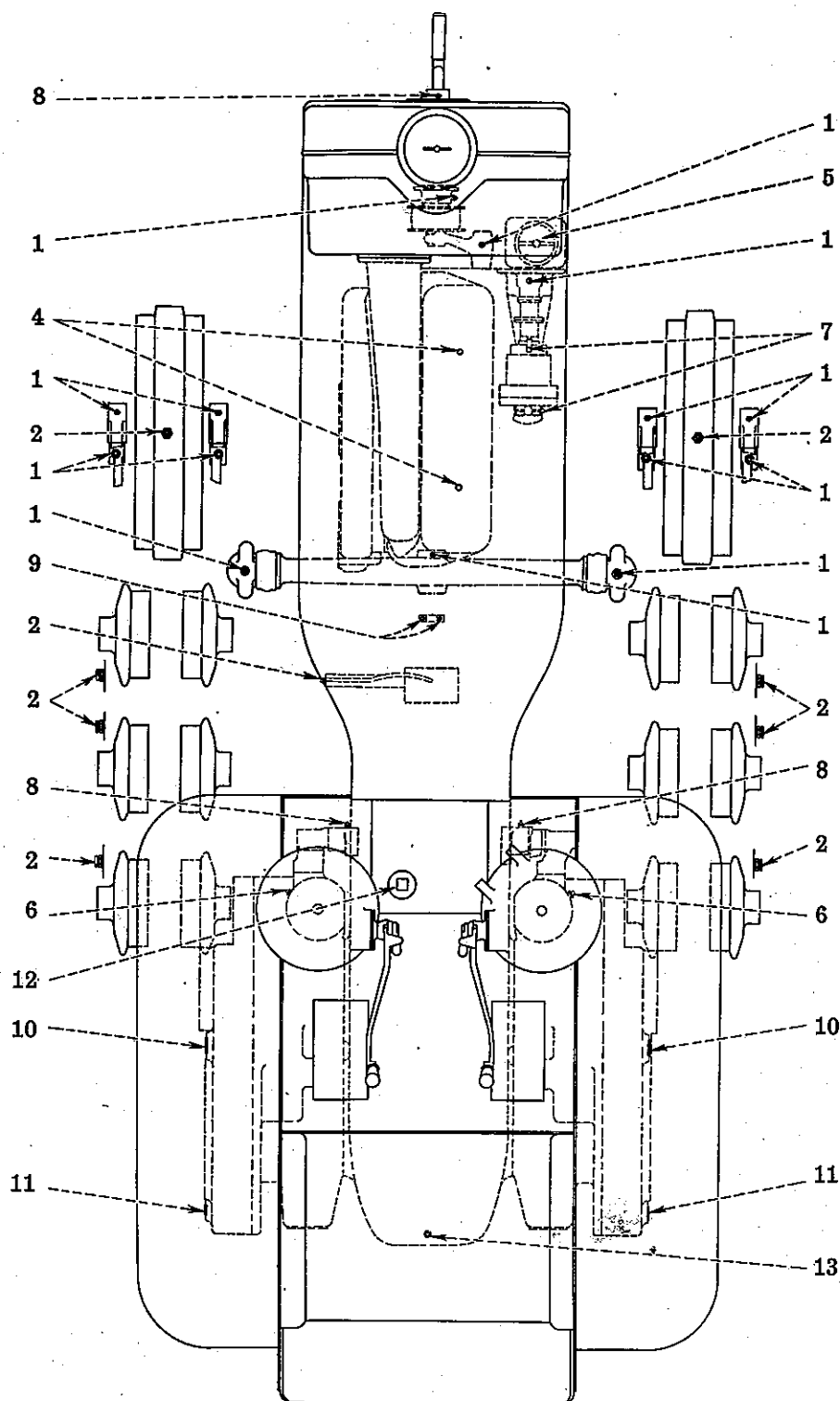




Illustration No. 9—Lubrication chart.

KEY TO LUBRICATION CHART

(See illustration No. 9)

1	Track spring yoke pivot.....	} Daily. Use approved lubricant.
	Governor and magneto shaft.....	
	Front axle pivot.....	
	Fan pulley shaft.....	
	Front axle bracket ball.....	
	Fan bracket.....	
2	Front idler arm pivot pin.....	} Daily. Use approved lubricant.
	Front idler and shaft.....	
2	Track roller.....	} <i>Note:</i> Use gat gun when lubricating these parts. (For instructions, see page 15.)
3	Clutch release bearing.....	Daily, or more often if the tractor is used in work which requires frequent clutch operation. Use approved lubricant.
4	Valve lever oil trough.....	Daily. Use cylinder oil. One-sixth of oil can as furnished with tractor.
5	Crankcase.....	Drain crankcase down to large cock and refill with fresh oil to level of upper test cock after every 10 hours' run. (See illustration No. 6.) Drain all oil from the crankcase pan once every 60 hours' run; refill with fresh oil. (See illustration No. 7.)
6	Steering worm shaft.....	Twice per week. Use approved lubricant.
7	Magneto and impulse coupling.....	Once per week. Few drops of sewing machine or cream separator oil. (See pages 34 and 37.)
8	Starting crank bearing.....	} Once per week. Use approved lubricant.
	Brake pedal.....	
9	Clutch spider pilot bearing.....	Automatically lubricated from crankshaft.
10	Sprocket drive housing..... (Oil filler plugs)	Remove both oil plugs. Fill through upper hole with approved lubricant until oil level hole (11) is reached.
11	Sprocket drive housing..... (Oil level plugs)	Proper oil level in sprocket drive housing.
12	Transmission..... (Oil filler plug)	Use approved lubricant. Keep lubricant in transmission up to level of plug (13) placed in rear of main frame, indicating proper oil level. Capacity is approximately 6 gallons.
13	Transmission..... (Oil level plug)	Proper oil level in transmission.

 Drain plugs are located in crankcase, rear main frame, and sprocket drive gear case covers.

 Specifications for approved lubricant are shown on page 9.

Transmission Lubrication

When the TRAC|RAC|OR is shipped from the factory to points in the United States and Canada the transmission is filled to proper level with an approved lubricant.

TRAC|RAC|ORS packed and shipped Export have had all oil drained from transmission before shipment, and before attempting to operate, transmission case must be filled to proper level with an approved lubricant.

See "Lubrication Chart" (illustration No. 9), also Specifications covering Approved Transmission Lubricants (page 9).

Oil should be inspected monthly and kept up to the proper level.

The transmission and final gears including differential and all bearings for the transmission are oiled automatically. The transmission and rear axle housing is filled to a definite level with heavy lubricant and the rotation of the gears carries this to all points.

It should not be necessary to add lubricant to transmission oftener than once a season unless excessive leakage occurs somewhere, or in case of accident, causing loss of grease.

Use approved transmission lubricant. Keep the lubricant up to level of plug located in rear of main frame. (See illustration No. 9.) Oil must be such as to remain fluid in cold weather. If it does not, change should be made so proper lubrication will be effected. Oil that is up to specifications will be satisfactory for all seasons and normal operating temperatures. Special effort should be made to obtain the correct oil. (See page 9 for lubricant specifications.)

Alemite-Zerk Lubrication System

When filling the grease gun, care must be taken to fill it full, avoiding air spaces as much as possible; otherwise, when in use, air is often forced into the bearings in place of grease.

Care must also be taken to see that the bearings are lubricated their full length. Roller bearings and bearings that have oil chambers will require more grease at the first filling than plain bearings. To make sure that all bearings are properly lubricated, grease should be forced into them until it begins to appear at the sides.

To Fill Alemite-Zerk Compressor with Oil

(See illustration No. 10.)

Fill with lubricant approved for use in Alemite-Zerk compressor. (For specifications, see page 9.)

Remove cap "A" and plunger assembly "B" and pour lubricant into the barrel to within one-half inch from top.

After compressor is filled, it is necessary to prime the high pressure nozzle unit "F." This is done by placing nozzle "D" against some solid object and pushing forward several quick complete strokes until lubricant is worked through the high pressure nozzle unit "F."

When filling the compressor the first time, spread and soften the leather washer "E" by rubbing a small quantity of lubricant into the leather before replacing in the barrel. This softens the leather and prevents lubricant from passing by plunger when pressure is applied.

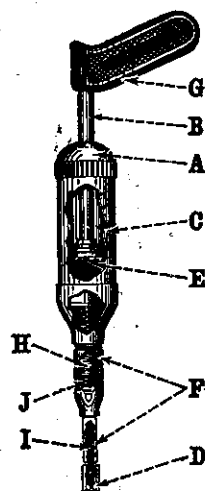


Illustration No. 10
Alemite-Zerk
Compressor.

Instructions for Lubricating (Alemite-Zerk)

Because of the cupped shape of nozzle "D" and the smaller flat tip of the Alemite-Zerk type fitting, a grease or oil-tight seal is secured at all points within a twenty-five degree angle of the axis of the fitting, giving a total effective angle of fifty degrees. Approximate alignment is recommended in order to avoid exceeding the limits.



Illustration
No. 11

Instructions for Lubricating (Alemite-Zerk)—Continued

See that fittings are wiped free of dust and dirt.

Do not turn handle "G." When pressure contact is made, the rim of the fitting seats in the cup of the nozzle "D" and effects a positive leak-proof seal at any angle within twenty-five degrees of the axis of the fitting.

A push on the pistol grip handle "G" forces the lubricant in the barrel "C" into the high pressure nozzle unit "F" from which it is ejected by the high pressure piston "H."

During the forward stroke, this piston "H" ejects the lubricant in the hollow stem "I" at super pressure through the nozzle "D" containing ball check, directly into fitting.

The hollow stem "I" is automatically refilled by vacuum suction, through an inlet "J," which is opened by the piston "H" at the end of the return stroke. To insure full opening of the inlet, it is *important* that a *complete* return stroke be made.

Alemite-Zerk type fittings. In the neck of each fitting is a check valve formed by a steel ball, held in place by a spring.

When pressure is applied, the ball is forced back, allowing clean lubricant to pass through into the bearing. Once the bearing is filled with lubricant and the pressure relieved, the spring forces the ball back into place, closing the opening, and a seal of grease is retained between ball and end of fitting through which no dirt can penetrate.

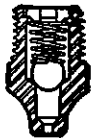


Illustration
No. 12

If a poor grade of lubricant is used, small particles of dirt and other foreign substances may clog up the fittings. If this should happen, remove the fitting and wash thoroughly with gasoline.


To lubricate bearings. A push on the pistol grip handle "G" develops a high pressure in the nozzle unit "F," and automatically opens the check valve in the fittings, permitting the lubricant to pass through into the bearing.

Usually, by one full stroke of the plunger "B," enough lubricant is delivered to the bearing, but in some instances more than one stroke may be necessary. This is especially true if air is encountered, due to improper filling of the compressor.

Keep Grease Free from Dust

The can containing your supply of grease should not be allowed to stand open so that dust can get into it. Dust is gritty and, if carried into the bearings with the grease, will cut the bearings rapidly and often cause them to heat excessively.

When filling grease nipples, it is important to wipe the dust from the nipple before filling. When grease is put in, the dust gets in with it and bad results follow.

 *Note the location of the grease connections in the Lubrication Chart.*

Alemite Gat Gun Lubrication System

The Alemite gat gun is used only for lubricating the Alemite button head fitting on the track frame and front idler and shaft. The gun has a lubricant capacity of approximately 21 ounces. To operate, first connect the long hose to the gat gun by the threaded coupling furnished on end of hose, then turn the coupling on opposite end of hose on to the button head fitting and pump the handle of gun up and down as often as desired.

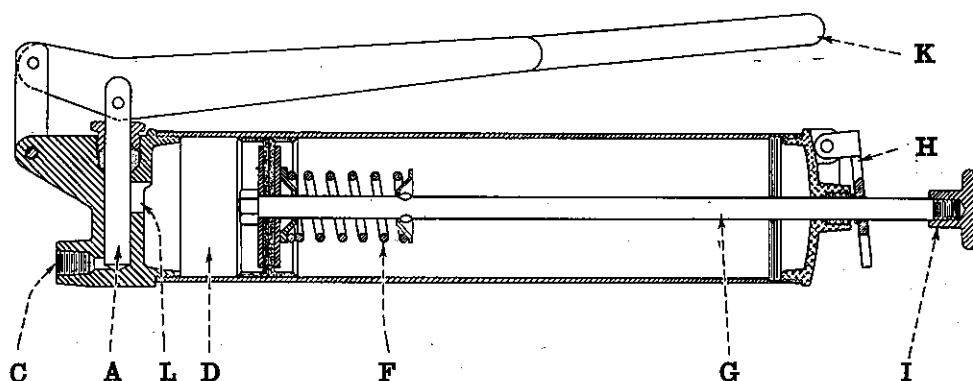


Illustration No. 13
Alemite gat gun (sectional view).

To Fill the Gat Gun

(See illustration No. 13.)

Fill with approved lubricant. (For specifications, see page 9.)

First uncrew the compressor barrel from the head of the gun, and press in on the plunger "I" as far as it will go. The barrel is then completely empty. Then submerge the threaded end of the barrel in an approved lubricant; press down the lock "H," and pull out the plunger assembly at "I," as far as possible. This suction will fill the barrel completely. Then screw the barrel back into the head of the gun. It is then ready for lubricating work.

To Operate the Gat Gun

(See illustration No. 13.)

First press in on the plunger at "I" as hard as possible, placing the knob "I" against the body and pumping the lever "K" up and down a few times to insure that the gun is free from entrapped air, for entrapped air will stop the flow of lubricant unless eliminated. When knob "I" has been forced as far forward as possible, the lock "H" grips the shaft "G," holding it in place. The spring "F" is compressed, holding the lubricant in space "D" compactly, so that lubricant is fed into the booster chamber "L" every time the lever "K" and high pressure piston "A" are raised and lowered.

When the handle "K" is pressed down, the plunger "A" forces the lubricant through "C" and the hose to the bearing under a pressure as high as 7500 pounds or more per square inch, depending on the strength of the operator. Approximately 1/20 of an ounce of lubricant is delivered with each full stroke of the piston. About 400 strokes are required to empty the gun when filled.



Illustration No. 14
Gat gun hose.

If difficulty is experienced in loosening the coupling from the button head fitting, raise handle "K" as high as it will go. This will permit easy removal of the coupling.

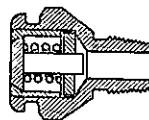


Illustration No. 15
Button head
fitting.

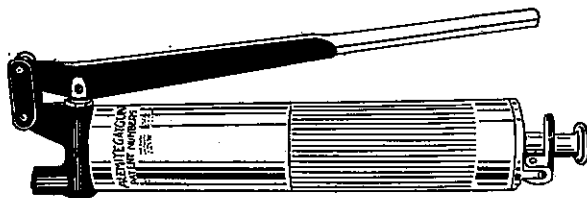


Illustration No. 16—Alemite gat gun.

Keep Grease Free from Dust

The gun containing your supply of grease should not be allowed to stand open so that dust can get into it. Dust is gritty, and if carried into the bearings with the grease, will cut the bearings rapidly and often cause them to heat excessively.

When filling grease nipples, it is important to wipe the dust from the nipple before filling. When grease is put in, the dust gets in with it and bad results follow.

 Note the location of the grease connections in the Lubrication Chart.

Importance of Engine Lubrication

The life and efficient working of the tractor depends on proper lubrication; neglect in this direction may cause serious trouble, excessive wear and complete breakdown. Properly oiled working parts must always have a thin film of oil between them; the kind of oil to use under a given condition is determined by its ability to establish this film between the rubbing parts, and to resist being squeezed out under normal pressure. It must also be of proper quality to resist decomposition caused by heat. The average operator does not know that to get the maximum horse power from his tractor he must look after his lubricating oil as closely as he does his fuel. The best oil that can be obtained will wear out and become gritty in time. Therefore, complete renewal of the oil is absolutely necessary after every 60 working hours *or more often when tractors are operating in very dusty or extremely dry soil, in which case the oil in the crankcase should be completely changed oftener; at least once a day if necessary.*

Putting fresh, clean oil into a dirty crankcase pan, containing a remainder of the worn-out oil, is a waste of good oil, since the old oil contaminates the new in a short time.

Too much cannot be said about the need of good oil of the proper body. Oil which is suitable for lubrication of internal combustion engines must be *neutral*—that is, free from *acid* or *alkali* reaction; free from moisture, tarry or suspended matter; must have no thickeners or mineral in suspension; and constants should closely approximate the following values.

	Flash	Fire	Viscosity At		Pour	Carbon
			100°F.	210°F.		Per Cent
Heavy oil (for Summer— above 32°F)	420°F Min.	490°F Min.	650 Seconds Max.	67 Seconds Min.	40°F Max.	.60 Max.
Light oil (for Winter— below 32°F)	375°F Min.	420°F Min.	450 Seconds Max.	55 Seconds Min.	35°F Max.	.50 Max.

Engine Oiling System

Cylinders, connecting rods, crankshaft bearings, camshaft, and all parts within the crankcase are lubricated by splash.

Engine Oil Supply

The oil must be poured into the crankcase sump through an opening for this purpose located on the governor housing at the front of the engine. If poured in through the handholes, governor parts will not be sufficiently lubricated. (See illustration No. 7.) Two small test cocks are located on the right side of the crankcase pan which indicate the high and low level of the oil. The oil should never be above the high level nor below the low level.

(See illustration No. 6.)

Engine Oiling Instructions

Engine oiling is very important and instructions should be followed closely. The oil should be drained down to the level of the *large drain cock* located on the right side of the crankcase pan and replenished with fresh oil to the level of the *top test cock*, after every 10 hours of work.

Drain the engine oil completely after every 60 hours' run *except when tractors are operating in very dusty or extremely dry soil, in which case the oil in the crankcase should be completely changed more often; at least once a day if necessary.* Remove the drain plug, located in the bottom of the crankcase sump for this purpose. (See illustration No. 6.) In cold weather drain all oil from crankcase pan when motor is shut down for the night, or a longer period. This should be done while the oil is hot so it will drain freely and completely. When refilling, warm oil *thoroughly* and pour into crankcase just before starting the motor as this will insure oil thin enough to pass through screen over pump suction, as with very cold oil it is possible to have lots of oil above the screen and none below for the pump to handle. The oil strainer in governor housing should be removed occasionally and cleaned.

(See illustration No. 7.)

Oil Pressure Gauge

The indicator pointer in oil pressure gauge should register at all times when the engine is running. Should the gauge not register, it is an indication that the oil pump is not performing properly or the oil supply needs renewing. The engine should be stopped immediately and the oiling system inspected to find the cause of failure.

(See illustration No. 2.)

Care of Oil Filter and Element

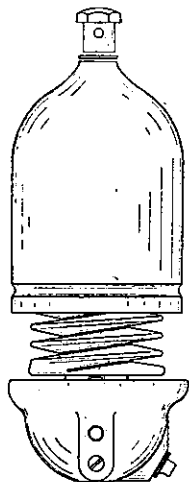


Illustration No. 17

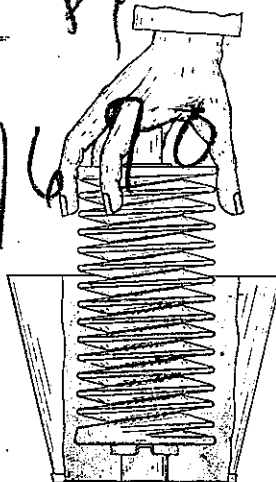


Illustration No. 18

The oil filter performs the very essential function of filtering the lubricating oil in the crankcase of the tractor continuously as the tractor runs, keeping the oil free from all dirt and abrasive matter. The dirt filtered from the oil is deposited in the filter and does not circulate with the oil as on tractors that are not equipped with an oil filter. It is, therefore, necessary that the oil filter be cleaned at least every one hundred hours of operation.

To clean the oil filter, first stop the engine, then remove the drain plug "14" from the base "6" of the filter. (See illustration No. 70.) Allow all the oil and dirt to drain off, and replace plug. Unscrew the retaining nut "7" on the top of oil filter case. Lift off nut "7" and gasket "1" and remove case "8." This now leaves the filter element "2" exposed. Remove filter element by lifting it off vertically. To wash the filter element, submerge it partially in gasoline, kerosene or distillate, place one hand firmly over the top of the filter element to close the opening, and press the element together several times (like an accordion) in the cleaning liquid. (See illustration No. 18.) This quickly washes away the accumulation of dirt on the outside of the filter element. The element, when clean, should be drained, *not dried*, and replaced in oil filter by sliding it down over the mounting stud, replacing the case, washer and retaining nut. Be sure that case is properly engaged against gasket "4" in top of base "6," and that retaining nut "7" is pulled up as tight as possible.

When cleaning the filter element, examine it closely after it has been washed and be sure that there are no breaks in the surface of the filter material. The life of the filter element under normal care is approximately one year. At the end of this time the element should be replaced to obtain best results.

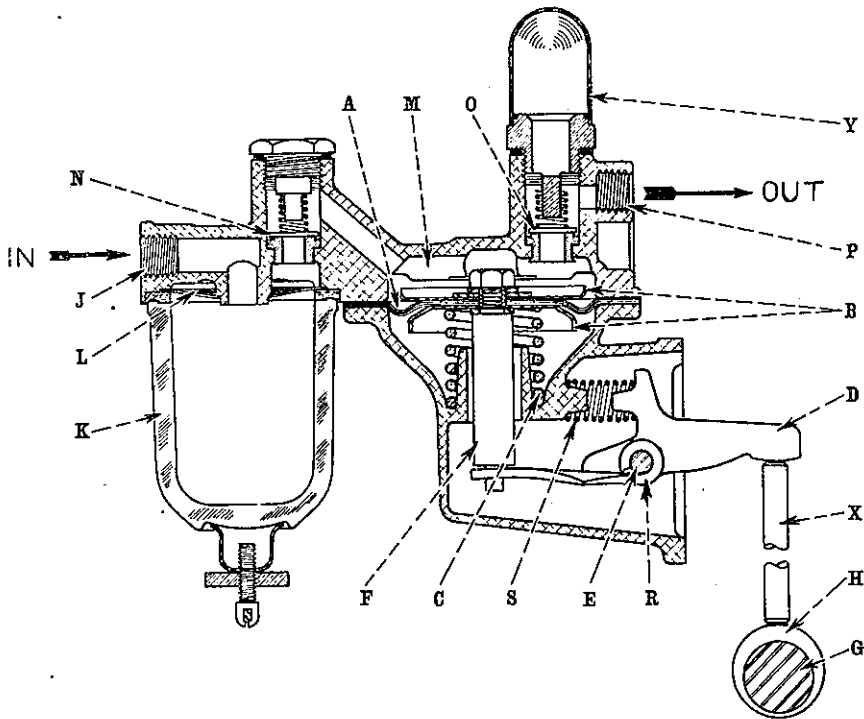


Illustration No. 19.

A. C. fuel pump (13698DB) (sectional view).

Service on the A. C. Fuel Pump is available through United Motors
Service Branches and Authorized A. C. Service Stations.

Description of Parts

A. Diaphragm.	G. Shaft.	O. Pressure valve.
B. Metal disks.	H. Eccentric.	P. Outlet opening.
C. Pressure spring.	J. Inlet opening.	R. Break.
D. Rocker arm.	K. Sediment bowl.	S. Rocker arm spring.
E. Pivot point of rocker arm.	L. Strainer.	X. Fuel pump shaft.
F. Pull rod.	M. Pump chamber.	Y. Vapor dome.
	N. Suction valve.	

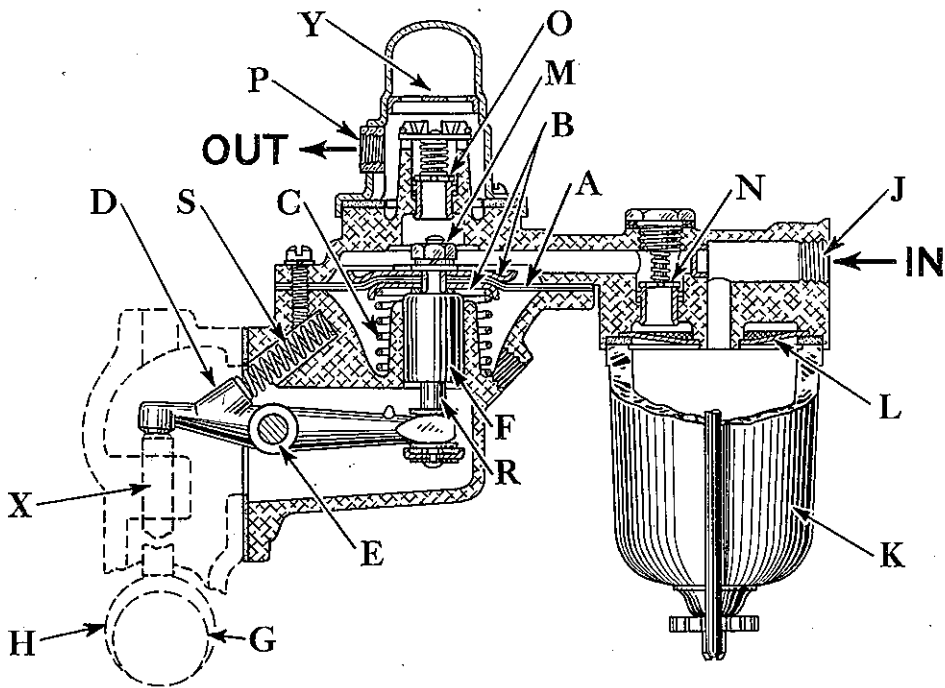


Illustration No. 20

Stewart-Warner fuel pump (18052D) (sectional view).

Service on the Stewart-Warner Fuel Pump is available through all authorized Stewart-Warner Service Stations.

Description of Parts

A. Diaphragm.	G. Shaft.	O. Pressure valve.
B. Metal disks.	H. Eccentric.	P. Outlet opening.
C. Pressure spring.	J. Inlet opening.	R. Pick-up.
D. Rocker arm.	K. Sediment bowl.	S. Rocker arm spring.
E. Pivot point of rocker arm.	L. Strainer.	X. Fuel pump shaft.
F. Pull rod.	M. Pump chamber.	Y. Vapor dome.
	N. Suction valve.	

Fuel Tanks

The gasoline tank holds $\frac{1}{2}$ gallon and the kerosene tank 26 gallons.

Shut-off Needle Valves

The shut-off needle valves under the gasoline and kerosene tanks should always be closed when engine is stopped for more than an hour.

(See illustration No. 1.)

Fuel Strainer

(See illustration No. 1.)

The fuel strainer should be taken apart and cleaned at least once a week when tractor is in use. This is done by first closing all shut-off needle valves for the gasoline and kerosene tanks.

To take strainer apart, loosen the lower jam nut, then the bowl adjusting nut, and swing the bail wire to one side. Fuel bowl can then be lowered, removed and cleaned. Note condition of screen and if it is not corroded or clogged with dirt it is not necessary to remove it.

In reassembling the fuel strainer, be sure that cork gasket between the bowl and main body is in good condition and does not leak.

Fuel Pump

(See illustrations Nos. 1, 19 and 20.)

Important—Do not attempt to disassemble the fuel pump further than described on page 23. If the trouble cannot be located after a careful check, take your pump to one of the Authorized Service Stations.

Service Hints. There are some service operations on the fuel pump that can, if necessary, be done without referring to the service station, and these are tabulated on page 23. In some instances, trouble is attributed to the fuel pump which in reality is caused by some other condition. Trouble should be carefully checked to avoid the needless replacement of fuel pumps.

Fuel pump operates direct from eccentric (**H**) on magneto shaft (**G**) by means of fuel pump shaft (**X**) interposed between eccentric and pump rocker arm (**D**). (See illustrations Nos. 19 and 20.)

Fuel Pump—Service Hints—Continued

Lack of Fuel at the Carburetor

Check as follows:

Cause	Remedy
Gasoline tank empty	Refill.
Leaky tubing or connections	Replace tubing and tighten all pipe connections at the fuel pump and gasoline tank.
Bent or kinked tubing	Replace tubing.
Glass bowl loose	Tighten thumb nut, making certain that cork gasket lies flat in its seat and is not broken.
Dirty screen	Remove glass bowl and clean the screen. Make certain that cork gasket is properly seated when reassembling.
Loose valve plug	Tighten valve plug securely, replacing valve plug gasket if necessary.
Dirty or warped valves	Remove valve plugs and valves. Wash valves in gasoline. If damaged or warped, replace them. Examine valve seat to make certain there are no irregularities, which prevent proper seating of valves. Place valve in valve chamber with the polished side downward. Make certain that valve lies flat on its seat and is not left standing on edge. Reassemble valve plug and spring, making certain that spring is around the lower stem of the valve plug properly. Use new gasket under valve plug if necessary.

Leakage of Fuel at the Diaphragm

Check as follows:

Cause	Remedy
Loose cover screws	Tighten cover screws alternately and securely. Caution: Do not disassemble the pump body. Note: Sometimes there appears to be a leak at the diaphragm, whereas the leak actually exists at one of the pipe fittings and the fuel has run down the pump to the diaphragm flange, appearing to originate there.

Flooding of Carburetor

Check as follows:

Cause	Remedy
Carburetor needle valve not seating	Check carburetor for proper adjustment.

The Carburetor

The 1½" Model "R" kerosene carburetor is used. After the fuel leaves the fuel line, it enters the float chamber of the carburetor by passing through a screen and float-controlled needle valve. The float maintains a constant fuel-level below the top of the suction tube. Through the suction of the engine, the fuel, properly mixed with air, is drawn past the governor throttle valve into the cylinder. Before the air enters the carburetor, it is passed through the air filter. A hand-operated damper (or choker valve) is located in the carburetor volute so that the air to the carburetor may be regulated for starting. The purpose of this choker valve is to enrich the mixture for starting.

(See illustration No. 2.)

Ref. No.	DESCRIPTION
1	Fuel adjusting screw (knurled nut).
2	Fuel strainer cage.
3	Fuel inlet.
4	Air inlet.
5	Throttle shaft stop screws.
6	Fuel adjusting screw retainer (lock spring).
7	Fuel bowl cover.
8	Fuel bowl.
9	Fuel drain cock.
10	Idling adjustment screw retainer spring.
11	Idling adjustment screw.

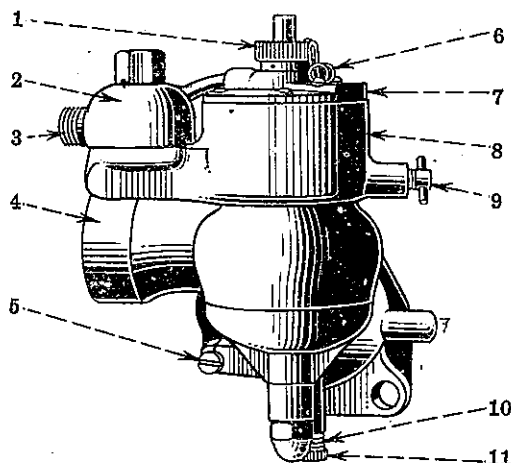


Illustration No. 21
Model "R," 1½" kerosene carburetor.

Kerosene cannot be used successfully as a fuel without the use of heat. Heat is necessary to turn the fuel into a vapor and unless it is completely vaporized before entering the cylinders, it will not burn efficiently. Unvaporized fuel in the cylinders has a tendency to destroy the lubricating properties of the oil on the pistons and may result in excessive dilution of the oil in the crankcase.

Heat for vaporizing the fuel is obtained from the exhaust gases. It takes some time for these gases to heat up the intake manifold when first starting. Since it is always necessary to start on gasoline, it is much better to run the engine on gasoline until the manifold is sufficiently hot. The switch from gasoline to kerosene should not be made until the intake manifold (illustration No. 23) is too hot to touch with the hand; and after the engine is once warmed up, see to it that it does not cool off during operation.

The tractor is supplied with a radiator curtain which is readily accessible and which should be used every time a cold engine is started. The quicker the engine warms up, the less gasoline will be used and the less oil dilution will be found from the use of kerosene.

On account of the nature of the demands on a tractor, it is necessary that they have a very efficient cooling system. For this reason, the engine cools off very rapidly when running idle or throttled. Therefore, it is good practice when throttling or idling for long periods, or operating at light loads in atmospheric temperatures under 60° F. to pull up the radiator curtain and keep the engine up to its working temperature during these periods.

Carburetor—Continued

The manifold and carburetor on this tractor are designed to give equally good performance with gasoline or kerosene as fuel. To accomplish this, two valves are incorporated in the construction to control the path of the exhaust gases. One of these valves is called the baffle and the other the control valve.

(See illustration No. 22.)

The baffle deflects the gases down against the intake portion of the manifold when in kerosene position and deflects them up away from the intake portion when in gasoline position.

The control valve when in kerosene position forces all of the exhaust gases to pass through the exhaust passage surrounding the vertical portion of the intake manifold. When in gasoline position this valve blocks the lower end of the passage surrounding the intake manifold and allows the gases to pass out directly through the rear passage.

When operating on kerosene the baffle should be set so that the word "**KEROSENE**" (cast on the baffle plate) is right side up, and the control valve must be set with the letters "**KER**" registering with the arrow cast on the lower exhaust passage. In extremely hot weather, the control valve can be set with the intermediate notch opposite the arrow.

To operate on gasoline the baffle should be set so that the word "**GASOLINE**" is right side up and the control valve set so the letters "**GAS**" register with the arrow.

It is important that both the baffle and control valve be properly set to correspond with the fuel being used. Under no conditions should the control valve be set in gasoline position with the baffle in kerosene position or vice versa, as the engine will not run properly.

To change the baffle from one position to the other, unscrew the two nuts "**A-A**," pull the baffle out and turn it over.

To change the control valve, unscrew nut "**C**," loosen nut "**B**," turn valve to desired position and locate nut "**C**" in proper notch before tightening down on both nuts.

First Adjustment of Carburetor

Open the fuel adjusting screw on the top of the fuel bowl one and one-half ($1\frac{1}{2}$) turns, and the idle mixture adjustment screw, underneath the carburetor, about two and one-half ($2\frac{1}{2}$) turns.

Pull up the choke and prime the engine with gasoline through the priming cocks. This will eliminate some of the hard work of cranking. As soon as the engine starts, drop the choke back about $\frac{1}{2}$ and hold it there until the engine runs steadily at no load.

Allow the engine to run at governed speed until properly warmed up. It is advisable when making the first adjustment, to cover the radiator entirely and run the engine until the water boils before making any change in the above adjustment.

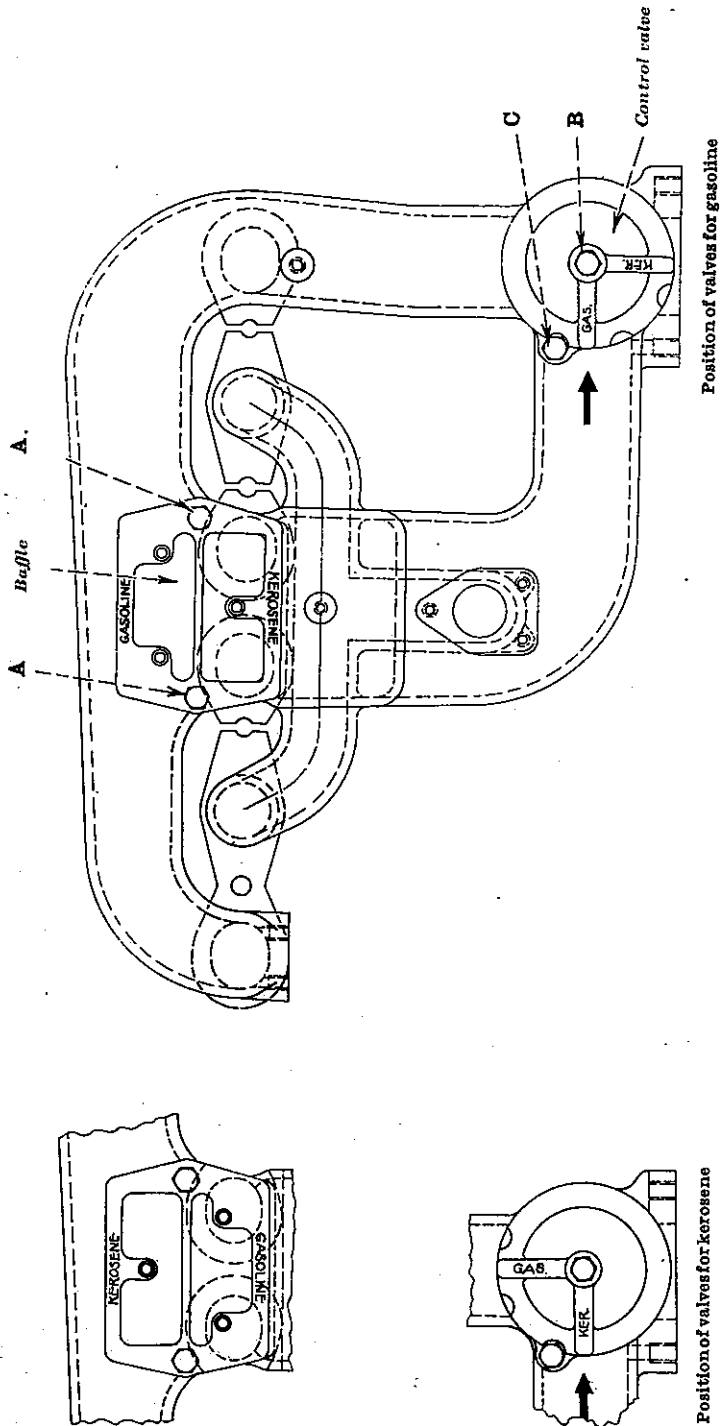


Illustration No. 22

Valve and baffle setting for combination manifold.

Carburetor—Continued

Attempt No Adjustment Until Engine is Hot

After engine is warmed up and spark is fully advanced, throttle wide open, and with engine running idle under governor control, screw in fuel adjusting screw (in center of fuel bowl cover) one notch at a time until engine begins to slow down. Back adjustment out carefully until engine regains full speed, and then stop.

This adjustment gives the most economical mixture consistent with maximum power. If maximum power is not required, greater economy may be had from a mixture slightly leaner than this setting.

It is always advisable to check up on this setting when the tractor is under load, bearing in mind that the proper mixture is always the leanest that will give good performance. *Over-rich mixtures do not increase power, but waste fuel and result in great damage to the engine.*

Now close down the throttle and retard the spark and adjust the throttle stop screw (See illustration No. 21) to the desired low speed. If the engine does not idle smoothly at this speed, turn the idle adjustment screw a few notches in either direction in order to correct it. Screwing the idle adjustment in enriches the mixture, and screwing it out makes the mixture leaner. After the proper adjustment has been made, and if it is necessary to throttle slower, it will be noted that screwing out the throttle stop screw for a lower speed has a tendency to enrich the mixture and must be compensated for by making the mixture leaner with the idle adjustment.

It is not possible to obtain an idle adjustment with the fuel adjusting screw on the top of the fuel bowl, with this type of carburetor.

Care

If proper attention is given to using clean fuel and keeping the fuel strainer and strainer cage clean, they should last indefinitely.

The carburetor is very simple. Proper care should be given to straining all fuel before going into the fuel tank. The fuel strainer, located on right side of engine, should be taken apart and the screen washed at least once a week when the tractor is in use. This strainer must be drained of kerosene every time the gasoline is turned on.

It is advisable to frequently check up the tightness of the cap screws which hold the carburetor to the manifold, as gaskets often become thinner from pressure and heat.

At times, after choking the carburetor, it will be noticed that a small quantity of fuel flows from the bottom of the carburetor. This fuel comes from a drain hole made for this purpose and is to keep an excess of fuel from settling in the lower part of the carburetor and manifold.

A small leakage of fuel, under these circumstances, should cause no concern, but if it continues more than a few seconds, it indicates that the carburetor is flooding. If tapping the strainer cage sharply does not overcome this, it may be necessary to remove the needle valve and its cage and clean them.

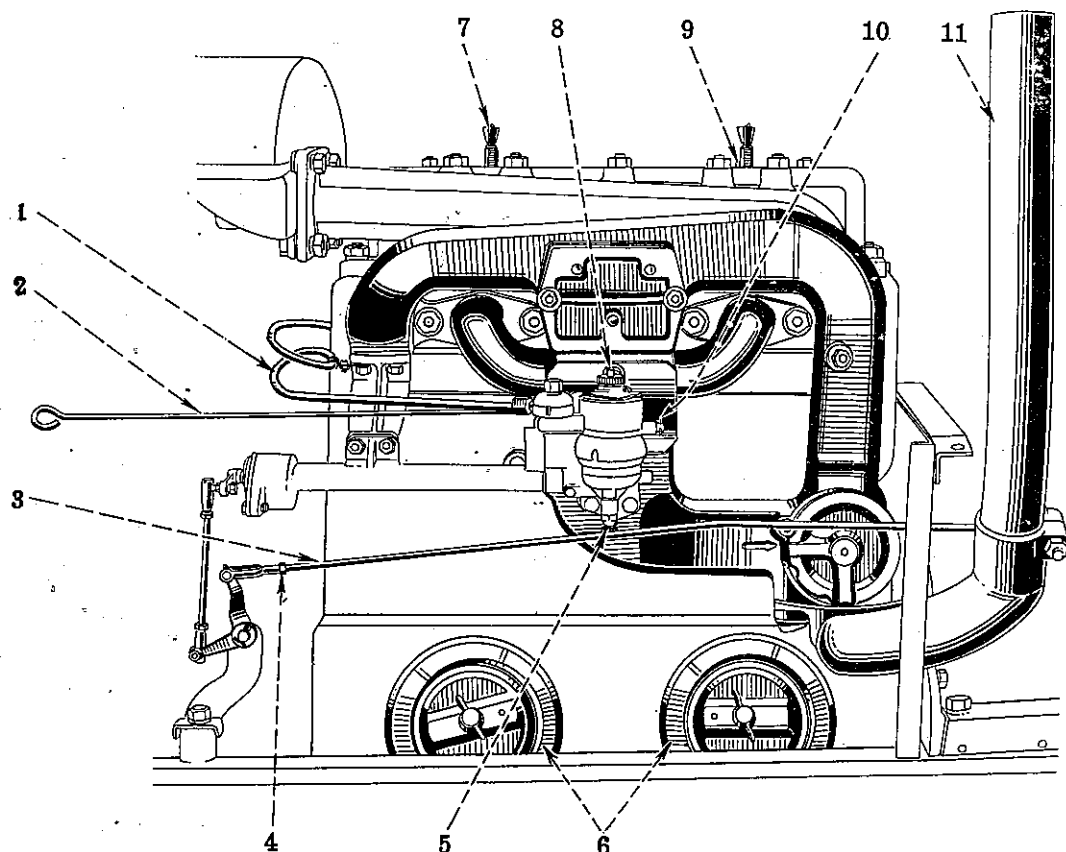


Illustration No. 23

Left side of engine showing fuel pipe and
throttle connections.

Ref. No.	DESCRIPTION	Ref. No.	DESCRIPTION
1	Fuel line.	7	Priming cup.
2	Choke rod.	8	Fuel adjustment screw.
3	Throttle rod.	9	Valve housing oiler.
4	Adjusting arm clevis nut.	10	Carburetor fuel drain cock.
5	Idling adjustment screw.	11	Overhead exhaust.
6	Handhole plates.		

Governor

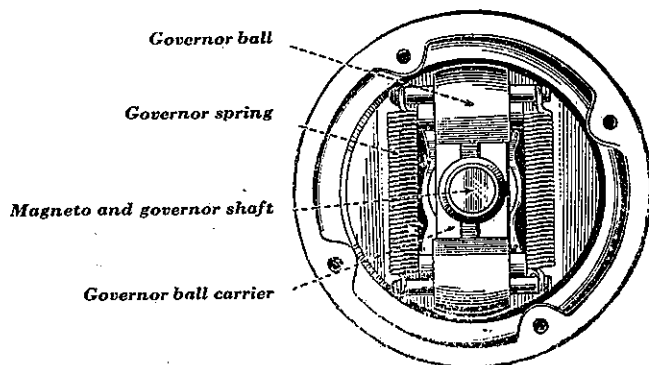


Illustration No. 24
Governor detail.

The governor is provided with a speed changing device which will allow for a change of speed from 900 R.P.M. to 1125 R.P.M. idling.

This device is located in back of the governor housing and when the block is turned to the right, the speed is increased; when turned to the left, the speed is decreased.
(See illustration No. 7.)

This device will be found very useful in obtaining proper speeds quickly when tractor is operating threshers and similar machines requiring close speed regulation.

Throttle Control Handle

(See illustration No. 3.)

The handle located on the left side of the left steering post is the throttle control handle. Since the governor maintains constant engine speed under variable loads, this handle should be used only to reduce the speed of the engine below normal operating speed, at which very little load can be handled by the engine.

AIR FILTER (Oil—International)

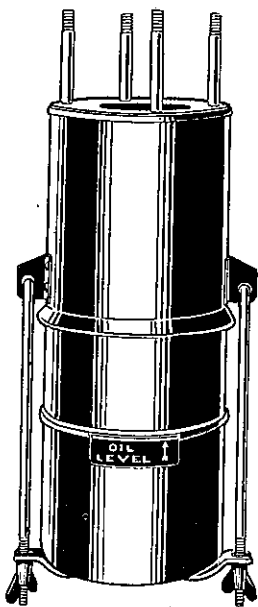


Illustration No. 25

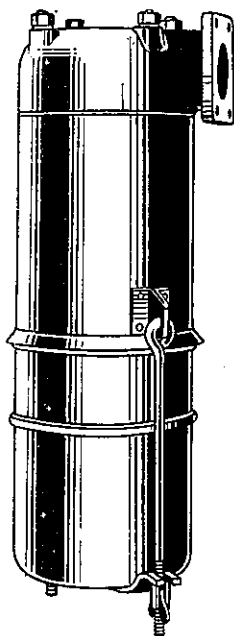


Illustration No. 26

Normally, the capacity of this air filter is sufficient to require removal of the oil and dust regularly at the time crankcase is drained; however, this must be done more frequently under severe dust conditions. The oil cup should be emptied and the sediment cleaned out. Refill with oil to the level indicated. (*See illustration No. 25.*)

It is important to wash the air filter periodically besides changing oil in oil cup. In order to accomplish this, the oil cup should first be removed, then the air filter body should be disassembled by removing the four nuts which hold the filter body to the filter top. (*See illustration No. 67.*) A handle on the bottom plate permits the entire air filter body to be held while the body strainer is being rinsed in a pail of kerosene. (*See illustration No. 67.*)

Under extreme conditions, the air filter tube may become clogged with mud and chaff, so that it is advisable to remove the bottom plate in order to reach the filter strainer. This is done by unscrewing the three machine screws which hold the bottom plate to the air filter tube. The air filter should then be turned upside down and rinsed in a pail of kerosene.

Oil Recommended for Air Filter

At temperature of 10° above or below zero (Fahrenheit)	} Use 100% crankcase flushing oil or about half kerosene and half crankcase waste oil.
At 40° to 10° above zero (Freezing temperature) (Fahrenheit)	
	} Dilute oil drained from crankcase with about one part of kerosene to five of the oil.

Crankcase flushing oil is a better medium for diluting crankcase waste oil than kerosene, as the flushing oil has a small amount of castor stock to give it stickness and adhesive qualities.

IGNITION SYSTEM

International E4A Magneto with International Automatic Impulse Coupling

The engine is equipped with a high-tension magneto and automatically operated impulse coupling.

Magneto is placed on engine in an approved manner; *illustration No. 27* shows the correct method of wiring.

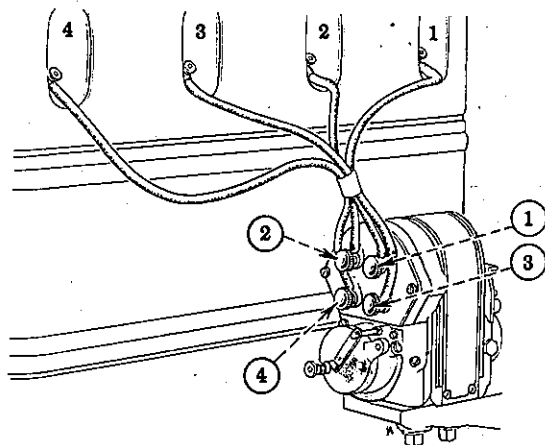


Illustration No. 27—Wiring plan (for E4A Magneto).

☞ Firing order is 1, 3, 4, 2, beginning at radiator end of engine.

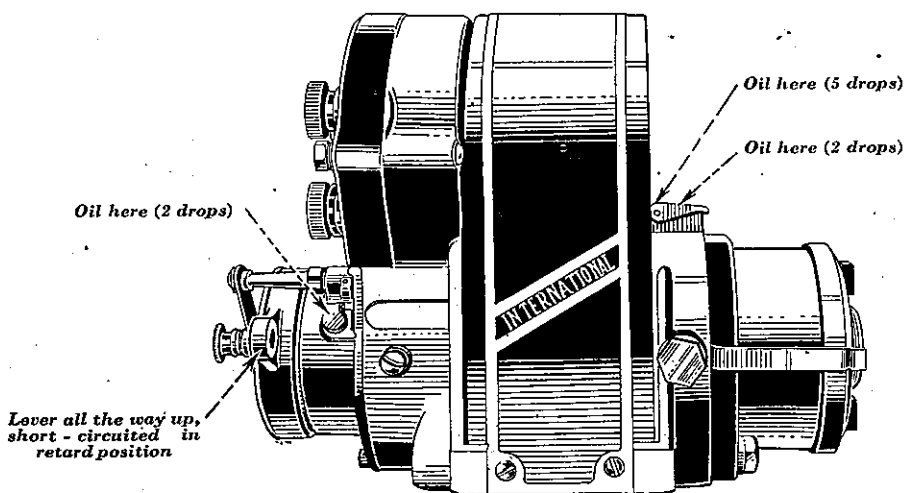


Illustration No. 28 (for E4A Magneto).

International E4A Magneto with International Automatic Impulse Coupling—Continued

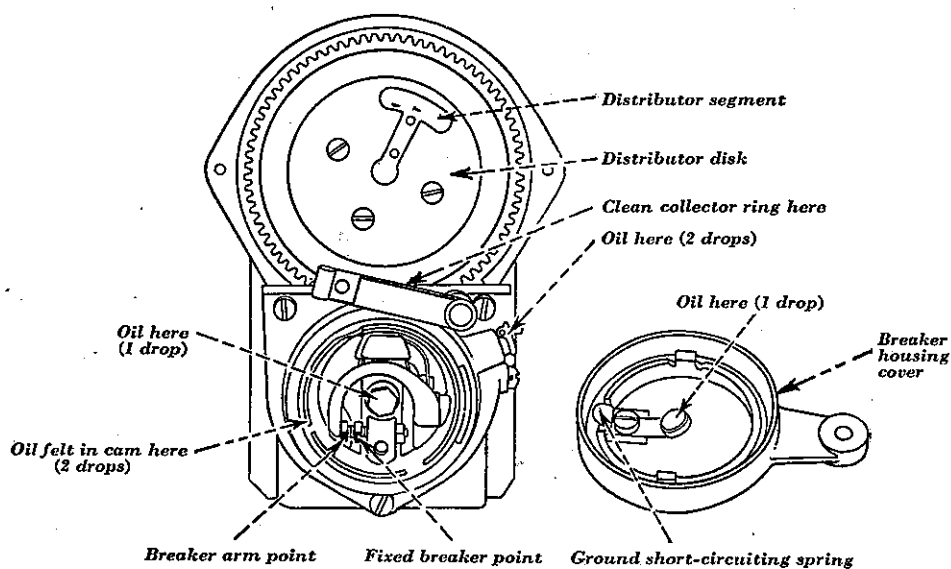


Illustration No. 29
(for E4A Magneto).

Operation and Care of Magneto

Every engine is correctly timed at the factory and therefore should not be tampered with. If the engine is overhauled and the magneto removed, the following diagram and instructions, if closely followed, will insure perfect operation and satisfaction:

Line up the magneto on the magneto bracket and bolt it in place, leaving the two screws out of the adjustment coupling and being sure that any shims that were between the couplings are replaced.

Using the crank, turn the engine until No. 1 piston (the piston next to the radiator) is on the upper dead center on the compression stroke. The compression stroke can easily be determined by removing the No. 1 spark plug and placing the thumb over the opening until an outward pressure is felt. Continue to turn the engine with the crank until D. C. mark on the flywheel and the pointer on the bell housing line up, taking into account the rotation of the distributor disk which is clockwise as viewed from the breaker end. (See illustration No. 29.)

Connect the spark plug cables to the magneto, starting with the No. 1 cable and attach same to the terminal on the distributor block marked 1; the other cables to be attached according to the firing order which is 1-3-4-2. (See illustration No. 27.)

Take hold of the magneto half of the adjustment coupling and rotate the armature until the breaker arm rubbing block is on the highest portion of the cam. The distance between the points while in this position must be .012" to .015" or the thickness of the gauge marked "Breaker Points" on the magneto wrench. Should the points need adjustment, loosen the "fixed breaker point lock nut" and adjust the "fixed breaker point" to the thickness of the gauge, care being taken not to move the "fixed breaker point" when tightening the lock nut. (See illustrations Nos. 29, 30 and 31.)

Put the spark control handle one notch forward from full retard position, then loosen the two nuts between the two spark control rod ball joints. Retard the breaker housing cover as far up as possible and with the spark control handle still in the same notch, adjust the ball joint rod and tighten up the nuts.

Without changing this setting, remove the breaker housing cover. (See illustrations Nos. 5 and 29.) Remove distributor block and rotate magneto armature in a clockwise rotation as viewed from the driving end until the segment in distributor disk is under the No. 1 terminal and the magneto points are just opening. (See illustration No. 29.)

The magneto is now correctly timed with the engine and care being taken not to change this setting, insert the two bolts in the adjustment coupling. The coupling is so made that only two of the holes line up exactly opposite to each other and the bolts must not be forced or the setting will be off. (See illustration No. 7.)

Screw on the distributor block and put on the breaker housing cover. Crank engine until the magneto impulse coupling trips. This should trip on dead center or 8° after dead center, care being taken to check this closely. The magneto is now ready for service.

Note—Care must be taken not to use too long a screw for holding magneto to base as the screw may damage the inside of the armature.

International E4A Magneto with International Automatic Impulse Coupling—Continued

Spark Control Handle

The spark control handle should always be about three notches advanced of the full retard position when starting the engine. The spark should be advanced after the engine has been warmed up or put to work.

Should the engine be started by mistake with the spark fully advanced, there is danger of a back-fire or "kick" which may result in serious injury to the person cranking. When running with retarded spark the engine will not develop full power, will heat up and use an excessive amount of fuel. If spark is advanced too far it will cause detonation and engine will pound.

It must be remembered that when the spark is *fully retarded*, the magneto is shorted through the ground post, and the engine cannot be started. As previously stated, the spark control handle must be advanced about three notches on guide so as to break contact to the ground post.

To stop the engine, it is necessary only to *fully retard* the spark control handle, which shorts the magneto to the ground post. (See other instructions on page 8.)

Oiling and Care of Magneto

Important: When the tractor is received from the manufacturer, or when it has stood idle for more than three months, fill both oil cups on the magneto twice before starting the engine.

When running continuously, oil every week or every 1,000 miles of travel. (See illustrations Nos. 28 and 29.) The ground contact button and breaker cam as shown in illustration No. 29 should be oiled with sewing machine oil once each week. *Do not oil these places excessively*, as the surplus oil may be thrown up and lodged on the breaker points, causing irregular firing and perhaps total failure of the magneto.

Remember that the magneto is one of the most sensitive and most neglected parts of any tractor engine. Sometimes it gets attention from an unskilled mechanic, all to the detriment of the magneto. Never take a chance on unskilled labor tinkering on your magneto.

It is requested that you bring your magneto to the International Harvester Co. dealer where you bought your tractor, or to any other authorized International Harvester Co. dealer, at least once for each 12 months of service, for general inspection and greasing of the armature bearings. If trouble should occur which cannot be taken care of with the aid of this instruction booklet, *don't hesitate*; take your magneto to the International Harvester Co. Service Station, where skilled mechanics give you attention for a very nominal sum.

Circuit Breaker

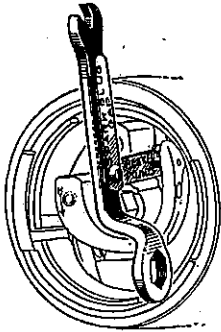


Illustration No. 30
Gauging breaker points.

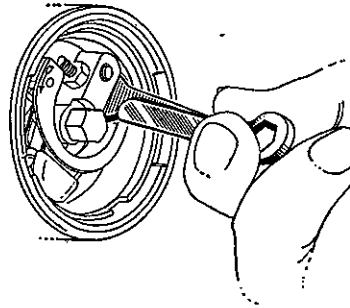


Illustration No. 31
Adjusting stationary breaker point.

Magneto breaker points should be inspected for gap opening after first 50 hours of operation; then again inspected after next 100 hours; then again after another 100 hours of operation. The gap should be maintained at .012" to .015" at all times. Gauges are supplied with each magneto. After first 250 hours, the fiber rubbing block on breaker has found its permanent seat.

Care should be taken that the rubbing surface of the cam be always free from dust and slightly oiled, thus preventing the fiber block from wearing excessively.

(See illustration No. 29.)

The breaker points on this magneto are made by a special process and are very hard. They require very little adjustment, due to the fact that they do not burn off or become pitted but very little. Should the points require dressing, use a sharp magneto point file, dressing only to the polishing point. One point should be slightly rounded, about .003" to .004" to insure good contact, even if the long one is rotated for adjustment. (See illustration No. 32.)

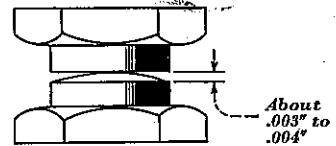


Illustration No. 32
Dressing breaker points.

Should the points need adjusting, proceed as described under paragraph "Operation and Care of Magneto."

In very damp territories or during damp seasons, the circuit breaker should be inspected occasionally and the springs cleaned and wiped with a piece of cloth dampened with machine oil to prevent the springs from rusting. A rusted spring is greatly weakened and will soon break if continued in operation.

Distributor

The distributor block should be removed every 200 or 300 hours of operation for inspection. The inside of the distributor block, the face of the distributor disc and the collector ring on the armature shaft (Illustration No. 29.) should be cleaned with a cloth moistened with gasoline and then wiped dry with a clean cloth. The brushes should be inspected to see that they are in good condition and move freely in their guides. If the brushes are allowed to stick in their guides they will arc and form a green corrosion on the brass parts and rust the brush and breaker spring. This will be the case even if only one brush is giving trouble. See that all brushes are free in their guides.

International E4A Magneto with International Automatic Impulse Coupling—Continued

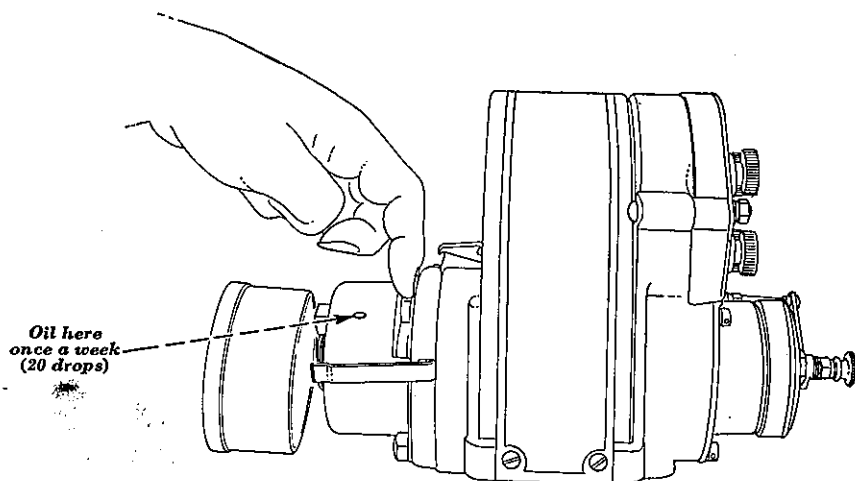


Illustration No. 33
Disengaging feature of impulse coupling.

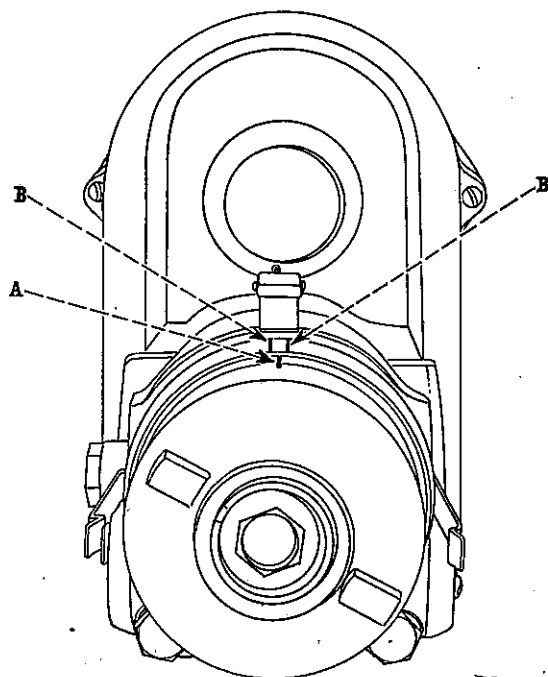


Illustration No. 34
Impulse coupling, showing timing marks.

International Automatic Impulse Coupling

The magneto of this engine is equipped with an automatic impulse coupling.

The International Automatic Impulse Coupling fitted to the International High Tension Magneto makes possible the production of as good a spark when cranking the engine at low speed as occurs at full speed normal operation. This is accomplished by means of a pawl and spring arrangement which holds the armature of the magneto back for a part of the engine's revolution and then releases it suddenly at the correct sparking time. The spring drive gives the armature a quick flip at each firing position. This is repeated until the engine has reached a speed of 160 revolutions per minute when the pawls are automatically disengaged by centrifugal force and the drive is direct without pulsations.

Disengaging Feature of Impulse Coupling

When timing the magneto it is necessary to disengage the impulse feature. This can readily be done by first unfastening the cover and then pressing the tail end of the top pawl down while the engine is being rotated. This prevents the pawl from engaging the catch plate. (See illustration No. 33.)

Time of Tripping

When the coupling is impulsing normally with the cover off, the mark "A" on the coupling member assembly should lie between the two timing marks "B-B" on the coupling plate at the exact time of tripping. (See illustration No. 34.)

Care of Impulse Coupling

Once a week, remove the dust cover and oil through oil hole in outer cup. (See illustration No. 33.) Oil liberally with cream separator oil or any good light oil with a cold flow test of at least 30° F. below zero.

Every precaution must be taken so as not to get dust or dirt of any kind in the coupling.

At least once a year the magneto with coupling should be removed for servicing at a service station. In case of inaccessibility to a service station, remove coupling, wash in kerosene and immerse in cream separator oil. Allow to drip off and reassemble.

WARNING! The use of ordinary machine oil in this coupling is dangerous, especially in cold weather. It may cause the engaging pawls to stick and thereby make the coupling inoperative. Failure to retard the spark before cranking may then cause a kick with the possibility of a broken arm.

Spark Plugs

Next to the magneto the spark plug is the most important part of the ignition system. If the plug is the wrong kind, old, or out of adjustment at the gap, the energy delivered by the magneto is not used to the best advantage.

The shape and construction of a spark plug has a very important bearing on its performance. This is especially true with reference to its operating temperature.

The spark plug selected after careful tests as best suited for this engine is the Champion No. 20 and should be used unless a good substitute of the same construction can be procured. (See illustration No. 35.)

Care of Spark Plugs. The gap must be maintained at .020" to .025" in order to get the most out of your engine.

Too wide a gap would cause misfiring especially at high speed and under heavy pulling at low speed with an open throttle, while too small a gap causes poor idling of the engine.

When adjusting the gap always bend the outside wire, never the center electrode so as not to split the insulator.

Plugs must be kept clean; outside free from dust, paint, oil and other accumulations; inside free from carbon. Any of the foregoing will cause leakage or loss of some of the electrical energy producing the spark in the cylinders.

The spark plug recommended is of the two-piece construction, making it easy to take apart and clean. The porcelain insulator and the shell should be kept clean at all times. The shell is best scraped with a knife or other suitable tool. The insulator should be washed in gasoline with the help of a stick of wood. Do not scratch the surface of the insulator because then the carbon will accumulate much faster.



.020" to
.025" gap

Illustration No. 35
Champion No. 20
spark plug.

Detection of Faults

In case of defective ignition, it must be determined whether the fault is in the magneto or in the spark plugs. It may be pointed out that in general, when only one cylinder misses, the fault is in the spark plug. Magneto failure usually is detected by irregular firing on all cylinders, first one and then the other.

Irregular firing is very often caused by the improper working of the circuit breaker and this part should be examined. It should be seen that the breaker arm moves freely, that the screws holding the arm to its springs are tight and that the opening between the breaker points is correctly set. Any oil, grease or dirt that is deposited on them should be removed. Trace all leads to spark plugs, make sure that the insulation is perfect and that the wire terminals make contact with only their respective terminal posts on magneto and spark plugs.

If this examination of the magneto has not led to the cause and it is absolutely impossible to start the engine, the timing of the magneto to the engine should be carefully verified. If the timing is found to be correct, and all other observation has not led to the cause or defect, *do not take magneto apart* for any reason at all. Take your magneto to your International Harvester Co. dealer where you will receive prompt service and repairs made correctly.

Some Common Defects of Spark Plugs

1st: Short circuit at the spark gap, due to small metallic beads which are melted by the intense heat of the spark, forming a conducting connection between the electrodes. This defect is easily ascertained and may be remedied by removal of the metallic beads.

2nd: If the gap between the electrodes is too great, caused by improper setting or the burning off of the ends, the spark will jump across the safety gap in the magneto. *This may be remedied easily by setting the gap to the proper distance using the gauge provided on the magneto wrench in the tool kit.*

(See illustration No. 36.)

3rd: Fouling of the spark plugs can be reduced to the minimum by using the correctly designed and recommended spark plug for the engine. Cleaning of shell and insulator is the only remedy for a plug full of carbon.

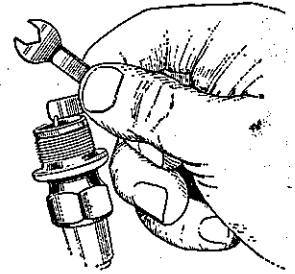


Illustration No. 36
Adjusting spark plug
points.

Test for Spark

To test for spark, remove a spark plug from the cylinder and with the wire attached lay it upon the engine. Crank engine slowly, being careful not to have brass nut at top of the plug touching any metal. If the spark is good it will be indicated by a bright flash between the spark plug points. Be sure that plug under test is removed when a cylinder is coming into firing stroke or turn engine until impulse starter has tripped at least four times.

WATER SYSTEM

General Information

The cooling of the engine is accomplished by the thermo-siphon system. The tank at top of radiator must be kept full to within 3 inches of the top. *The water level must not be allowed to drop below the radiator inlet, otherwise the loss of water will be excessive and the engine will overheat.*

The Radiator

Keep the radiator filled with water which is free from lime, salt, gypsum, sulphur or other impurities. Soft or rain water should be used if same can be readily obtained. Never pour cold water into an empty or nearly empty water system when the engine is very hot. Wait until engine cools off.

Draining the Water System

A drain pipe with a cap located under the radiator drains the entire water system. The capacity of the water system is about 10 gallons. The water system must be drained when there is danger of freezing, as serious trouble arises if the water freezes in the engine or radiator. *A list showing the properties of anti-freezing solutions may be found on page 51.*

Cleaning the Water System

The radiator and cylinder water jackets should be cleaned occasionally. To clean the radiator, disconnect the connections and flush thoroughly by pouring water in at top and through the radiator onto the ground. The cylinder jackets may be flushed in the same manner. Should the cylinders and radiator become limed up, make a solution of one part muriatic acid and seven parts rain water, and allow this to stand in system for thirty-six hours. Then drain, and flush the entire system with clean water.

The Fan

The fan is driven from the crankshaft by an endless belt. If radiator gives sign of overheating by excessive steaming or the engine laboring, examine the belt for slippage. Due to atmospheric conditions or prolonged use, the fan belt will stretch, and fan may hit against the upper part of fan shroud. In this case a new *endless* belt should be provided. *A laced belt is not satisfactory.*

(See illustrations and instructions on pages 57 and 58.)

BEARINGS AND GASKETS

Inspecting and Testing

To determine if the connecting rod bearings are loose, remove the handhole plates on left hand side of engine. Turn engine over until bearing to be tested is nearly at the top dead center of compression stroke. Then place a bar under nut on bearing cap and pry against it; meanwhile place the other hand on bearing and crankshaft and determine by touch what looseness is present.

(See illustration No. 37.)

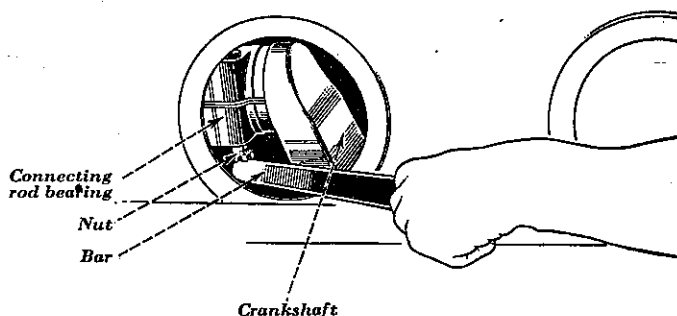


Illustration No. 37

Testing connecting rod bearings for looseness.

If excessive looseness is found, a sufficient amount of shims should be removed to leave about $3/1000''$ to $5/1000''$ play in the bearings and there should be from $10/1000''$ to $15/1000''$ side play. The main bearings are ball bearings and do not need adjustment or special attention except to *keep grit away from same*; this is best accomplished by keeping clean oil in crankcase.

(See "Engine Lubrication," page 17.)

Gaskets

Before putting on new gaskets, the surface for the joint must be thoroughly cleaned. When tightening up a joint after a new gasket has been inserted, screw up all nuts fairly snug, then tighten uniformly, giving each nut a small part of a turn at a time. Continue this until all nuts are tight. Do not screw one nut down perfectly tight, and then go to the next, as you will not secure an even pressure on the gasket in this manner. *After engine has been running a few minutes, tighten the nuts again.*

CAUTION—Be sure to adjust valve tappet clearance after the last tightening of cylinder head stud nuts.

ENGINE

Running a New Engine

Never run a new engine immediately under full load. Work it easily until you are sure that oil has reached all parts.

Maintaining Compression

Compression in all cylinders should be equal. Test the compression occasionally by turning the starting crank until compression is felt in each of the four cylinders in succession, comparing the result. Loss of compression is probably due to worn cylinder sleeves, worn pistons and rings, imperfect seating of valves, too little clearance between ends of valve levers and stems or by carbon deposit on the valve seats.

Carbonized Cylinders

In case the engine knocks continuously and does not develop the normal amount of power, it may be that the combustion chamber walls are coated with carbon. If the cylinders are carbonized, remove the cylinder head, scrape off the carbon from the head, piston head and combustion chamber. It is also advisable to regrind the valves at this time.

When replacing cylinder head, follow the instructions on page 41 under heading "GASKETS" regarding tightening of nuts as it is important to secure an even pressure on all studs.

Grinding Valves

Valves and seats must be kept in good shape. To regrind valves, drain the cooling system, remove the cylinder head, take off the valve springs, then lift out and clean valve and seat with kerosene. Make a paste of fine emery dust and oil, or use a prepared valve grinding compound.

Apply grinding compound to seat of valve. Put the valve in place and revolve it with a screw driver, or better a carpenter's brace with a screw driver bit, turning a few turns to the right and then to the left, lifting the valve off the seat occasionally to let the grinding compound get between the valve and seat. Continue in this manner until the valve and seat show an even surface all the way around. Then wash off with gasoline or kerosene. Be sure there is no dirt or compound left on the valve seat or in parts when assembling. *After grinding valves, it will be found necessary to readjust valve levers to compensate for the wear.*

K

Valve Adjustment

The valve levers must be kept properly adjusted, otherwise hard starting and lack of power will result. The firing order of the engine is 1-3-4-2. (See illustration No. 27.) If, for any reason, the valve setting has been disturbed or cam gear is to be replaced, care must be taken to restore to original setting. To facilitate this, all gears are properly marked and the marked teeth must be meshed together. Every time the nuts are tightened on cylinder head studs, the valve levers must be adjusted by means of the valve lever screws, using the valve clearance gauge so that there is a clearance of .012" between ends of valve levers and valve stem when valve is closed. This clearance is very necessary.

(See illustration No. 38.)

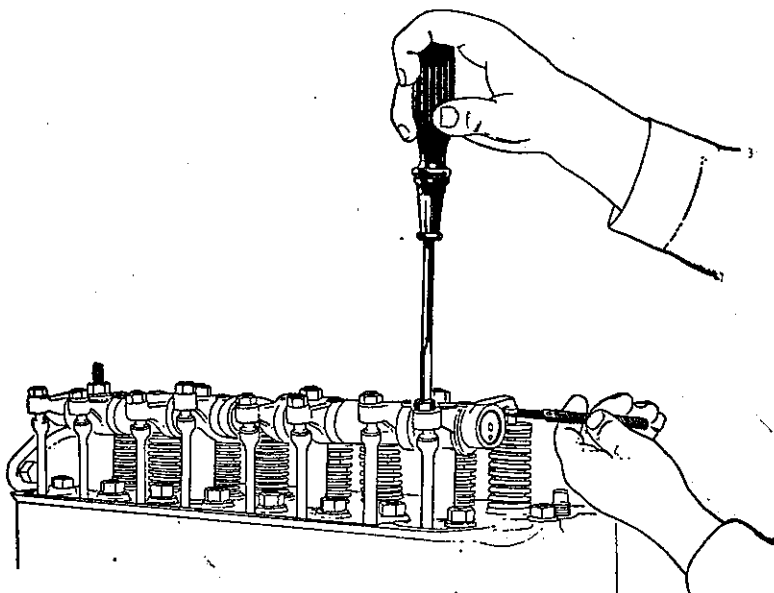


Illustration No. 38.
Gauging valve levers with a "feeler" gauge.

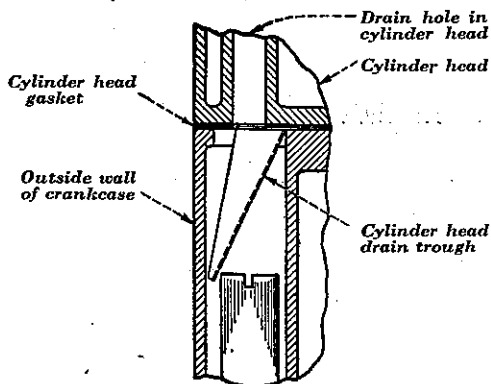


Illustration No. 39
Cylinder head drain trough.

Illustration shows drain trough properly placed to deflect water collected on top of cylinder head from passing into crankcase through breather tube.

CLUTCH

Care of Clutch

The clutch is so designed as to require a minimum amount of attention. It is very important, however, that the clutch throw-out bearing be kept properly lubricated. This can easily be done by following the instructions given below.

About five or six complete strokes of the compressor gun should be applied to this bearing *DAILY, or more often* if the tractor is used in work which requires frequent clutch operation.

Fill bearing with approved lubricant (*for specifications, see page 9*), using the compressor (supplied with tractor).

Clutch release bearing lubricator is located on the end of the shifter shaft on the left side of tractor. (*See illustration No. 75.*) Lubricant is conveyed from lubricator through drilled hole in clutch shifter shaft, then through flexible grease hose and connections to the clutch release bearing and collar.

It is very important that a clearance be maintained between the clutch shifter shoe and the throw-out bearing retainer flange. (*See illustration No. 76.*) In order to maintain this clearance, the clutch pedal should have a free movement of $1\frac{1}{4}$ " to $1\frac{1}{2}$ " from the rear of the slot in platform when the clutch is fully engaged. As the clutch wears, this free movement decreases and adjustment should be made before free movement has become less than $\frac{3}{4}$ ". Clutch may be badly damaged unless a free movement is maintained. The clutch can easily be reset to the original position by lengthening the rod between foot pedal and clutch shifter lever.

Access to the clutch may be had by removing the sheet steel cover.

TRANSMISSION

Bevel Pinion Thrust Studs—Adjustment

If the studs on the side of the tractor main frame do not support the transmission case, the bevel pinion will be forced out of proper mesh with the bevel gear when in operation. This has been found to be cause for breakage of teeth in bevel pinions.

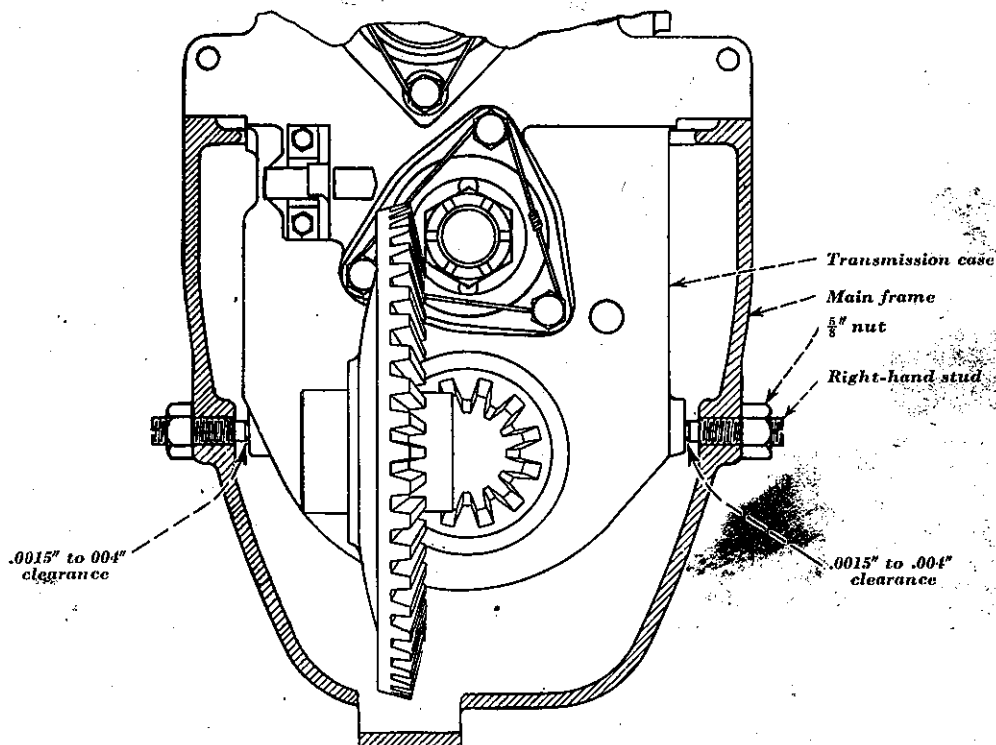


Illustration No. 40

To adjust Studs, proceed as follows:

Adjust gear contacts properly as shown in *illustration No. 40* with stud backed away from transmission case, then set *right-hand stud* against the transmission case (using the wrench provided) and adjust the stud to give .0015" to .004" clearance at point indicated before bevel pinion and gear are adjusted. This same amount of clearance must exist after bevel pinion gear and bearings are adjusted and jam nut is locked tight. Lock stud firmly in place with lock nut. Then adjust left-hand stud to give the same clearance and lock in place.

Note: The above instructions must be followed carefully. If the stud is jammed too tight against the transmission case, serious injury may be done to the internal parts.

At stated intervals, it is advisable to check the setting of these studs to make sure the above clearance is maintained.

Caution! Should it ever be necessary to disassemble the pulley drive shaft, care must be taken when reassembling to see that the correct size and number of bearing cage shims are used in the rear bearing cage, so that a clearance of .027" to .037" is maintained between the pulley drive gear spacer and the pulley drive shaft bearing cage, front. (See *illustration No. 78.*)

Steering

(See illustration No. 2.)

Steering is accomplished by means of two single plate disc clutches, located on either side of driver's seat. The power transmitted to each track is equal when both clutches are engaged and the tractor travels straight ahead. Releasing one of the clutches by means of the hand lever makes the track on that side inoperative and the opposite track being still under power, causes the inoperative track to become a pivoting point and the tractor turns in that direction. With a load, this turning effect is more pronounced. The degree of turning can be governed by the application of foot brake on side towards which it is desired to turn.

Do not apply foot brake until steering clutch is fully released. Keep feet off brake pedals when not engaged in turning.

Seat and Fenders

(See illustration No. 41.)

When required, the seat and fenders can be disassembled complete by removing the eight cap screws "A" (four on each side) which fasten the fender side to the steering posts, and loosening the four nuts and bolts "B" (two on each side of fender) which fasten to the brake pedal stops. Also remove the four cap screws which fasten the rear end of seat to the bull gear cover.

The seat and fenders can then be removed as a unit.

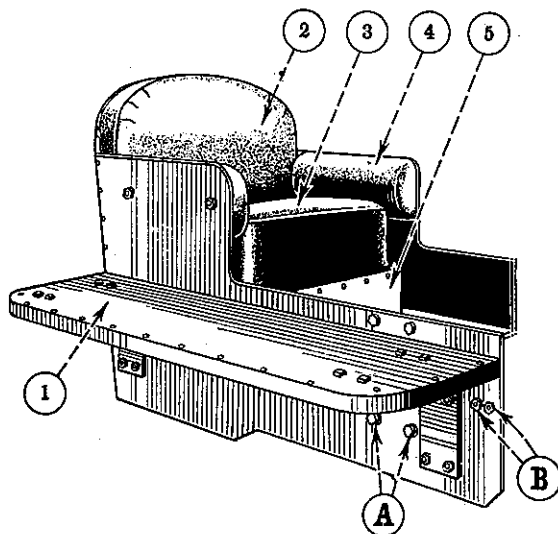


Illustration No. 41—Seat and fenders.

Ref. No.	DESCRIPTION
1	Fender, complete (R. H.).
2	Seat cushion back.
3	Seat cushion.
4	Seat cushion side.
5	Tool box (seat frame).

Swinging Drawbar

(See illustration No. 42.)

The swinging drawbar will require little attention except to see that the four cap screws which hold the drawbar pivot support to the sprocket housing case are kept tight and wired.

Also occasionally check up the eight cap screws which fasten the drawbar brackets to the sprocket drive gear case. See that they are kept tight.

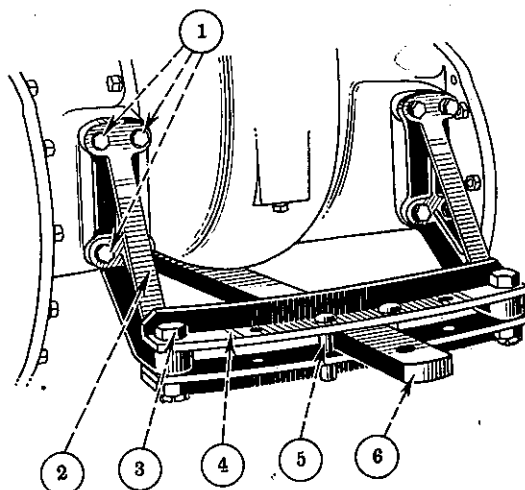


Illustration No. 42—Swinging drawbar.

Ref. No.	DESCRIPTION
1.	Drawbar bracket cap screws, $\frac{5}{8}$ ".
2.	Drawbar bracket.
3.	Drawbar guide bolt.
4.	Drawbar guide.
5.	Drawbar stop pin.
6.	Drawbar tongue.

Brakes

(See illustrations Nos. 55, 79 and 80.)

The brake is located in the sprocket drive gear case, and is of the external contracting band type.

Brake adjustment is made with both the brake cam lever, located on sprocket drive gear case, and the brake rod adjusting yoke, located in front of driver's seat under the platform.

(See illustrations Nos. 43, 44 and 55.)

Brakes—Continued

There is a brake pedal stop in back of each brake pedal (see illustration No. 43, letter "B"), which keeps the brake pedals from hitting the fuel tank support. Adjustment should be made so that maximum braking is obtained before the pedals reach the pedal stop.

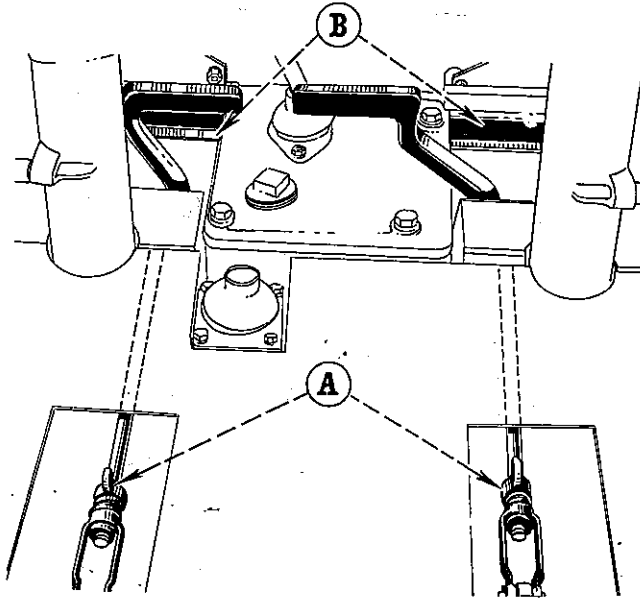


Illustration No. 43
Brake pedal adjustment.

To adjust for wear, screw up on brake rod adjusting yoke "A" which will shorten the brake rod, then pull brake cam lever forward, thereby contracting the brake band. Test out with the brake pedal while making the adjustment.

If the above adjustment is not sufficient to get results, reverse the above procedure by screwing the adjusting yoke the opposite way until end of rod is flush with end of yoke, then loosen the nut and remove bolt on brake cam lever. Then move cam lever back one or more serrations on the cam holder (see illustration No. 44), fasten lever to cam holder with bolt and nut, and proceed as outlined in the above paragraph by screwing up on the adjusting yoke until desired results are obtained.

It is important that all joints in brake mechanism be kept free from dirt and well oiled, so that brakes will release freely.

Caution! Be careful in adjusting so as not to have the brake drag.

Refer to page 63 for instructions on removing or replacing the brakes.

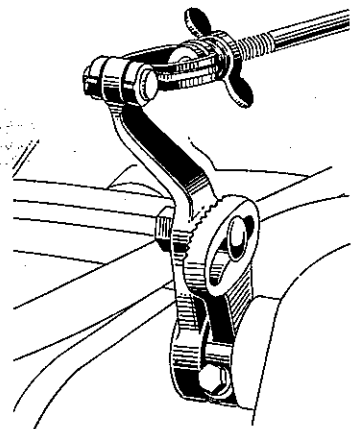


Illustration No. 44
Detail of brake cam and lever.

ADJUSTING RADIATOR CURTAIN

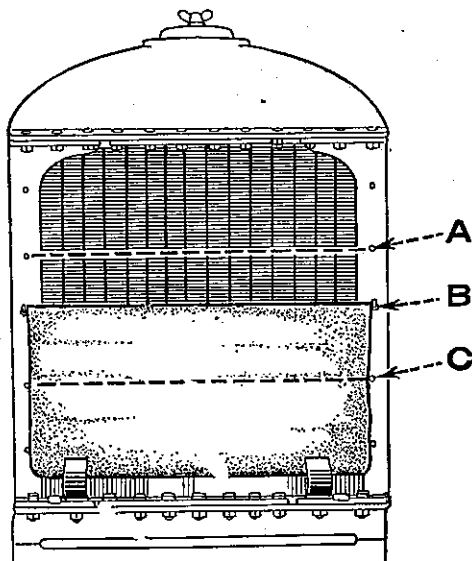


Illustration No. 45

Curtain is supplied with tractor, and should be adjusted in warming up as follows:

1. In cold weather, set curtain at "A," as shown in illustration, or cover radiator completely. (**Note:** Curtain should be raised full height whenever it is necessary to **warm up** tractor rapidly. After water has reached approximate boiling temperature, lower curtain to a point where this temperature may be maintained.)
2. In cool to cold weather, set at "B," so that an approximate boiling temperature of water in the cooling system is obtained rapidly after engine starts and maintained while engine is in operation.
3. In non-freezing weather in the early morning or late evening hours, curtain should be adjusted to position "C."

Stages of curtain height are shown—approximately the lower quarter, half, three-quarters, or complete radiator, as is required by weather conditions.

Instructions for Care and Operation in Cold Weather

Cold weather offers certain problems to all tractor owners. These are not much of a handicap to the experienced tractor operator, but are likely to be to the man who is wintering his tractor for the first time. In order of their importance these problems are:

1. Danger of water in cylinder jackets freezing, with consequent cracking of the cylinders.
2. Faulty lubrication, due to the sluggish action of oils when cold.
3. Difficulty in starting the engine.
4. Storing the tractor for the winter months.

Danger from Freezing

One reason an engine cylinder cracks is because the water around it freezes.

A man may forget to drain his engine or he may not think it is going to be cold enough to freeze the water in the cylinder jackets. No matter how the water happens to be left there, the result is invariably a cracked cylinder, often followed by an extensive outlay for repairs. To avoid anything of this sort, there is one simple precaution to take in cold weather and that is to *drain the water out of the cooling system at the end of every run*. If tractor is to be left standing idle for a few hours, it should be drained.

Where a tractor operator has finished using his tractor, although at that time the weather may not be freezing, he should take care to drain his tractor because, when the freezing weather does come, he may have forgotten that he left water in the cooling system.

When engine is left standing for any length of time in freezing weather, crankcase pan should be inspected for water in the oil on account of the possibility of pump freezing and causing breakage.

Draining the **TRACTOR**

The engine is equipped with a water drain pipe which draws off the water from the entire cooling system; it is located underneath the radiator.

This drain pipe should be opened and care should be taken to see that the water drains through properly. Stoppage may result in failure to drain system. It is a good plan to open the drain pipe just before the engine is shut down.

Another important point to be observed is to leave the drain pipe open until ready to fill up the cooling system for another run. This is especially important where the tractor is left in the open.

Care and Operation in Cold Weather—Continued

Properties of Anti-Freezing Solutions

% By Volume	Denatured Alcohol			Menthanol (Wood Alcohol)			Distilled Glycerine			Ethylene Glycol (Prestone)		
	Freezing Point		Specific Gravity	Freezing Point		Specific Gravity	Freezing Point		Specific Gravity	Freezing Point		Specific Gravity
	°C	°F		°C	°F		°C	°F		°C	°F	
0%	0	32	1.000	0	32	1.000	0	32	1.000	0	32	1.000
10%	-3	27	.988	-5	23	.987	-2	29	1.029	-3	26	1.016
20%	-7	19	.978	-12	10	.975	-6	21	1.057	-9	16	1.031
30%	-12	10	.968	-19	-2	.963	-11	12	1.085	-16	3	1.045
40%	-19	-2	.957	-29	-20	.952	-18	0	1.112	-24	-11	1.058
50%	-28	-18	.943	-40	-40	.937	-26	-15	1.140	-35	-31	1.070

Do not use a solution of Calcium Chloride or any Alkaline solution—they are injurious to the metal parts.

Danger from Thick Transmission Lubricant

In cold weather transmission lubricant of other than approved specifications often becomes thick and heavy and *care should be taken to see that it is diluted sufficiently with a lighter oil so that it will flow readily*, otherwise it will channel and stick to the sides of the case and not flow back to the bottom of the case from where the gears can carry it over the bearings and gears.

Failure of the transmission lubricant to flow readily will soon cause the bearings to be without lubrication.

Overloading

Never overload the TRAC|RAC|OR; to do best work the machine should only have a normal load under normal speed. Overloading a TRAC|RAC|OR means ruining it. In running a TRAC|RAC|OR the operator soon recognizes the sound and regularity of the exhaust as an indication of its speed and running condition. An overload reduces the normal speed of the engine which in turn cuts down the number of exhaust sounds per minute. Any load which slows the TRAC|RAC|OR down in this manner is an overload and is more than the prescribed amount it should pull with safety.

CARE OF TRAC|RAC|OR IN STORING AND HOUSING

When the TRAC|RAC|OR is not to be used for a period of time, it should be stored in a dry and protected place. To leave the TRAC|RAC|OR standing in an open field or yard exposed to rain and snow, will result in materially shortening the life of the TRAC|RAC|OR. And, since surely nobody would leave an automobile or auto truck days and nights in the open air, but run it at least under a shed, the same care must be taken also with the TRAC|RAC|OR.

Special Notice

Always mention number of TRAC|RAC|OR when ordering repairs.

Number is stamped on name plate on hood sheet, rear.

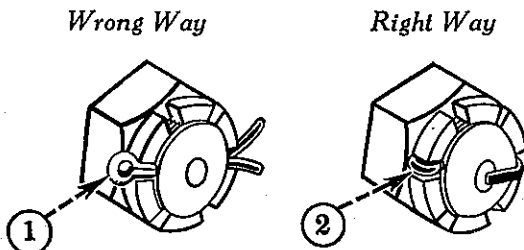


Illustration No. 46

Wrong and Right Way to secure a Cotter Pin

1. Head of cotter not in slot of nut—turned wrong. Ends not split right—turned wrong. This combination will soon work loose and come out.

2. Head of cotter in right—pounded down firm—a snug fit in hole. End of cotter pounded back over end of bolt—other end pounded down. Cotter should be tight.

TROUBLE CHART

There are several different things which might produce any one of the various troubles commonly experienced in operating an engine. Frequently the exact cause will not be apparent, even to an experienced operator, but a few tests will usually enable one to reach the correct conclusion. The following chart shows the most common causes of engine troubles and will be found of value for reference.

LOSS OF POWER:

Ignition	{	Spark occurring too late.
		Dirty spark plugs.
		Poor connections; also dirty connections.
		Dirty timer.
		Spark weak because of poor or broken wiring.
		Breaker points worn, oily, or out of adjustment.
Fuel	{	Commutator brush dirty or oily.
		Mixture too lean or too rich.
		Supply pipe partly clogged.
		Inlet valve not opening sufficiently.
		Water in fuel.
		Leaks around intake manifold.
Engine	{	Overheating in cylinders or bearings.
		Gummy, inferior or insufficient oil.
		Exhaust pipe partially clogged.
		Governor out of adjustment.
		Lack of compression, which may be due to worn, stuck, or broken piston rings.
		Scored cylinder walls.
		Leaks through and around cylinder head joints.
		Valves sticking, worn, pitted, or not seating properly because of dirt.
	{	In cold weather, engine and cooling water too cold.

TROUBLE CHART—Continued

MISFIRING:

- | | | |
|-----------------|---|--|
| Ignition | { | Poor connections.
Dirty timer.
Breaker points pitted, dirty or poorly adjusted.
Dirty or cracked spark plugs; points of plugs not properly spaced.
Breaker points not touching properly. |
| Fuel | { | Mixture too lean or too rich.
Fuel passage partly clogged.
Water in fuel. |
| Engine | { | Lack of compression.
Valves sticky or not working properly. |

*EXPLOSIONS IN EXHAUST PIPE:

- | | | |
|-----------------|---|--|
| Ignition | { | Irregular ignition.
Poor spark, or very late spark. |
| Fuel | { | Mixture too lean or too rich. |

POUNDING:

- | | | |
|-----------------|---|--|
| Ignition | { | Spark too early. |
| Engine | { | Red-hot carbon deposit.
Loose bearings.
Tight piston, due to lack of oil or lack of cooling water.
Loose flywheel or loose key.
Very loose piston (piston slap). |

BACKFIRING:

- | | | |
|-----------------|---|--|
| Ignition | { | Spark too late. (If engine backfires and stops, spark may be too far advanced.)
Short circuit on primary wire.
Wires to wrong spark plugs. |
| Fuel | { | Weak mixture.
Occasionally too rich mixture. |
| Engine | { | Leaky or stuck intake valve.
Red-hot carbon deposits.
Leaky manifold or carburetor gasket. |

* Explosions in exhaust pipe often occur just after starting, due to first charges not firing in cylinder and passing through into exhaust pipe, where burning gases from first few explosions will ignite them.

TROUBLE CHART—Continued

OVERHEATING:

- Ignition** { Spark too late, or very weak.
- Fuel** { Mixture too rich.
- Engine** {
Insufficient lubrication.
Insufficient cooling water.
Circulation of cooling water impeded.
Pump not working properly.
Heavy carbon deposits in cylinder.
Water chamber coated from impure water.

IRREGULAR SPEED:

- Ignition** { Loose connections, or partly broken wire.
Breaker points pitted, or poorly adjusted.
- Fuel** { Supply to carburetor irregular.
Dirt on needle valve.
- Engine** { Governor gummy, sticky, out of adjustment or badly worn.
Valves sticky.

SMOKE:

Black smoke in exhaust indicates too rich a mixture.
Bluish smoke indicates too much lubricating oil.
Smoke from the crank case or open end of cylinder indicates leak past the piston.
Look for worn rings, rings stuck in grooves, or scoring on cylinder walls.

ENGINE USES TOO MUCH FUEL:

Needle valve open too wide.
Spark too late.
Leaky valves.
Cooling jacket water too cold.
Engine not properly lubricated.
Engine running below speed.

ILLUSTRATIONS AND INSTRUCTIONS FOR "OVERHAULING"

This section contains instructions and illustrations pertaining to certain simple adjustments and replacements which can readily be made. However, the owner should consult the dealer before attempting a general overhauling or when any mechanical difficulties occur, as he has the necessary equipment for doing the work.

INDEX—"OVERHAULING"

DESCRIPTION	Page No.
Bevel gear and sprocket drive shaft—disassembling.....	63 to 66
Fan belt—removing and replacing.....	57, 58
Front axle pivot support.....	68
Front idler bushings.....	67
Removing and putting on track.....	60, 61
Replacing track roller bushings in track frame.....	67
Steering clutch lever adjustment.....	59
Track chain adjustment.....	62
Track pivot shaft.....	67
Vertical steering worm shaft adjustment.....	59

Removing or Replacing Fan Belt

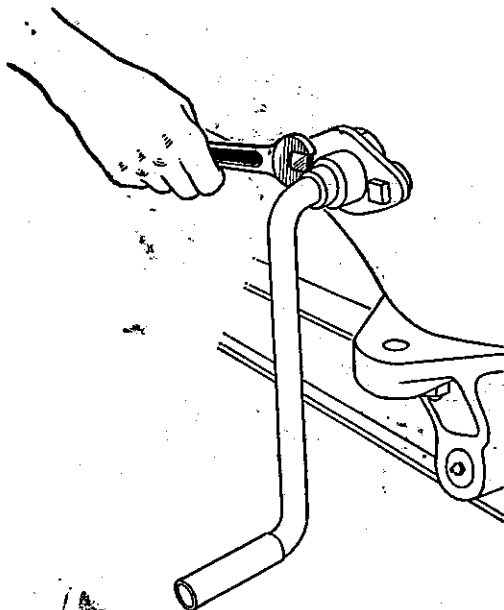
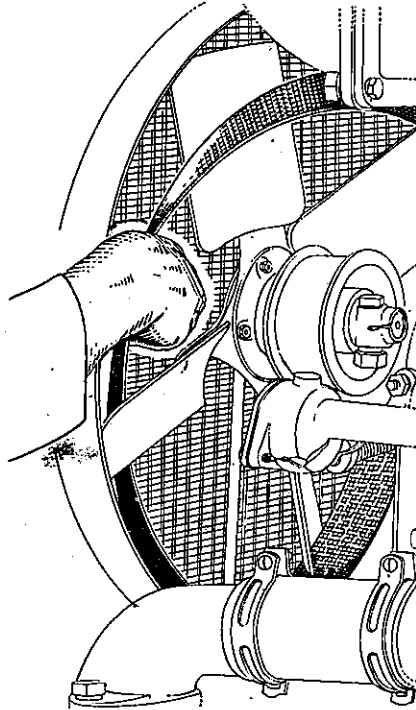


Illustration No. 47

Loosening the starting crank.

Loosen the starting crank as shown in *illustration No. 47*. This is done by loosening the two bolts which hold the starting crank bearing to the main frame. *These bolts need not be taken entirely out, but loosened just enough to permit the belt to pass between the starting crank and the end of crankshaft.*

Removing or Replacing Fan Belt—Continued**Illustration No. 48****Removing fan belt.**

Loosen the wing nut on the fan adjuster bolt, to relieve the tension of the spring on the fan bracket. Fan pulley can then be pushed down so that the fan belt will pass over the fan edge of the belt pulley. Next put the belt over the belt drive pulley. Then work the belt over the fan blades, as shown in *illustration No. 48*.

In replacing the belt, the reverse procedure should be followed. Adjust fan belt to avoid slippage.

Adjustment of Vertical Steering Worm Shaft

Adjustment of vertical worm shaft is made by adding or removing shims under the flange of upper worm bearing cage.

(See illustration No. 81, item 50.)

Assemble so that flat on side of flange on steering worm cage matches the side of main frame. (See illustrations Nos. 49 and 81.) (Vertical play in worm shaft should be .015" to .020" clearance.)

(See illustration No. 81.)

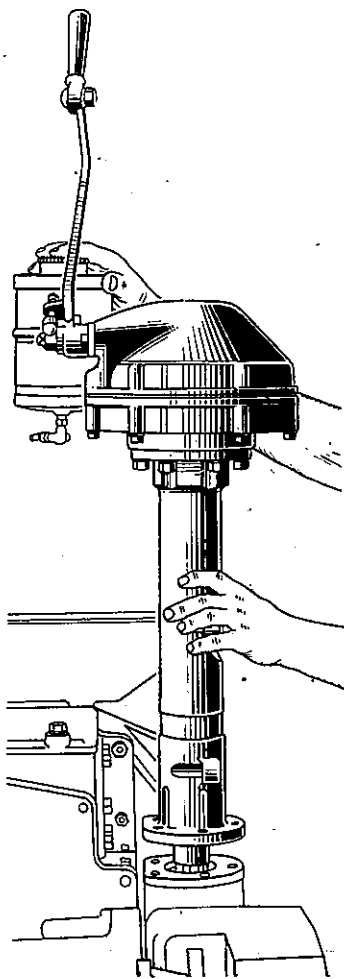


Illustration No. 49

Steering clutch supports and clutches being assembled.

Adjustment of Steering Clutch Lever

Steering clutch levers may be adjusted to various positions. Close adjustments are made by raising or lowering the $\frac{3}{8}$ " set screw which rests on top of the lever stop.

If greater lever adjustment is necessary than can be made by the set screws, remove the entire steering clutch shaft assembly (with sleeve) by taking out the two cap screws at the sleeve flange and selecting whatever tooth is necessary on the shaft gear to give the desired lever position. Then readjust set screws to line up both levers, and tighten jam nuts.

(See illustrations Nos. 49 and 82.)

Removing and Putting on Track

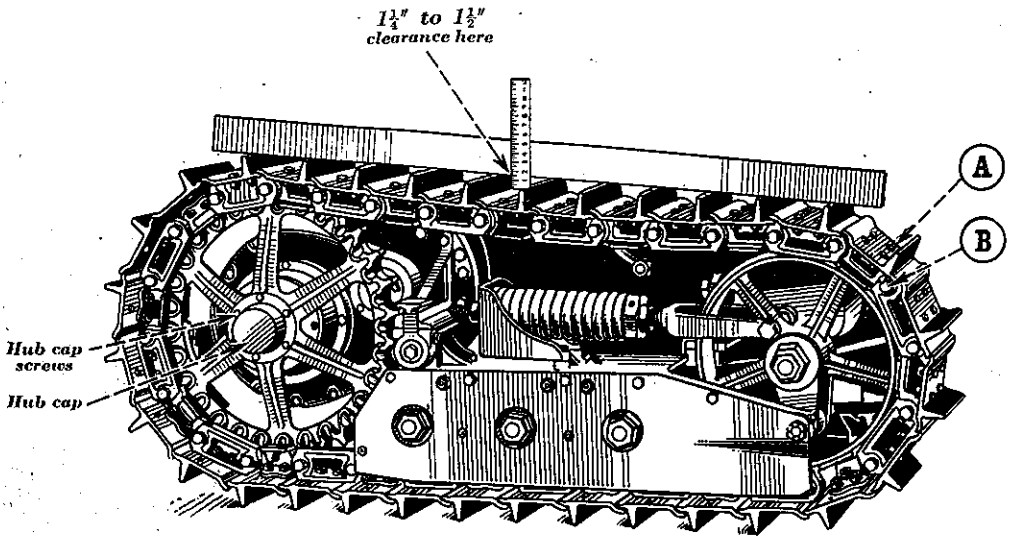


Illustration No. 50
Track chain mounted on sprocket.

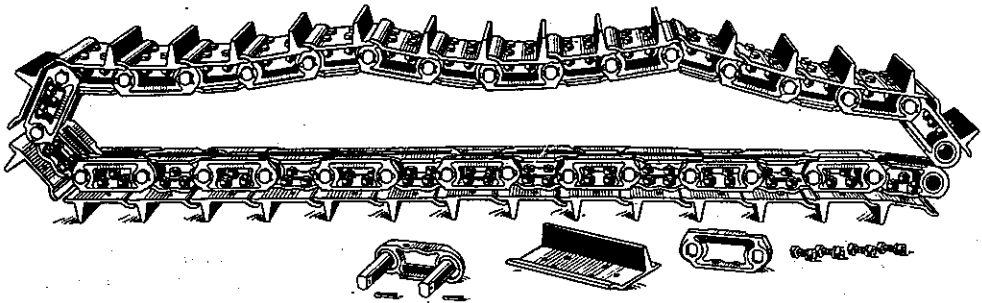


Illustration No. 51—Track chain (parallel type link).

To Remove Track

Jack up rear end of **TRAC|RAC|OR**. Loosen adjustment on track spring as explained under "**Adjustment of Track Chain.**"

For Parallel Type Track Link

Choose a portion of track chain at approximate top of front idler, remove four bolts "**A**" (see *illustration No. 50*) from a track plate which is attached to a pair of outer links. Remove cotter pins "**B**" from ends of link pins (in this outer link) and drive pins back together, striking pins alternately, using care so as not to batter ends of pins or links. (Also see *illustration No. 51.*)

For Offset Type Track Link

This type of track chain uses a master pin for removing the track. The end of this pin is squared off and is further designated by an extra long cotter pin used at this track pin. This can be easily located by observing end of pin on outside of track. Drive out this pin and proceed as outlined below. **Note:** This chain can only be taken apart at point of master pin. Be careful not to lose the two steel filler washers located on each side of master bushing. These washers must be properly replaced before reassembling chain.

Note: When installing track of the "offset link" type, the end with bushing "**A**" must be toward front of tractor when track is laid out flat on ground, as shown in *illustration No. 84*. These instructions must be carefully observed or unnecessary wear will result.

For Either Type of Track Link

After bolts or master pin have been removed, lay front end of track on the ground, start the engine, release steering clutch (see *illustration No. 2*) on opposite side to track being removed, put **TRAC|RAC|OR** in reverse, and slowly engage clutch until track falls off behind.

To Put on Track

Put rear end of track far enough up on sprocket that it will stay in place. Start engine, release steering clutch on side opposite to track being replaced, put **TRAC|RAC|OR** in low gear and slowly engage engine clutch until chain becomes tight; watch front end of track that it does not follow sprocket around and become jammed behind track roller frame. Bring front end against track ahead of front idler and take up slack with jack until holes in track meet those in links, then reverse the instructions given above pertaining to the removing of track link bolts or master pin, whichever type is used.

Hold a sledge behind end of pins when replacing, using care that edges of holes in link are not battered. Replace cotter pins and track plate. Adjust tension on track spring as instructed under "**Adjustment of Track Chain.**"

Adjustment of Track Chain

(See illustration No. 52.)

The track chain spring, when properly adjusted, takes care of the play in the track chain so that there is no tension on track when in normal operating position.

To take up slack in track chain, proceed as follows:

Loosen lock nut "A" at front end of track spring. Turn adjusting yoke rod holder "B" to the right by inserting a round bar in hole or by use of a wrench on hex. portion. This adjustment pushes track spring yoke and front idler forward, thereby tightening track chain.

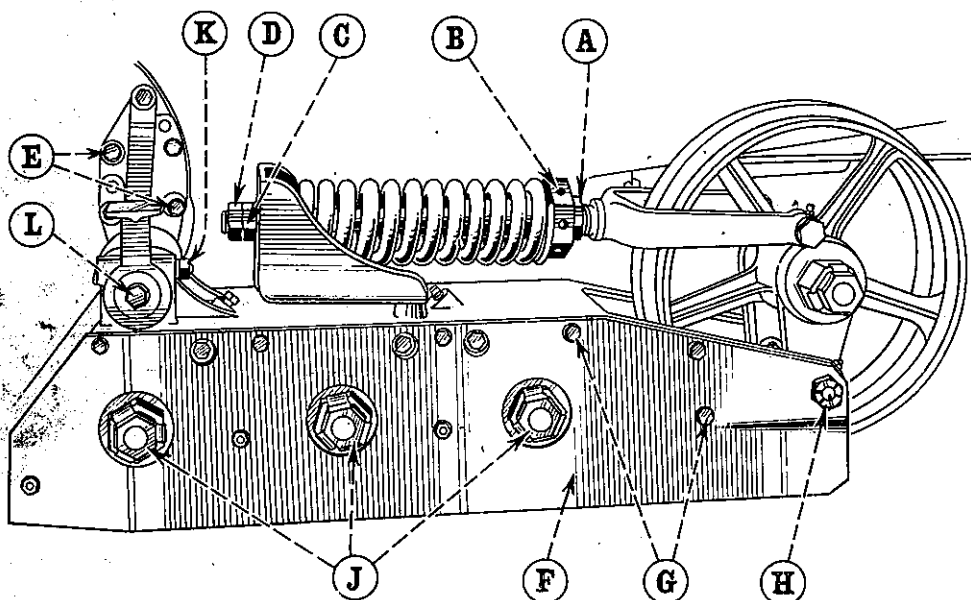


Illustration No. 52
Track frame and roller assembly.

Ref. Letter	DESCRIPTION	Ref. Letter	DESCRIPTION
A	Lock nut.	G	Track cap screws, bolts, etc.
B	Adjusting yoke rod holder.	H	Front idler nut and pin.
C	Compression spring lock nuts.	J	Track roller nuts and nut locks.
D		K	Track frame pivot locking pin and nut.
E	Track pivot shaft bracket cap screws.	L	Pivot pin cap screw.
F	Track shields.		

The adjustment should be checked as follows:

Place a straight edge along the top of track lugs, the full length of chain. Proper adjustment of chain is obtained by having from $1\frac{1}{4}$ " to $1\frac{1}{2}$ " clearance between the underside of straight edge and top of lug at approximate center of chain. (See illustration No. 50.)

When this adjustment is obtained, tighten lock nut "A." (Illustration No. 52.)

Caution! When making this adjustment, be careful not to raise the compression spring lock nuts "C" and "D" from their seat.

Disassembling Bevel Gear and Sprocket Drive Shaft

Follow the instructions given below and for detail instructions refer to description of individual operations.

Remove track as instructed on page 61.

Next refer to sprocket drive assembly as shown in illustrations Nos. 79 and 80 and follow the instructions given below.

Drain oil from sprocket drive gear case by removing drain plug at bottom of gear case cover. It is also advisable to drain oil from main frame. (Remove plug underneath rear of main frame.)

Next remove the six cap screws in sprocket shaft cap, and remove cap, then remove sprocket shaft lock nut and nut lock assembly, complete. Then pull the sprocket off the splined shaft and remove the oil seal leather. (See illustrations Nos. 50 and 53.)

Note: If it is necessary to replace the oil seal diaphragm, the eight nuts "A" on top and bottom of carrier must be removed. (See illustration No. 53.) This enables the inner diaphragm to be removed.

Next remove all the cap screws "B" (see illustration No. 53) on outer sprocket drive bearing cage and pull the carrier off, being careful not to damage any of the shims.

Next remove the bearing cover from the drive bevel gear shaft outer bearing.

Next disconnect the ball socket cap at front axle. Then remove all the cap screws "E" and dowel pins at track pivot shaft bracket. (See illustration No. 52.)

Now roll the complete track frame towards the front of the **TRACTOR** so as to be out of the way for removing the sprocket drive gear case cover.

Next remove all the nuts, bolts, cap screws and dowel pins around the outside of sprocket drive gear case cover. (See illustration No. 53.)

The gear case cover can then be removed. Next remove (as a unit) the sprocket drive gear, shaft and bearings complete. (See illustration No. 54.)

Next loosen all adjustments on brake cam and brake lever so that the brake band assembly is free and loose. Refer to instructions on brake adjustment. (See page 48.) Next disconnect brake lever and let brake cam fall back out of the way. Now the brake band, complete with lining, stop and cam brackets, can be removed as a unit. (See illustration No. 55.)

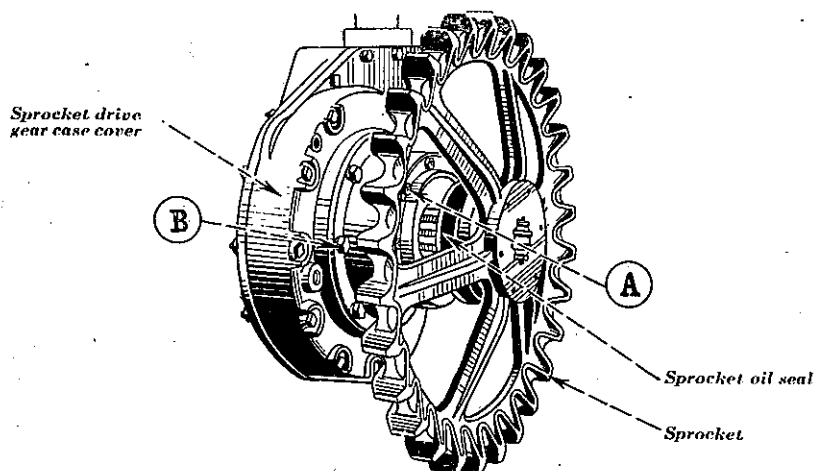


Illustration No. 53
Removing sprocket and oil seal.

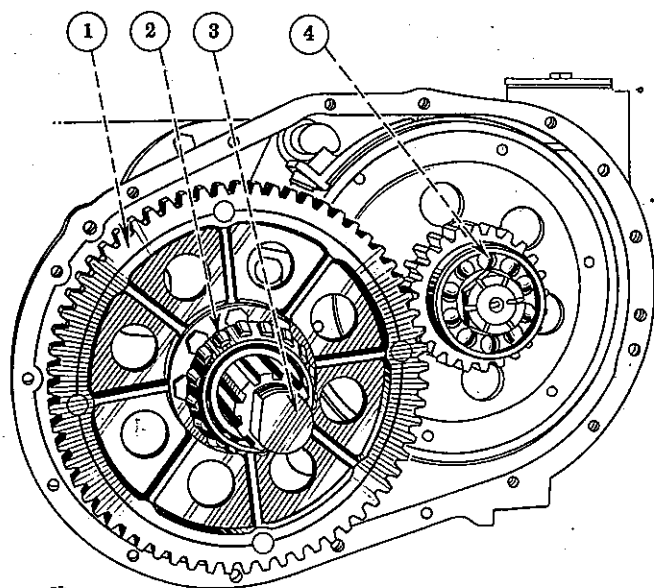


Illustration No. 54
Sprocket drive gear, shaft and bearing.

Ref. No.	DESCRIPTION
1	Sprocket drive gear, 64 teeth.
2	Sprocket drive shaft taper roller bearing, outer.
3	Sprocket drive shaft.
4	Drive bevel gear shaft ball bearing, outer.

Disassembling Bevel Gear and Sprocket Drive Shaft—Continued

So far the procedure outlined has covered the disassembling up to the removing of the brake band.

If the disassembling has been for the purpose of relining the brake band only, then after relining, replace the brake band and proceed to reassemble; otherwise proceed as follows:

Next remove cotter pin and nut holding bevel gear shaft outer ball bearing, then remove the bearing and thrust washer. (*See illustration No. 54.*)

Remove the sprocket drive pinion, planetary ring gear carrier, and brake drum together with roller bearings and thrust washer. (This can all be removed as a unit.) (*See illustration No. 55.*)

Note: If it is desired to disassemble only to replace the brake band, then it will not be necessary to remove the sprocket drive pinion, planetary ring gear carrier, etc., as explained above.

Next remove the steering clutch assembly, complete with support and shaft as outlined on page 59. (*See illustration No. 49.*)

Next remove the steering worm cage and shims "A," then remove the worm up through the bore by unscrewing same out of worm gear. (*See illustration No. 56.*)

Now remove the planetary drive pinion nut and nut lock. The complete worm gear carrier, planetary idler gears, shafts, planetary drive pinion, thrust washer, etc., can now be removed as a unit. (*See illustration No. 56.*)

Note: If it is desired to replace any of the parts contained in the above mentioned unit, they can be assembled at the bench into the unit, before same is installed into the sprocket drive gear case.

Now cut lock wire of the drive bevel gear shaft bearing cage cap screws and remove the drive bevel gear bearing cage, thrust bearing, and adjusting washer.

Note: It is not necessary to remove the sprocket drive gear case to get at the axle, unless it is desired to replace the gear case itself; however, before the axle and drive bevel gear can be removed, both right and left sprocket drive assemblies must be completely disassembled.

To reassemble all of the aforementioned parts, reverse the procedure as outlined.

Important: When reassembling, be sure that the drive bevel gear adjusting washer and thrust bearing is properly assembled and that the correct thickness of adjusting washer is used, so that the best possible bevel drive gear adjustment is secured. (*See illustration No. 80, item No. 70.*)

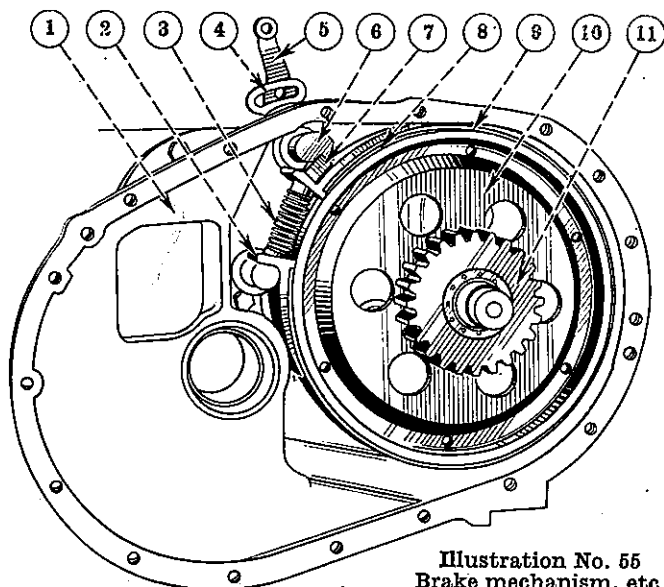


Illustration No. 55
Brake mechanism, etc.

Ref. No.	DESCRIPTION	Ref. No.	DESCRIPTION
1	Sprocket drive gear case, R. H.	7	Brake band cam bracket.
2	Brake band stop bracket.	8	Brake band lining.
3	Brake cam spring.	9	Brake band, complete.
4	Brake cam holder, R. H.	10	Sprocket drive pinion carrier, complete.
5	Brake cam lever.	11	Sprocket drive pinion, 24 teeth.
6	Brake cam, R. H.		

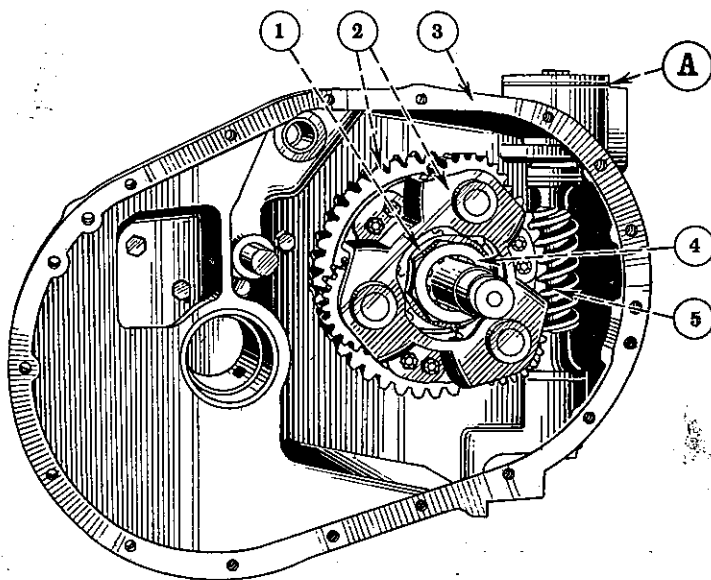


Illustration No. 56
Sprocket drive gear case, showing worm gear and worm.

Ref. No.	DESCRIPTION	Ref. No.	DESCRIPTION
1	Planetary drive pinion nut lock.	4	Planetary drive pinion nut.
2	Steering worm carrier with worm gear.	5	Steering worm.
3	Sprocket drive gear case, R. H.		

Replacing Track Roller Bushings in Track Frame

(See illustrations Nos. 52 and 83.)

There are three roller assemblies located in each track frame. To replace the track roller bushings, it is necessary to remove both track shields "F" inner and outer, on the track frame on the side on which replacement is to be made.

Take out the cap screws, bolts and lockwashers "G" which fasten the track shields to the track frame. Then remove the cotter pin and nut "H" from the front idler arm pivot pin. Now remove the track roller nuts and nut locks "J" and pull the track roller side off of shaft. The opposite track roller and shaft can then be pulled through the opposite bore.

Caution: When reassembling, be sure that track roller side thrust washers are in place and centered on their pins.

Track Pivot Shaft

(See illustration No. 52.)

The object of the track pivot shaft is, that with this type of construction the track frame is allowed to swivel or shift to meet the conditions of broken and uneven ground.

If for any reason the track frames are to be removed, other than explained under the disassembling of sprocket drive, this can readily be done as follows:

Track must first be removed as explained on page 61.

Remove front axle ball socket cap from front axle. Then remove the track frame pivot locking pin, lockwasher and nut "K."

Also remove the pivot pin cap screw and lockwasher "L." Now, by using the tapped hole in end of shaft, a puller can be used to remove this shaft. The entire track frame can now be removed. (See illustration No. 52.)

Reverse the procedure for reassembling.

Replacing Front Idler Bushings

(See illustration No. 85.)

In order to replace the front idler bushings (in front idler), it will be necessary to remove track spring yoke pivots, by removing the cotter pins and nuts and then driving out both of the pivots.

Next remove the cotter pins and nut from the front idler arm pivot pin and drive out both pins. The front idler can now be removed from the track frame as a unit.

Next remove either of the front idler shaft nuts and nut lock, and remove front idler arm from shaft. The bushings will then be available for removal from the hub.

Reverse the above procedure when reassembling.

Front Axle Pivot Support

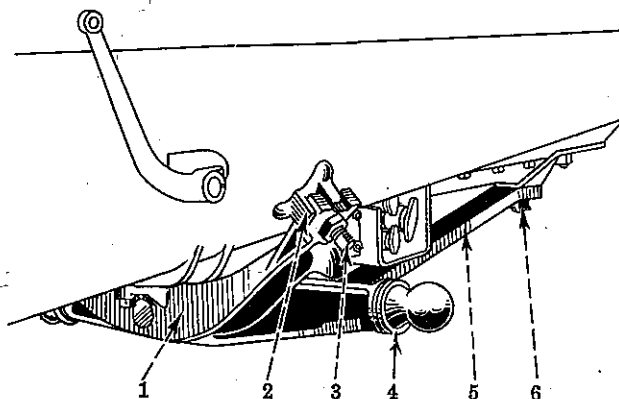


Illustration No. 57

Front axle pivot support and axle.

Ref. No.	DESCRIPTION
1	Front axle pivot support, rear.
2	Front axle pivot support rear pad.
3	Front axle pivot support rear adjusting screw.
4	Front axle.
5	Front axle pivot.
6	Bolt, $\frac{3}{4}$ x $2\frac{5}{8}$ " (front axle pivot to bolster).

The front axle pivot support will require little attention except to see that the front axle pivot support rear adjusting screw pad is kept tight against the main frame.

Do not tighten screw so much as to spring the pivot support.

List and Illustrations

Detailed illustrations of the principal units are included in this section, together with list showing the numbers and description of parts.

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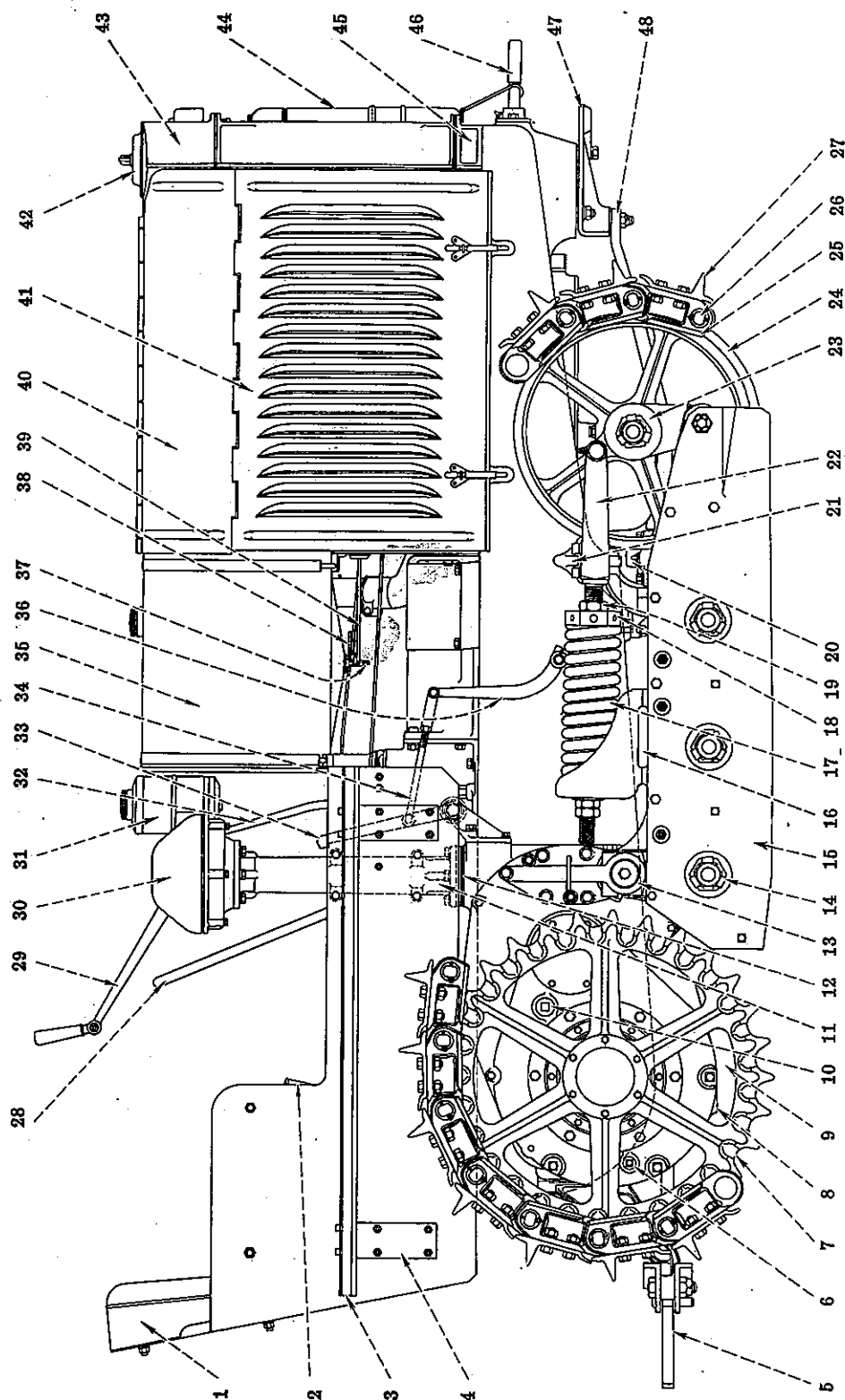


Illustration No. 58—Right side of complete tractor.

see page 110-111

COMPLETE TRACTOR

(See illustration No. 58)

Ref. No.	I H C Part No.	DESCRIPTION
1	17808D	Seat cushion back.
2	17815DX	Seat cushion, complete.
3	17834D	Fender, complete, R. H.
4	17796D	Fender brace.
5	17762DX	Drawbar tongue.
6	.....	Oil level plug (sprocket drive housing).
7	1995D	Sprocket, 29 teeth.
8	.....	Oil drain plug (sprocket drive housing).
9	1997DAX	Sprocket drive gear case cover, R. H.
10	.....	Oil filler plug (sprocket drive housing).
11	1999D	Steering clutch post.
12	1979DX	Steering worm cage.
13	2009D	Track frame pivot bracket, R. H.
14	16537D	Track roller shaft.
15	17927DA	Track shield, outer, R. H.
16	2018D	Track spring retainer.
17	17847D	Track spring
18	2005DX	Track spring yoke rod adjusting holder.
19	17839D	Track spring adjusting lock nut.
20	17830D	Front axle.
21	2020D	Front axle pivot support rear pad.
22	2006DX	Track spring yoke.
23	17791D	Front idler arm (L. H., inner; R. H., outer).
24	2007DX	Front idler.
25	17899D	Track link, outer, R. H.
26	16529D	Track link pin.
27	16541D	Track shoe, 12" (parallel type)
27	16541DA	Track shoe, 12" (offset type).
28	17744DX	Gear shifter lever.
29	17713D	Steering clutch lever, R. H.
30	1985DX	Steering clutch cover, R. H.
31	16438DX	Gasoline tank, complete with cap.
32	17718D	Pulley shifter lever.
33	17746D	Clutch pedal.
34	16524D	Clutch shifter rod.
35	16330DAX	Fuel tank, complete with cap.
36	16523D	Clutch shifter shaft lever.
37	18055D	Fuel tank shut-off valve and drain cock.
38	18008DX	Oil pressure gauge pipe, complete
39	18006DX	Fuel pipe, complete (fuel tank to fuel pump).
40	17821D	Engine hood, complete.
41	10680DAX	Hood side door, R. H.
42	4080D	Water tank handhole cover, complete.
43	847DAX	Water tank, upper.
44	16466DAX	International oil air filter.
45	837DX	Water tank, lower.
46	10628DX	Starting crank.
47	2004D	Front bolster.
48	17792D	Front axle pivot.

ENGINE—Continued

(4 1/4 x 5)

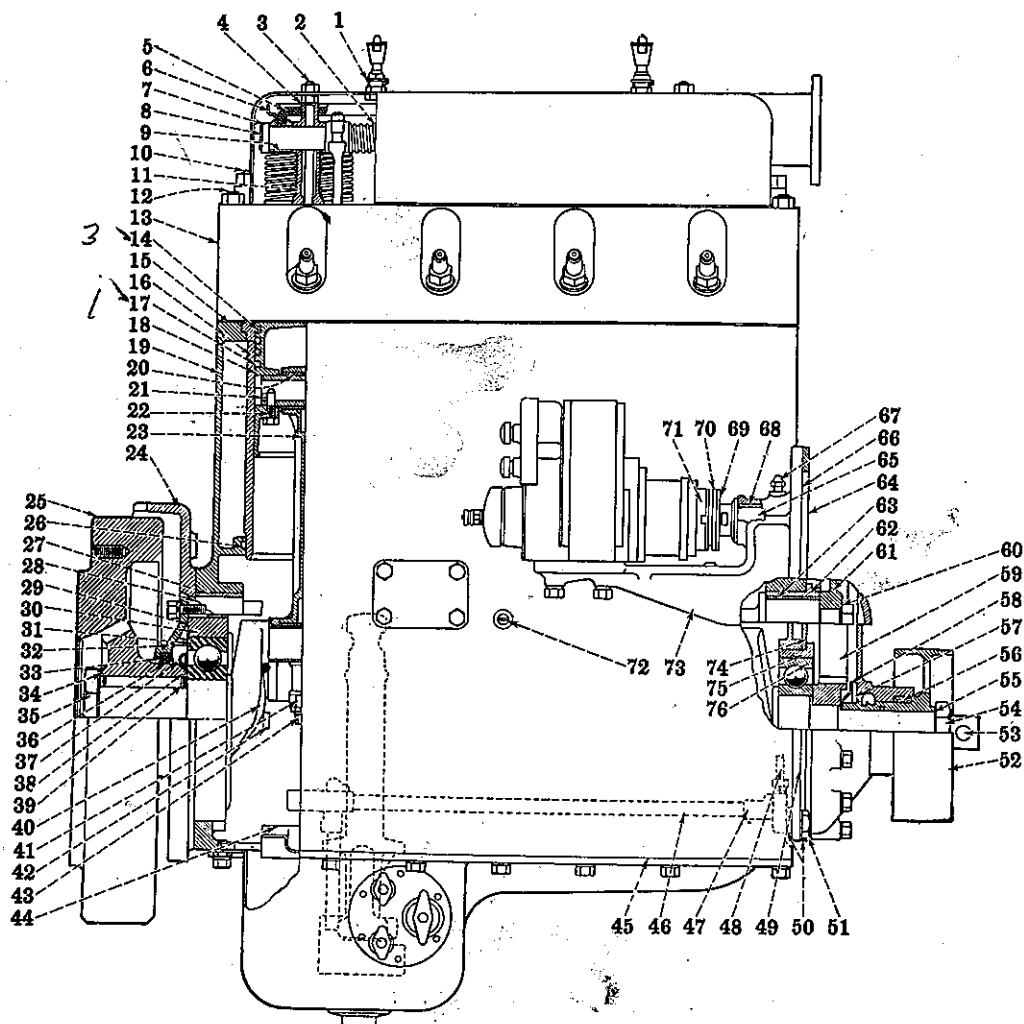


Illustration No. 59

Right side of engine (4 1/4 x 5) (sectional view).

ENGINE—Continued

(See illustration No. 59)

Ref. No.	I H C Part No.	DESCRIPTION	Ref. No.	I H C Part No.	DESCRIPTION
1	13143D	Oiler.	39	10410D	Flywheel key.
2	12209D	Spring.	40	10379DAX	Crankshaft with wick.
3	7618D	Stud, long.	41	8349T	Nut.
4	4039D	Stud, short.	42	12219D	Clutch shaft bearing wick.
5	4319D	Spacer.	43	8047TAX	Connecting rod bolt with nut and cotter.
6	4042D	Oil trough packing.	44	449DAX	Crankcase pan oil trough.
7	4043D	Oil trough.	45	10421D	Crankcase pan gasket.
8	12208D	Pin collar.	46	14855D	Oil discharge pipe, complete.
9	8014TA	Pin, 1 x 9 3/8".	47	14848D	Oil discharge elbow.
10	7991T	Bushing.	48	10411D	Camshaft gear oil pipe.
11	10408D	Stud, long.	49	10420D	Crankcase front plate gasket.
12	7974TB	Pin support.	50	4301D	Oil discharge elbow gasket.
13	8000T	Stud, short.	51	10493DA	Oil discharge elbow nut.
14	419DXc	Cylinder head with valve guides and studs.	52	425DBX	Fan drive pulley.
15	3651T	Piston ring.	53	10319D	Starting crank pin.
16	10366DB	Gasket.	54	10316D	Crankshaft pinion nut.
17	435DX	Cylinder sleeve with ring.	55	10374D	Crankshaft pinion nut lock.
18	12259D	Piston ring.	56	12734D	Crankshaft felt washer, front.
19	439DAX	Piston with pin, set screw and cotter.	57	10320D	Crankshaft pinion spacer.
20	437DBX	Crankcase.	58	10317D	Crankshaft pinion washer.
21	7176TA	Bushing.	59	10383D	Crankshaft pinion (28 teeth).
22	7144TA	Piston pin.	60	4221D	Camshaft nut.
23	4787T	Set screw.	61	10384DX	Camshaft gear, 56 teeth (with shim).
24	10393DBX	Connecting rod with cap and bushing.	62	10311DB	Camshaft front bearing.
25	440D	Bell housing.	63	10398DA	Camshaft.
26	460D	Flywheel.	64	10419D	Crankcase front cover gasket.
27	822C	Packing ring.	65	16375DX	Governor and magneto shaft with carrier.
28	16738DA	Camshaft rear bearing.	66	10367D	Magneto bracket gasket.
29	16739D	Camshaft rear bearing gasket.	67	14186D	Starting crank bearing lubricator.
30	10497D	Crankshaft (main) bearing cover plate gasket.	68	12241D	Magneto and governor shaft bushing.
31	442D	Crankshaft (main) bearing retainer, rear.	69	7882T	Magneto coupling.
32	10400D	Crankshaft ball bearing, rear.	70	12740D	Magneto coupling block, male.
33	441DAX	Main bearing cover plate.	71	12741D	Magneto coupling block spacer.
34	12750D	Main bearing cover plate washer.	72	7115T	Camshaft center bearing lock screw.
35	10354D	Flywheel nut lock.	73	1859DX	Magneto bracket with bushing.
36	10353D	Flywheel nut.	74	10382DA	Crankcase front plate.
37	12748D	Crankshaft felt washer, rear.	75	436D	Crankshaft (main) bearing retainer, front.
38	12749D	Crankshaft felt washer retainer.	76	10399D	Crankshaft (main) ball bearing, front.
39	10355D	Crankshaft (main) bearing oil deflector.			

ENGINE

(4 1/4 x 5)

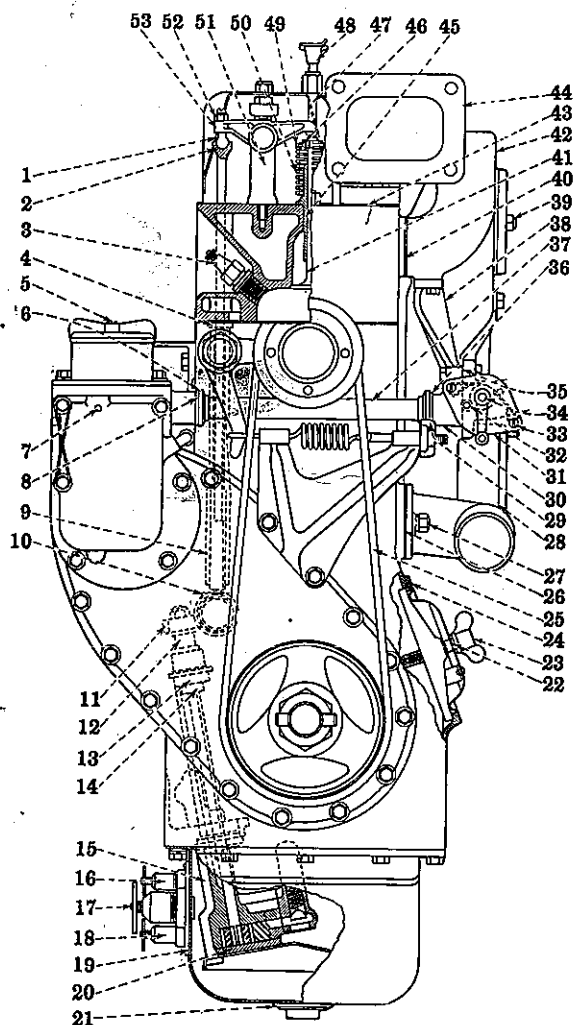


Illustration No. 60

Front view of engine (4 1/4 x 5) (sectional view).

ENGINE—Continued

(See illustration No. 60)

Ref. No.	I H C Part No.	DESCRIPTION
1	10951D	Valve lever screw.
2	10365D	Valve push rod.
3	13173D	Spark plug, $\frac{7}{8}$ " S.A.E. (Champion No. 20).
4	14186D	Fan pulley lubricator.
5	4098D	Oil filler stud.
6	12720D	Felt washer retainer.
7	G1256	Governor rockshaft lever pivot pin.
8	12726D	Felt washer.
9	431D	Valve tappet guide.
10	10332D	Valve tappet.
11	10335D	Oil pump drive pinion, 10 teeth.
12	445D	Oil pump shaft bushing.
13	406DBXa	Oil pump body with bushing and pin.
14	10337D	Oil pump shaft collar.
15	14413D	Oil discharge pipe, vertical.
16	1998T	Oil gauge cock, $\frac{3}{8}$ ".
17	1994TA	Crankcase oil drain valve, 1".
18	1998T	Oil gauge cock, $\frac{3}{8}$ ".
19	449DAX	Crankcase pan, complete.
20	413D	Oil pump cover.
21	.....	Crankcase pan drain flange (standard $\frac{3}{4}$ " pipe plug).
22	4112D	Clamp bolt gasket.
23	7167T	Clamp bolt.
24	10420D	Front plate gasket.
25	10414DA	Fan belt.
26	12235D	Water intake elbow gasket.
27	G3243	Water intake elbow stud.
28	434D	Water intake elbow.
29	12720D	Felt washer retainer.
30	1448DX	Governor rod support with bushing.
31	1452D	Governor rod support cover.
32	1451D	Governor throttle lever.
33	12758D	Machine screw.
34	15899DX	Governor throttle shaft, complete.
35	12757D	Carburetor gasket.
36	12726D	Felt washer.
37	12744D	Governor connecting rod housing.
38	1826D	Governor rod support bracket.
39	11422D	Stud, short.
40	10413DA	Manifold gasket.
41	10893DA	Intake and exhaust valve.
42	1714DX	Combination manifold.
43	10422D	Manifold gasket.
44	1499D	Water outlet manifold.
45	7973T	Valve guide.
46	10898DA	Valve spring seat key.
47	10322DA	Cylinder priming tube.
48	13106D	Cylinder head priming cup.
49	10897DA	Valve spring seat.
50	12232D	Valve spring.
51	7974TB	Valve lever pin support.
52	10952D	Valve lever screw check nut.
53	4089DB	Valve lever with bushing.

FAN

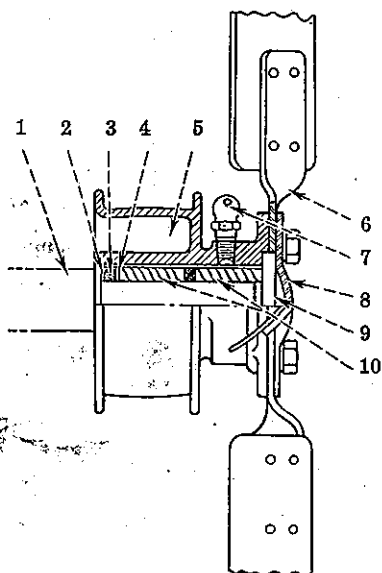


Illustration No. 61

Fan assembly (sectional view).

Ref. No.	I H C Part No.	DESCRIPTION
1	10343DB	Fan bracket stud.
2	10388D	Fan felt retainer.
3	10387D	Fan felt washer, $1\frac{7}{8}$ " O. D., $\frac{3}{4}$ " I. D., $\frac{1}{4}$ " thick.
4	10389D	Fan felt retainer washer.
5	432DA	Fan pulley, 4" diam., $1\frac{1}{8}$ " face.
6	10423D	Fan blade carrier with blades (fan blade only, 10334D).
7	13129D	Fan bracket lubricator.
8	433D	Fan pulley cap.
9	10385D	Fan shaft.
10	10392D	Fan shaft roller bearing.

RADIATOR

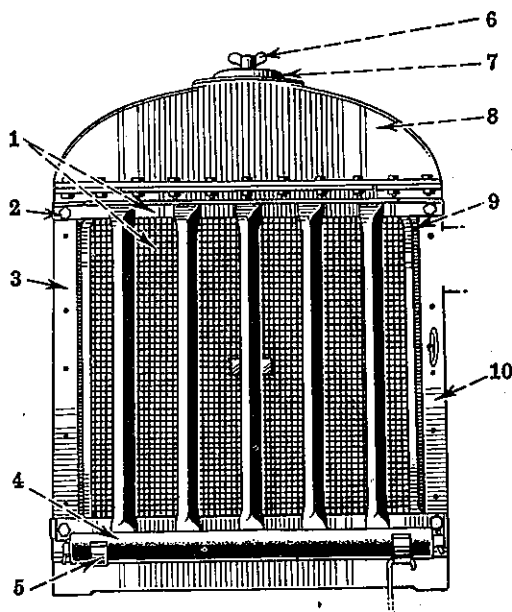


Illustration No. 62
Radiator with guard.

Ref. No.	I H C Part No.	DESCRIPTION
1	16507DX	Radiator screen and guard with angles.
2	.....	Radiator guard support angle cap screws.
3	1865D	Radiator core spacer, R. H.
4	16502D	Radiator curtain.
5	16504D	Radiator curtain holder.
6	7167T	Water tank handhole cover clamp bolt.
7	4080D	Water tank handhole cover with clamp stop.
8	847DAX	Water tank, upper.
9	10685DA	Radiator core, complete.
10	2094DX	Radiator core spacer, L. H.

COMBINATION MANIFOLD

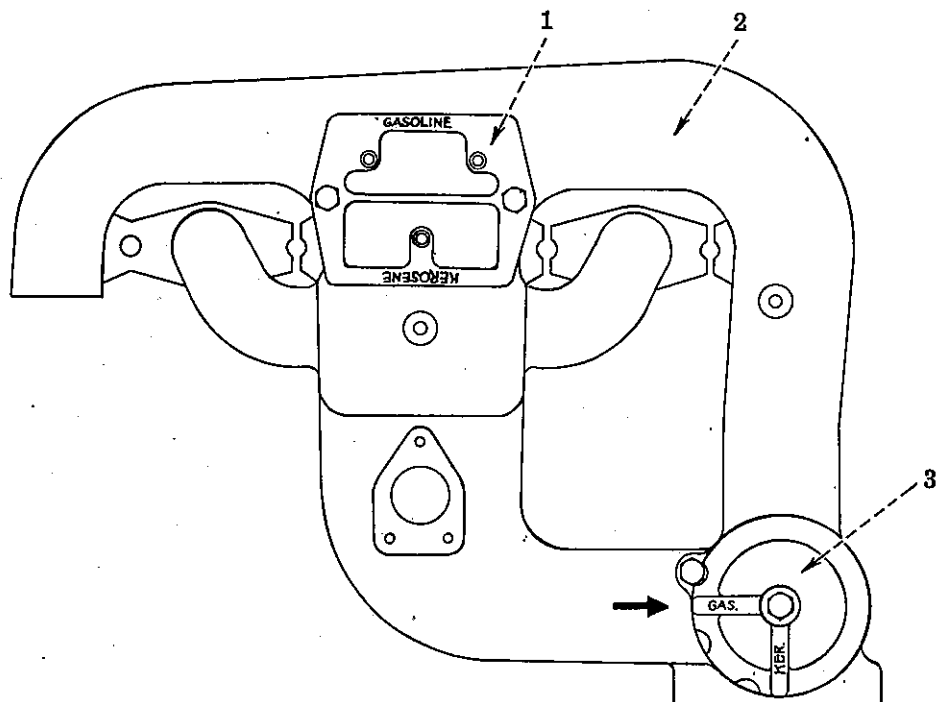


Illustration No. 63
Combination manifold.

Ref. No.	I H C Part No.	DESCRIPTION
1	1832DX	Combination manifold baffle plate, complete with baffle.
2	1714DX	Combination manifold, complete with studs and baffle plate.
3	1497DA	Combination manifold valve.

CARBURETOR

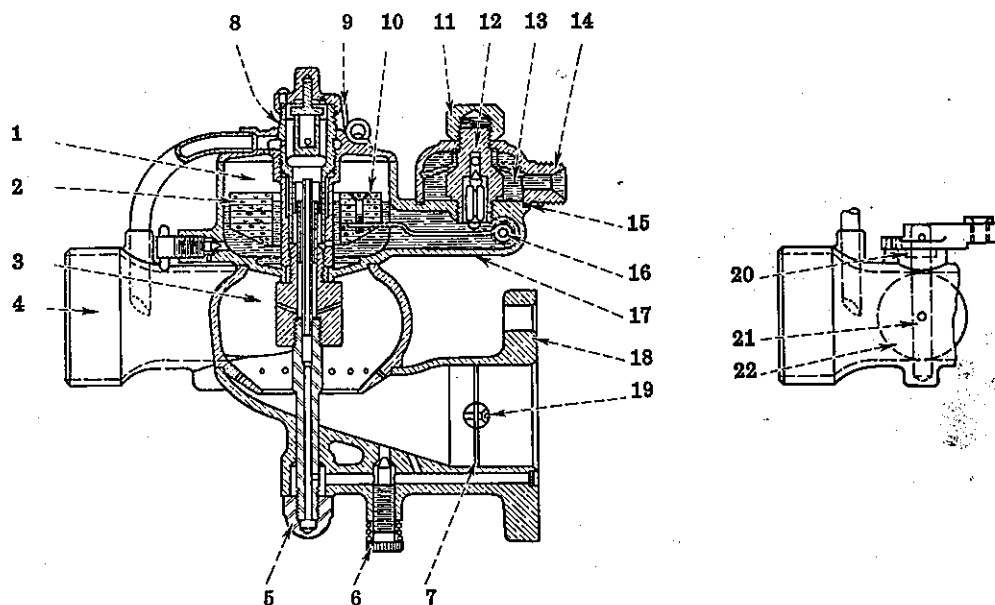


Illustration No. 64—Carburetor, Model "R," 1½" (17945D) (sectional view).

Ref. No.	I H C Part No.	DESCRIPTION
1	.....	Float chamber.
2	16876D	Cork float (fuel bowl).
3	.....	Centrifugal chamber.
4	1728DX	Left hand volute.
5	14582D	Suction stem nut.
6	14562DX	Idling adjustment screw and retainer spring.
7	14958D	Throttle butterfly.
8	14520DX	Fuel adjusting screw assembly.
9	14576D	Fuel adjustment retainer spring.
10	14567D	Float lever screw washer.
11	14552D	Strainer cage nut.
12	14511DX	Float valve assembly.
13	14570D	Strainer cage screen.
14	1725DX	Strainer cage (fuel bowl).
15	14575D	Strainer cage gasket.
16	14549DA	Float lever pivot assembly.
17	1708DX	Fuel bowl assembly.
18	1722DX	Throttle tube assembly.
19	14971D	Butterfly screw.
20	14581D	Volute dust washer.
21	14561DAY	Starting shutter shaft.
22	14568D	Starting shutter.

FUEL TANK WITH VALVE CONNECTIONS

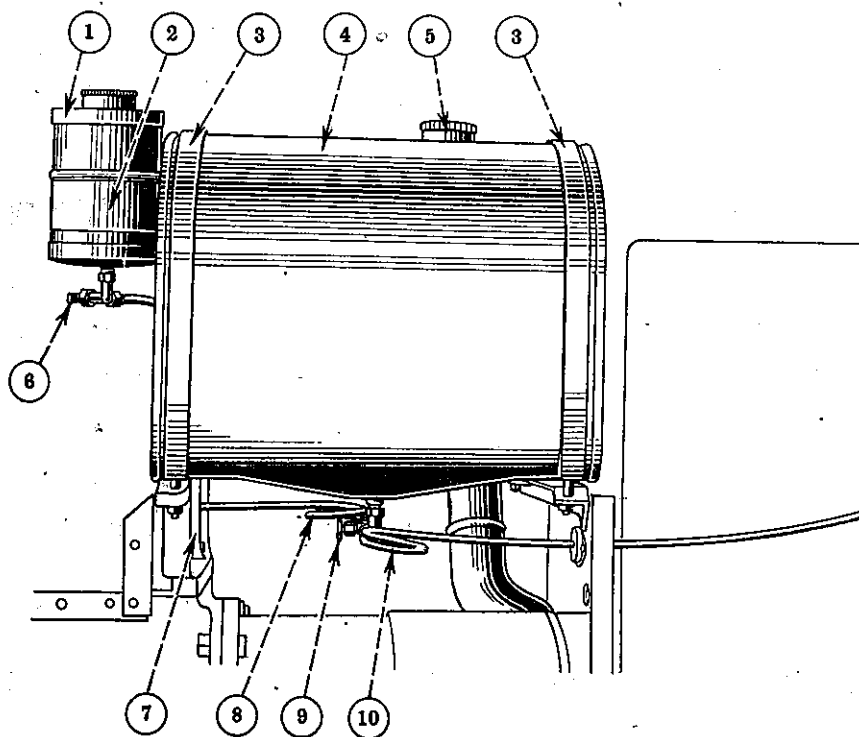


Illustration No. 65

Fuel tank with valve connections.

Ref. No.	I H C Part No.	DESCRIPTION
1	16438DX	Gasoline tank, complete with cap.
2	16337D	Gasoline tank strap.
3	16329DX	Fuel tank strap, complete.
4	16330DAX	Fuel tank, complete with cap.
5	11446D	Fuel tank filler cap assembly.
6	17228D	Gasoline tank shut-off needle valve.
7	1987D	Fuel tank support, rear.
8	18007DX	Gasoline pipe, complete (gasoline tank to fuel tank).
9	18055D	Fuel tank shut-off needle valve.
10	18006DX	Fuel pipe, complete (fuel tank to fuel pump).

GOVERNOR

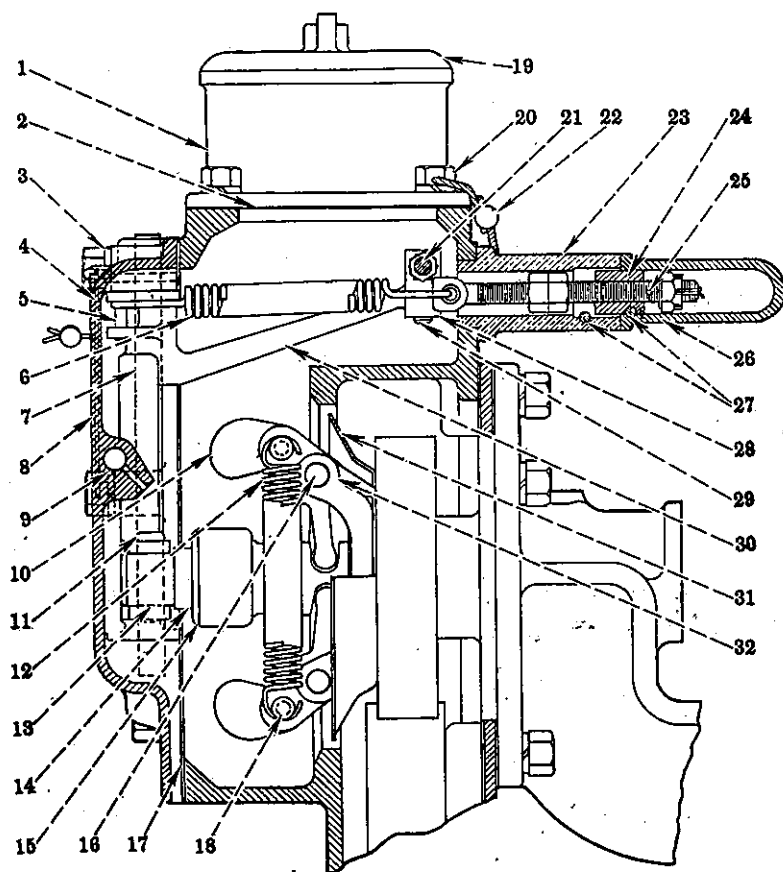


Illustration No. 66—Enclosed governor.

Ref. No.	I H C Part No.	DESCRIPTION	Ref. No.	I H C Part No.	DESCRIPTION
1	495D	Oil filler.	20	15208D	Oil filler cap screw.
2	12727D	Oil filler gasket.	21	12742D	Governor connecting rod.
3	4084D	Governor shield cap screw.	22	.....	Governor seal.
4	.....	Governor seal.	23	1454D	Governor throttle spring support.
5	9863T	Governor throttle spring pin.	24	14137D	Governor throttle spring adjuster nut.
6	14136D	Governor throttle spring.	25	14133D	Governor throttle spring eye-bolt.
7	12710D	Governor rockshaft.	26	12712DA	Governor throttle spring adjuster.
8	582DX	Governor shield with pin.	27	.....	Oval head rivet, $\frac{1}{4} \times 1\frac{1}{2}$.
9	4084D	Governor shield cap screw.	28	12719D	Governor connecting rod fork.
10	12716DX	Governor ball with pin.	29	12715D	Governor fork pivot.
11	12711D	Governor shoe pin.	30	12718DX	Governor rockshaft lever, complete.
12	12754D	Governor spring.	31	12212D	Governor shield, rear.
13	14134D	Governor shoe.	32	16375DX	Magneto and governor shaft with carrier.
14	.....	Governor shoe contact plate.			
15	1401DDX	Governor sleeve with contact plate.			
16	12214D	Governor ball pin.			
17	12728D	Governor shield gasket.			
18	7117T	Governor spring pin.			
19	101D	Oil filler cap.			

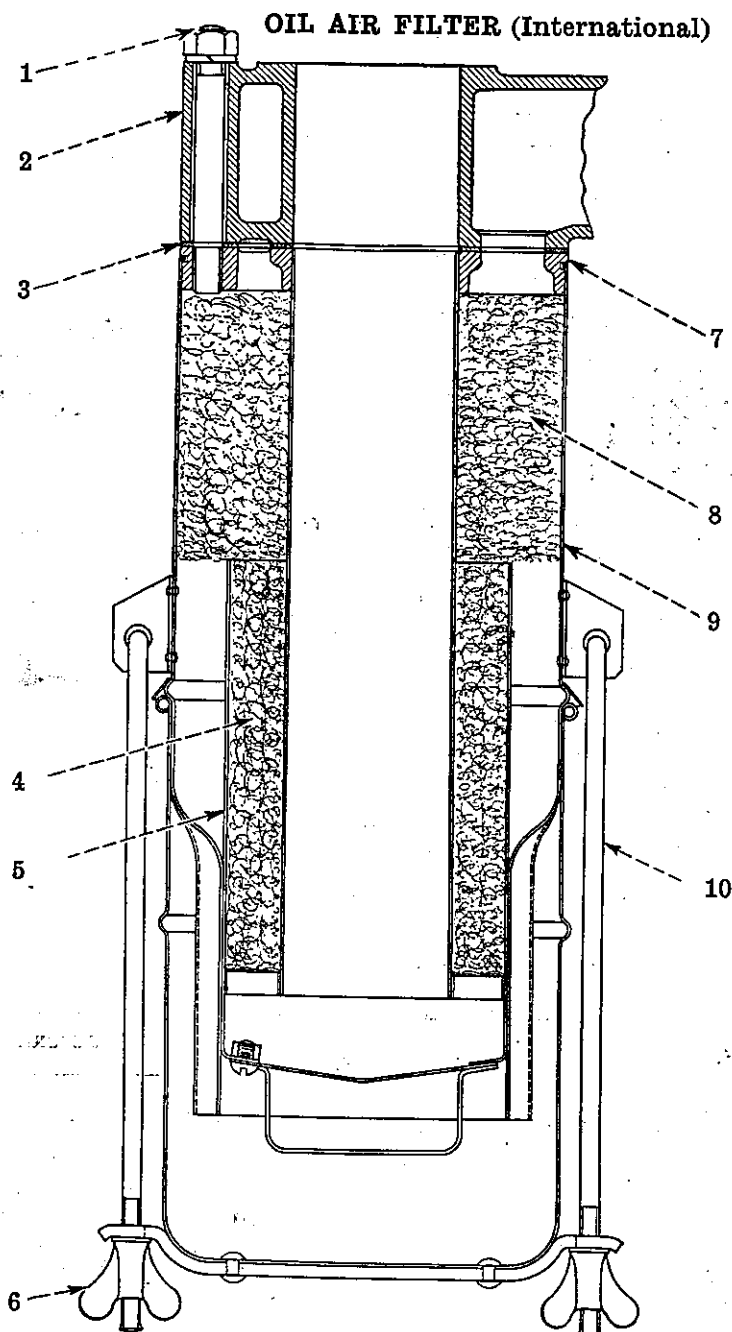


Illustration No. 67—Oil air filter (16466DAX) (sectional view).

Ref. No.	I H C Part No.	DESCRIPTION	Ref. No.	I H C Part No.	DESCRIPTION
1	11974D	Air filter top stud.	6	11916D	Oil cup wing nut.
2	2015D	Air filter top.	7	1863D	Body support.
3	16479D	Body gasket.	8	.....	Body strainer (steel wire).
4	.....	Inlet tube strainer (steel wire).	9	16476D	Air filter body (with strainer).
5	.....	Inlet tube.	10	17975D	Oil cup clamp rod.

OIL AIR FILTER AND CONNECTIONS

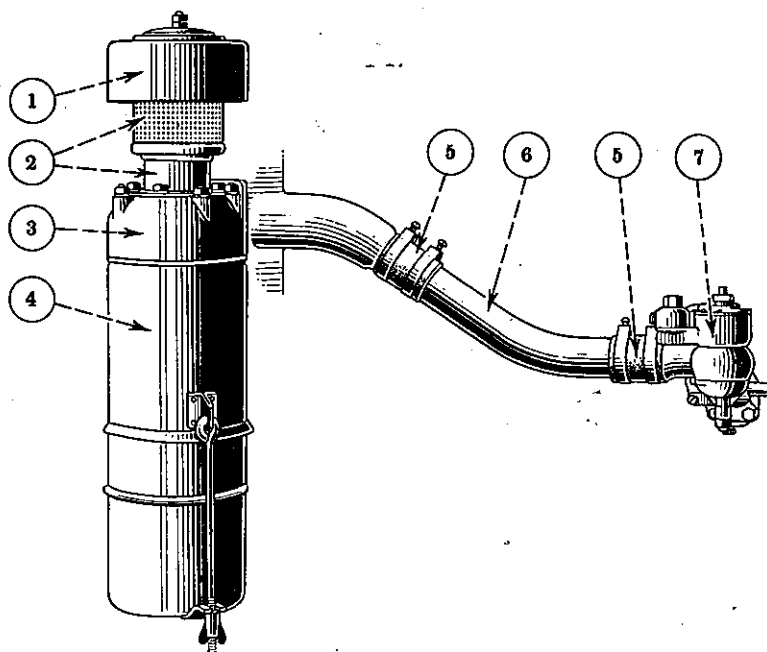


Illustration No. 68

Oil air filter with carburetor and connections.

Ref. No.	I H C Part No.	DESCRIPTION
1	11196D	Air strainer top.
2	17789DY	Air pipe, complete with strainer and top.
3	2015D	Oil air filter top.
4	16466DAX	Oil air filter.
5	12814D	Carburetor connection hose.
6	17817D	Carburetor connection tube.
7	17945D	Carburetor (Model "R," 1 1/2").

OIL FILTER AND CONNECTIONS

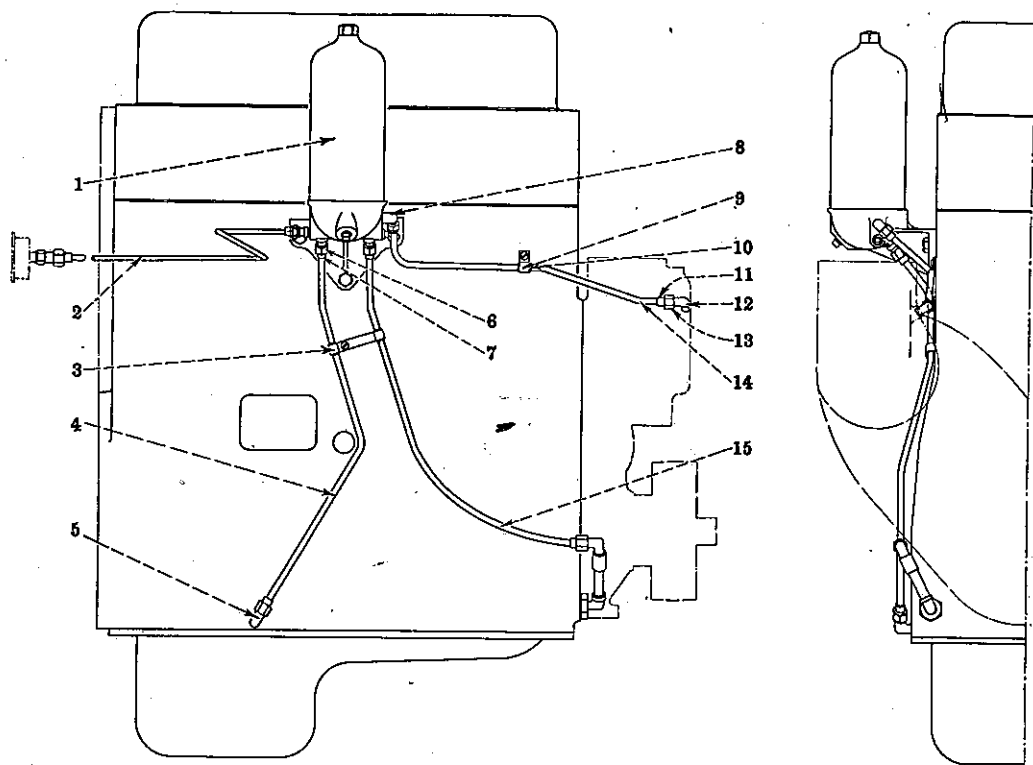


Illustration No. 69

Detail—Oil filter and connections.

Ref. No.	I H C Part No.	DESCRIPTION
1	13148D	Oil filter (Purolator type B-29).
2	18008DX	Oil pressure gauge pipe with nuts.
3	16584DA	Oil filter inlet and outlet pipe clip.
4	15952DBX	Oil filter inlet pipe with nuts.
5	17216D	Oil filter inlet and outlet pipe elbow.
6	16718D	Oil filter inlet and outlet pipe nut.
7	16719D	Oil filter inlet and outlet pipe nipple.
8	16737D	Governor oil pipe elbow.
9	11659D	Oil pipe clip.
10	11662D	Oil pipe cushion.
11	16716D	Governor oil pipe nipple.
12	17632D	Governor oil pipe elbow.
13	16715D	Governor oil pipe nut.
14	17035DX	Governor oil pipe with nuts.
15	15953DBX	Oil filter outlet pipe with nuts.

OIL FILTER

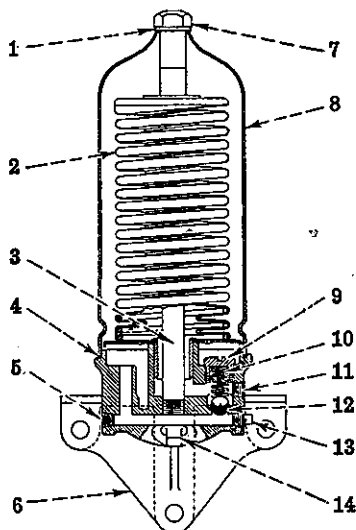


Illustration No. 70—Oil filter (sectional view).

Ref. No.	I H C Part No.	DESCRIPTION
1	13727D	Retaining nut gasket.
2	13731DA	Element assembly.
3	13721D	Retaining stud.
4	13728D	Case gasket.
5	.....	Inlet.
6	13602D	Base.
7	13726D	Retaining nut.
8	13729D	Case.
9	13720D	Blow-off cover screw.
10	13719D	Blow-off spring.
11	.....	Outlet.
12	13722D	Blow-off ball.
13	.....	Pipe plug.
14	13638D	Drain plug.

MAGNETO

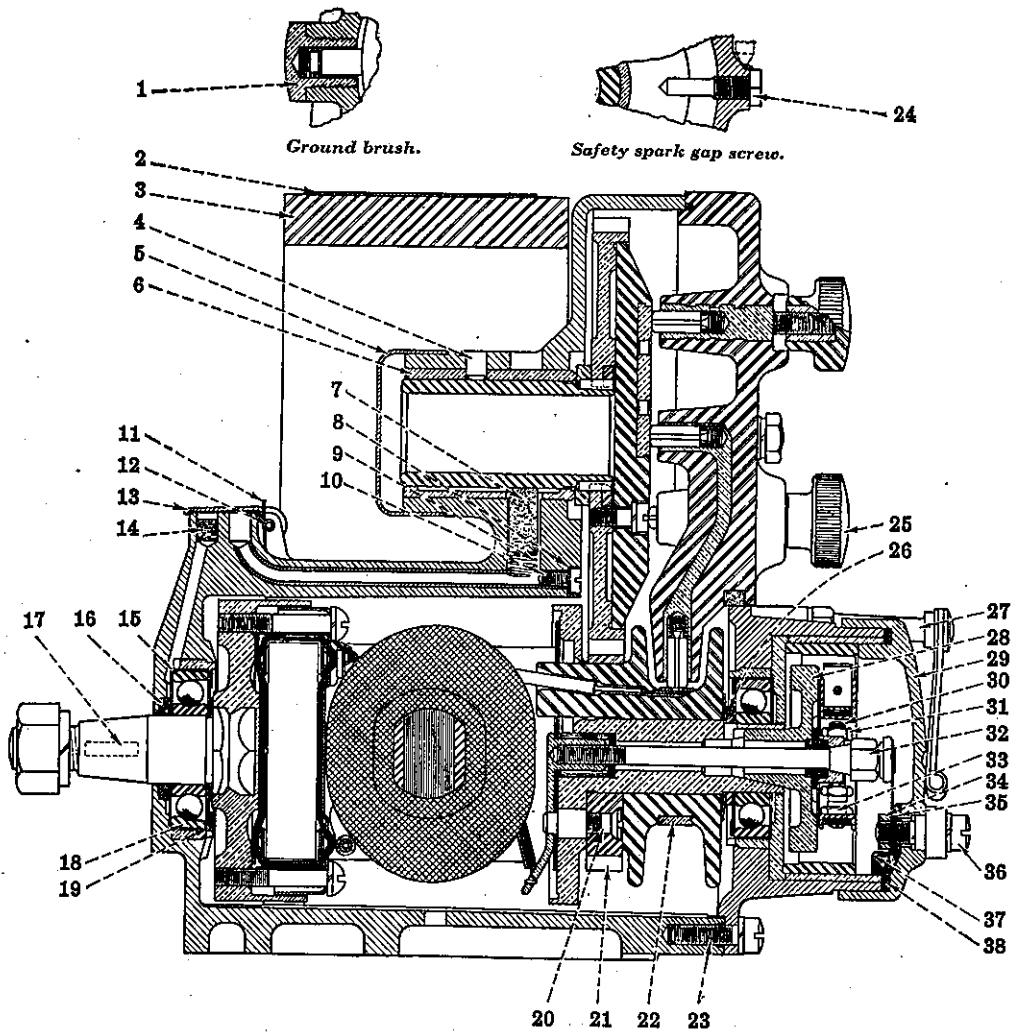


Illustration No. 71
E4A Magneto assembly (sectional view).

MAGNETO—Continued

(See illustration No. 71)

Ref. No.	I H C Part No.	DESCRIPTION
1	E4 -218	Ground brush holder.
2	E4A- 28A	Name plate and magneto band.
3	E4- 1	Magnet.
4	E4A-473	Dowel pin for distributor gear shaft bushing.
5	E4A-233	Distributor gear shaft cover.
6	E4A-231	Distributor gear shaft bushing.
7	E4A-217	Distributor gear shaft oil wick.
8	E4A-321	Magneto distributor shaft oil pipe screw gasket.
9	E4A-247	Distributor gear shaft oil wick spring.
10	E4A-322	Magneto distributor shaft oil pipe screw.
11	E4 -245	Magneto frame oil well cover spring.
12	E4 -225	Magneto frame oil well cover pin.
13	E4 -224	Magneto frame oil well cover.
14	E4 -216	Ball bearing oil well felt.
15	E4A-261	Bearing insulation, outer.
16	E4 -226	Magneto bearing felt.
17	4167T	Key for armature driving end.
18	E4 -294	Magneto shaft ball bearing, complete.
19	E4A-324	Oil flinger.
20	E4A-461	Armature pinion screw.
21	E4 -207	Armature pinion, 37 teeth.
22	E4 -102	Collector ring for "A" and "B" windings only.
22	E4A-522	Collector ring for "C" windings only.
23	E4A-358	Magneto end plate and breaker housing screw, plain.
24	E4 -244	Safety spark gap screw.
25	E4A-320	Distributor block thumb nut.
26	E4A-325	Oil flinger spacer.
27	E4A-314A	Breaker housing cover spring post, complete. (Specify number of magneto.)
28	E4A-304	Breaker, complete with breaker points.
29	E4A-284A	Breaker housing cover.
30	E4A-258	Fixed breaker point.
31	E4A-262	Fixed breaker point lock nut.
32	E4 -229	Breaker screw for holding breaker in place.
33	E4A-259	Breaker arm point.
34	E4A-499	Short-circuiting terminal inside nut.
35	E4A-307A	Short-circuiting terminal insulation.
36	E4A-503	Short-circuiting terminal screw, short.
37	E4A-275A	Short-circuiting spring, short.
38	E4A-302	Breaker housing cover packing.

AUTOMATIC IMPULSE COUPLING (For E4A Magneto)

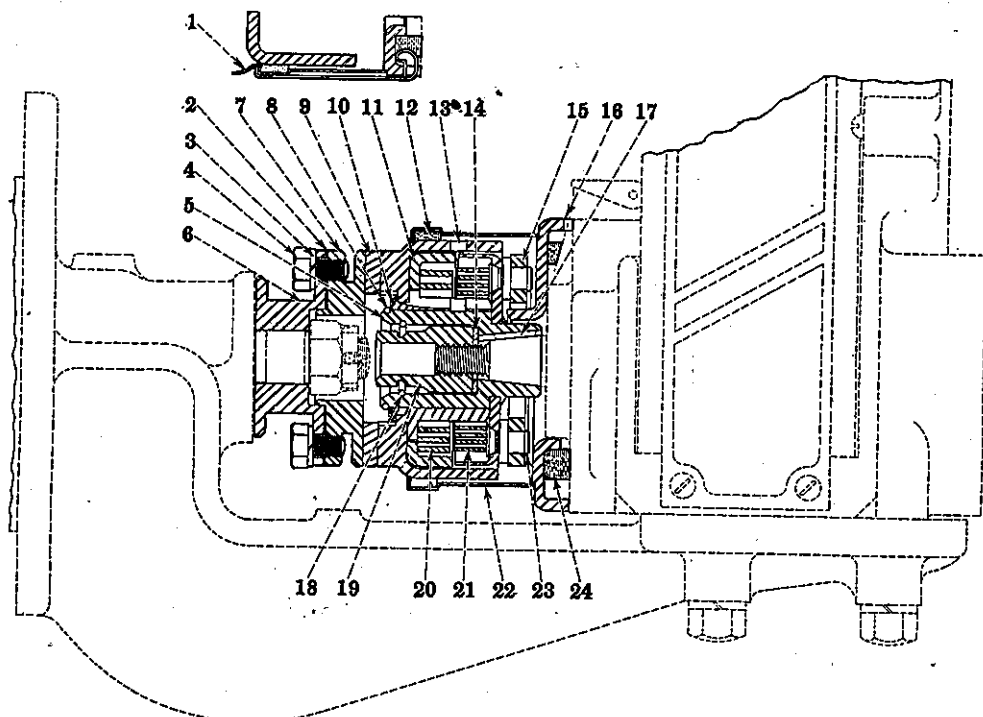


Illustration No. 72

Automatic impulse coupling (E4A-500) (for E4A magneto).

Ref. No.	I H C Part No.	DESCRIPTION
1	E4A-439	Cover spring.
2	10481D	Magneto coupling shim, medium.
	10482D	Magneto coupling shim, heavy.
	10553D	Magneto coupling shim, light.
3	.....	Lockwasher, $\frac{1}{4}$ ".
4	.....	Cap screw, $\frac{1}{4}$ x $\frac{3}{8}$ ".
5	E4A-451B	Magneto member, complete.
6	7882T	Magneto coupling.
7	12740D	Magneto coupling block, male.
8	E4A-453	Magneto member shaft snap ring, outer.
9	12741D	Magneto coupling block spacer.
10	E4A-452	Magneto member shaft outer snap.
11	E4A-456	Coupling member stop ring.
12	E4A-437	Cover felt.
13	E4A-447C	Coupling member spring.
14	.....	Lockwasher, $\frac{1}{16}$ ", light.
15	E4A-440	Pawl.
16	E4A-434	Coupling plate.
17	4167T	Key for magneto member.
18	E4A-454	Magneto member shaft snap ring, inner.
19	E4A-455	Coupling nut.
20	E4A-460	Snubber spring.
21	E4A-459	Drive spring.
22	E4A-438	Coupling cover, complete.
23	E4A-442	Pawl pin snap ring.
24	E4A-457	Coupling plate felt.

BREAKER ASSEMBLY (For E4A Magneto)

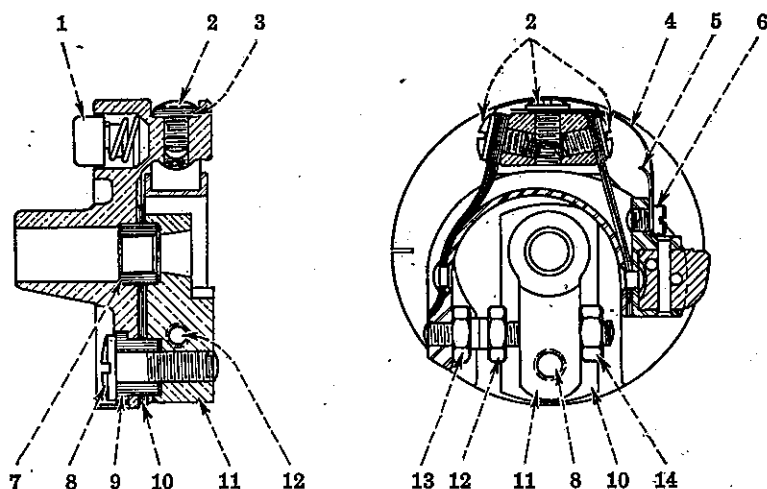


Illustration No. 73

Breaker assembly (E4A-304) (for E4A magneto).

Ref. No.	I H C Part No.	DESCRIPTION
1	E4A-410	Ground carbon, assembly.
2	E4A-425	Breaker spring screw on carrier.
3	E4A-427	Short top pressure spring.
4	E4A-428	Long pressure spring.
5	E4A-426	Short side pressure spring.
6	E4A-424	Breaker spring screw in arm.
7	E4A-422	Breaker center bushing.
8	E4A-421	Stationary breaker point support screw.
9	E4A-423	Stationary point support bushing.
10	E4A-420	Stationary breaker point support insulation.
11	E4A-242	Stationary breaker support.
12	E4A-258	Fixed breaker point.
13	E4A-259	Breaker arm point (order E4A-552X).
14	E4A-262	Fixed breaker point lock nut.

SPARK ROD AND CABLE CONNECTIONS

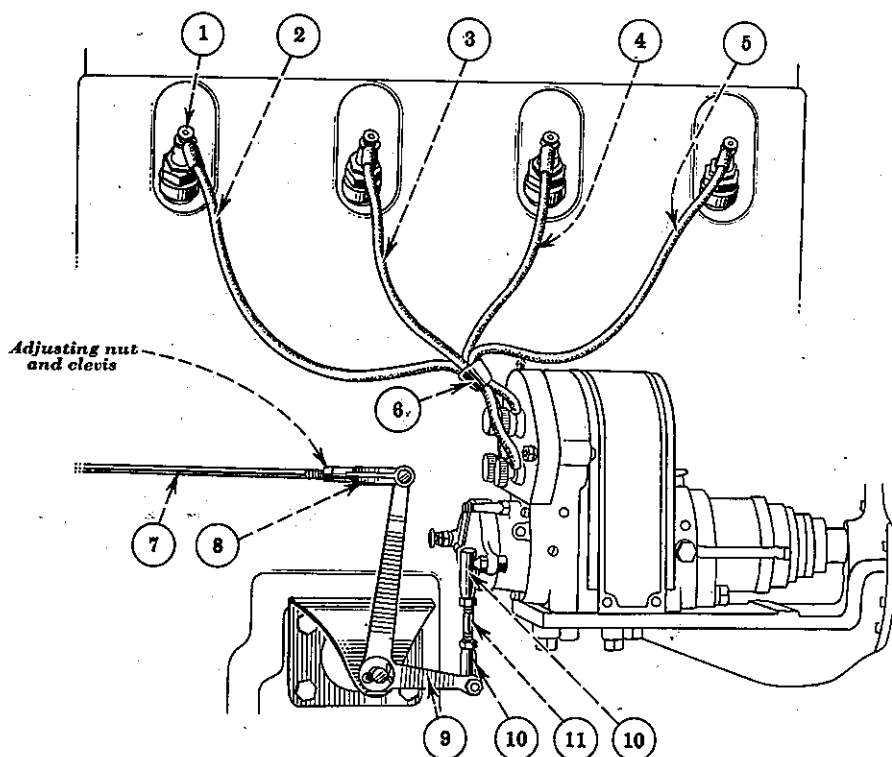


Illustration No. 74

Spark rod and cable connections.

Ref. No.	I H C Part No.	DESCRIPTION
1	13173D	Spark plug, $\frac{7}{8}$ " S.A.E. (Champion No. 20).
2	12747D	Spark plug cable (to No. 4 plug).
3	14042D	Spark plug cable (to No. 3 plug).
4	4672D	Spark plug cable (to No. 2 plug).
5	4675D	Spark plug cable (to No. 1 plug).
6	10435DB	Spark plug cable assembly.
7	17735D	Spark control rod.
8	17730D	Spark control rod clevis.
9	1989D	Spark control bell crank.
10	13096D	Spark control rod ball joint.
11	17726D	Spark control ball joint rod.

CLUTCH

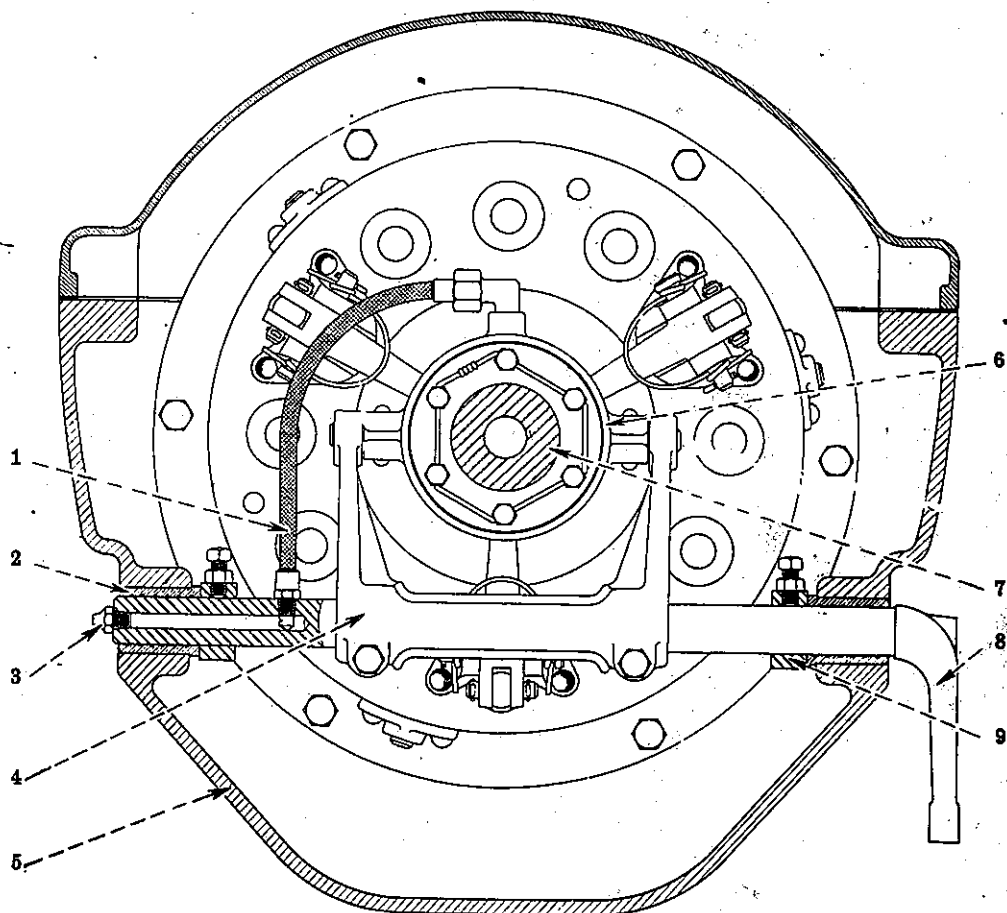


Illustration No. 75

Clutch release collar and fork assembly.

Ref. No.	I H C Part No.	DESCRIPTION
1	15946DX	Clutch release bearing oil tube, complete.
2	4447DB	Clutch shifter shaft bushing.
3	14186D	Clutch release bearing lubricator (Alemite-Zerk) (on clutch shifter shaft).
4	1829DA	Clutch shifter fork.
5	828DDX	Main frame.
6	1835DBX	Clutch release bearing collar, complete with pin.
7	10725D	Clutch coupling (16 teeth).
8	16349DX	Clutch shifter shaft, complete.
9	4734D	Clutch shifter shaft collar.

CLUTCH—Continued.

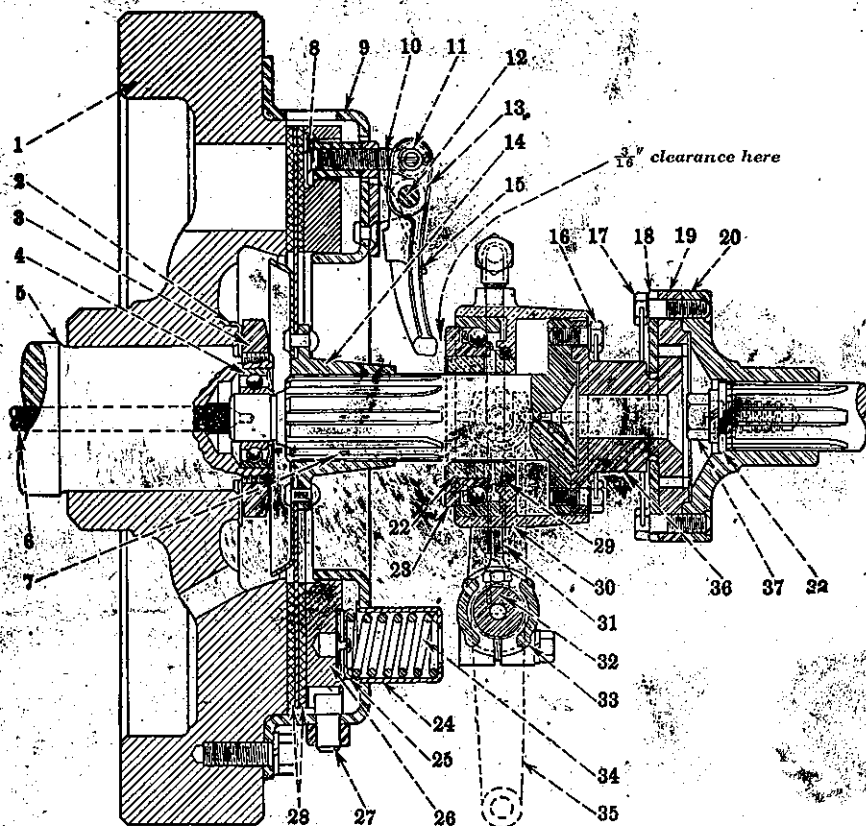


Illustration No. 76

Single plate clutch (sectional view).

Ref. No.	I H C Part No.	DESCRIPTION	Ref. No.	I H C Part No.	DESCRIPTION
1	460D	Flywheel.	21	1830DA	Release sleeve.
2	10354D	Flywheel nut lock.	22	13149D	Clutch release bearing.
3	10353D	Flywheel nut.	23	12981D	Clutch pressure plate spring cup.
4	10701DA	Clutch shaft ball bearing, front.	24	14603DB	Pressure spring insulating cup.
5	10379DAX	Crankshaft.	25	987D	Clutch pressure plate.
6	12219D	Clutch shaft bearing wick.	26	12983D	Clutch pressure plate driving pin.
7	15948D	Clutch shaft.	27	14622DA	Friction facing.
8	12989D	Release lever eye-bolt sleeve.	28	15943DA	Release sleeve felt washer.
9	14623DX	Release lever plate, complete.	29	1835DBX	Release bearing collar, complete with pin.
10	12982D	Release lever eye-bolt.	30	15946DX	Release bearing oil tube, complete.
11	16881D	Release lever eye-bolt pin.	31	4733D	Shifter fork key.
12	16882D	Release lever pin.	32	1829DA	Clutch shifter fork.
13	14618D	Release lever.	33	14909D	Clutch pressure spring.
14	14624D	Clutch driven disk and facing.	34	16349DX	Clutch shifter shaft with keys.
15	16885D	Release lever spring.	35	10725D	Clutch coupling (16 teeth).
16	10722D	Clutch coupling screw.	36	4688D	Splineshaft clutch couplingscrew.
17	10721D	Transmission joint screw.	37	10657D	Transmission joint washer.
18	10723D	Clutch coupling washer.	38		
19	10724D	Clutch coupling ring (16 teeth).			
20	10726D	Transmission joint.			

GEAR SHIFTER LEVER ASSEMBLY

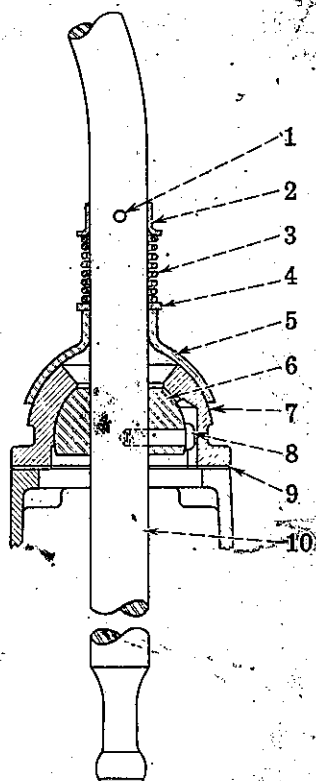


Illustration No. 77

Detail—Gear shifter lever.

Ref. No.	I H C Part No.	DESCRIPTION
1	1858T	Gear shifter lever spring stop pin.
2	11373D	Gear shifter lever spring stop.
3	11374D	Gear shifter lever spring.
4	17700D	Gear shifter lever spring stop, lower.
5	17703D	Gear shifter ball socket shield.
6	17707D	Gear shifter lever ball.
7	1982D	Gear shifter lever ball socket.
8	17702D	Gear shifter lever pin.
9	17711D	Gear shifter lever ball socket gasket.
10	17744DX	Gear shifter lever.

TRANSMISSION

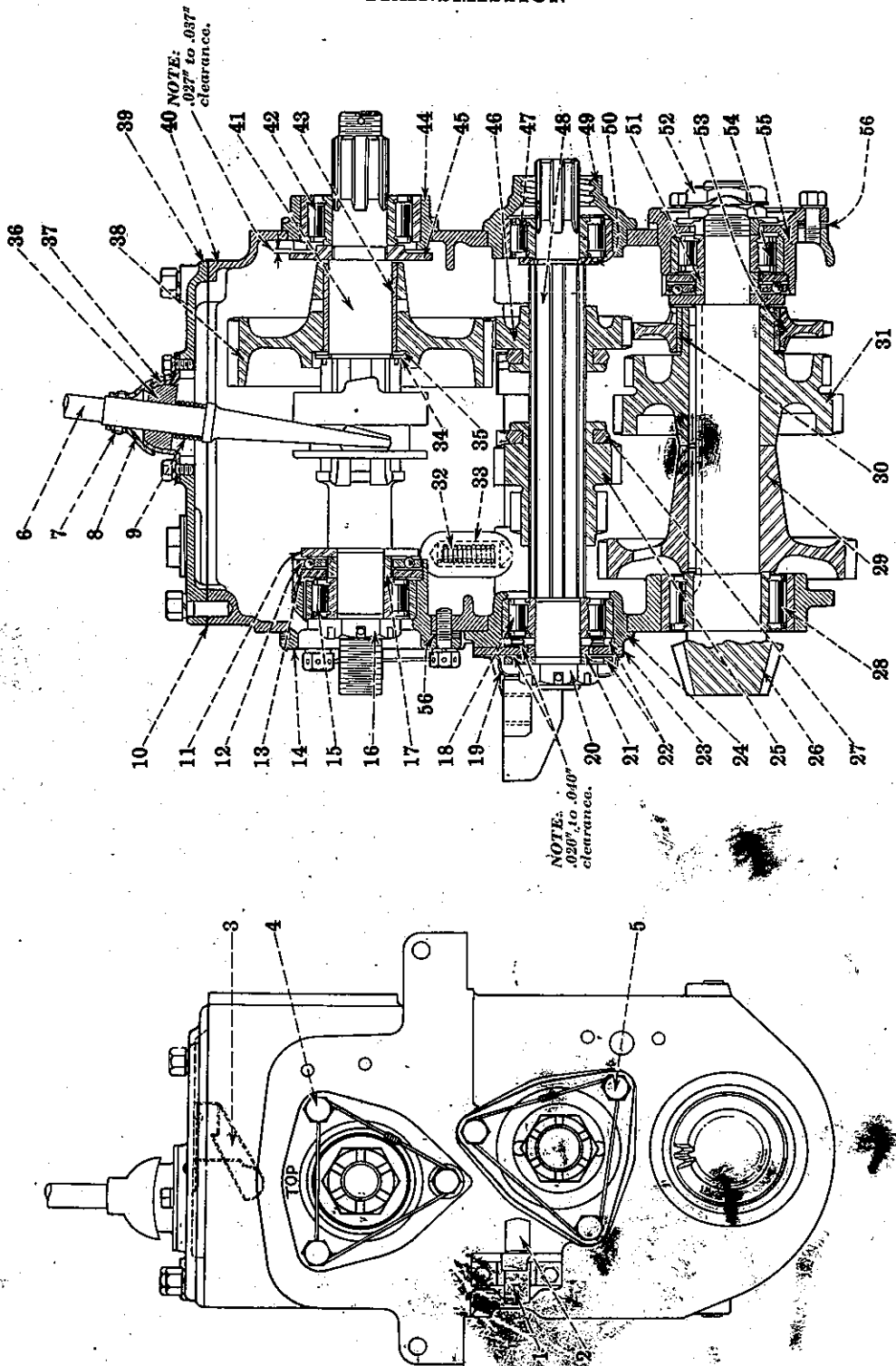


Illustration No. 78—Detail of transmission (17852D).

TRANSMISSION—Continued

(See illustration No. 78)

Ref. No.	I H C Part No.	DESCRIPTION
1	10640D	High and reverse speed shifter rod.
2	10638D	Medium and low speed shifter rod.
3	10750D	Transmission case cover oil trough.
4	10961D	Cap screw through pulley drive shaft bearing cage, rear.
5	10962D	Cap screw through transmission spline shaft bearing cage, rear.
6	17718D	Pulley shifter lever.
7	6220T	Pulley shifter ball socket cap pin.
8	11377D	Pulley shifter ball socket cap.
9	11374DA	Pulley shifter lever spring.
10	10694D	Transmission case cover gasket.
11	10518D	Pulley drive shaft thrust washer.
12	805DX	Pulley drive shaft thrust bearing, rear.
13	10519D	Pulley drive thrust washer.
14	808DX	Pulley drive shaft bearing cage, with race.
15	4738TC	Pulley drive shaft roller bearing, complete.
16	4647D	Pulley drive shaft nut.
17	10520D	Pulley drive shaft thrust washer spacer.
18	4738TC	Transmission spline shaft roller bearing, rear, complete.
19	10702D	Spline shaft thrust washer oil retainer.
20	4647D	Transmission spline shaft nut, rear.
21	10544D	Spline shaft thrust washer spacer.
22	10543D	Spline shaft thrust washer, small.
23	10542D	Spline shaft thrust washer, large.
24	809DX	Transmission spline shaft bearing cage, rear, with race.
25	10528DA	Medium and low speed pinion.
26	17639D	Bevel pinion and shaft (22 teeth).
27	10525DA	Medium and low speed shifter fork.
28	12323DA	Bevel pinion shaft roller bearing, rear, complete.
29	10524DA	Low speed gear (45 teeth).
30	806DA	Oiler gear bushing.
31	10526DBX	Medium and high speed gears.
32	10862D	Transmission shifter rod poppet spring.
33	9222H	Transmission shifter rod poppet.
34	12262D	Pulley drive gear washer spacer.
35	12263D	Pulley drive gear washer.
36	11375D	Pulley shifter lever ball.
37	11376DX	Pulley shifter lever swivel bearing.
38	10533DA	Pulley drive gear (46 teeth).
39	1696DAX	Transmission case cover with oil trough.
40	829DBX	Transmission case.
41	10537DAX	Pulley drive shaft with bushing.
42	4592DC	Pulley drive shaft roller bearing, front, complete.
43	807D	Pulley drive gear bushing.
44	824DAX	Pulley drive shaft bearing cage, front, with race.
45	10937D	Pulley drive gear spacer.
46	10523D	High speed pinion (25 teeth).
47	4738TC	Transmission spline shaft roller bearing, front.
48	10545D	Transmission spline shaft.
49	825DX	Transmission spline shaft bearing cage, front.
50	10687D	Spline shaft bearing washer.
51	10520D	Bevel pinion thrust washer spacer.
52	12322D	Bevel pinion shaft lock nut.
53	10529DB	Oiler gear (36 teeth).
54	4738TC	Bevel pinion shaft roller bearing, front.
55	804DX	Bevel pinion shaft bearing cage with race.
	10621D	Shim (.0625" thick).
	10622D	Shim (.03125" thick).
56	10623D	Shim (.0156" thick).
	10624D	Shim (.007" thick).

SPROCKET DRIVE ASSEMBLY

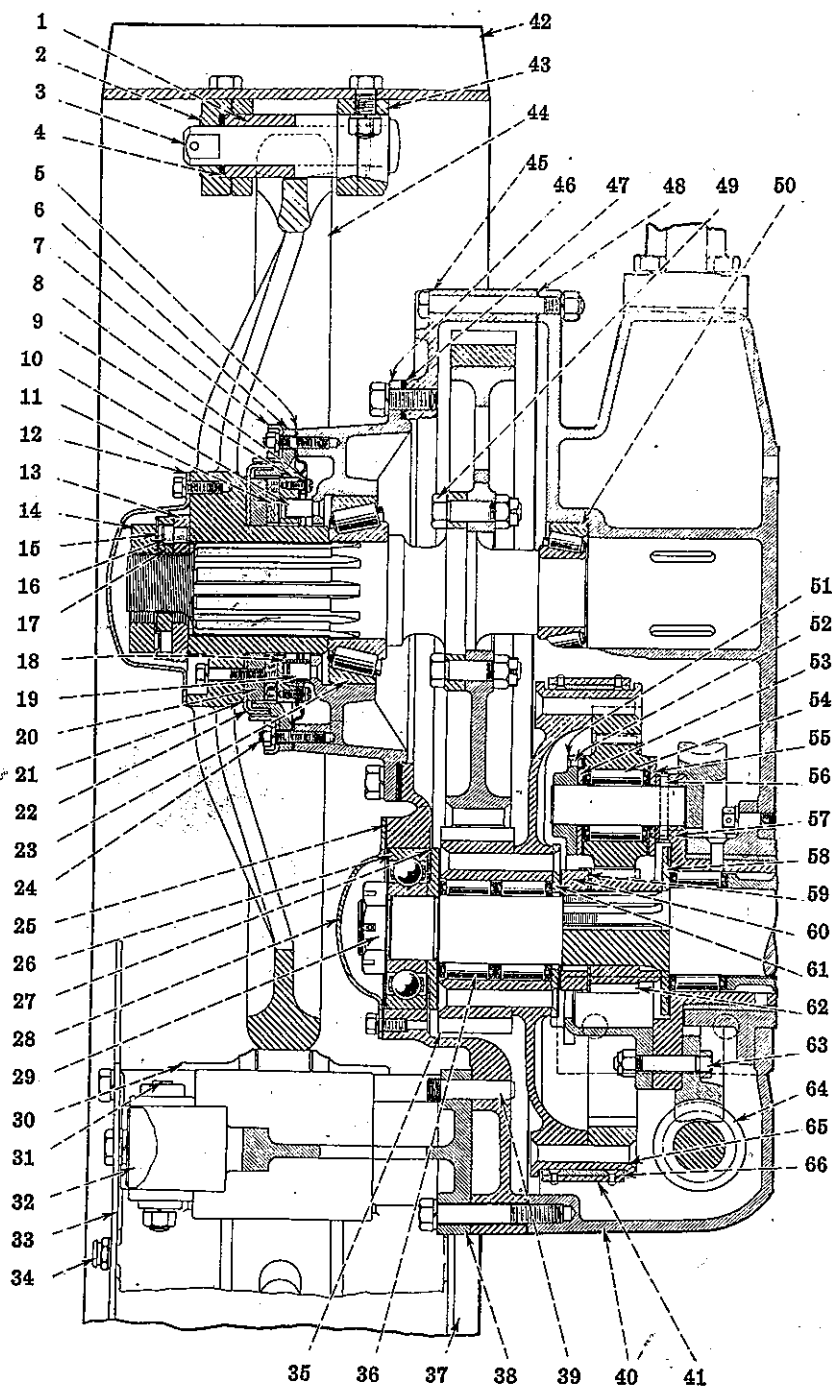


Illustration No. 79—Sprocket drive assembly (right side).

(For list of parts, see pages 98 and 99)

SPROCKET DRIVE ASSEMBLY—Continued

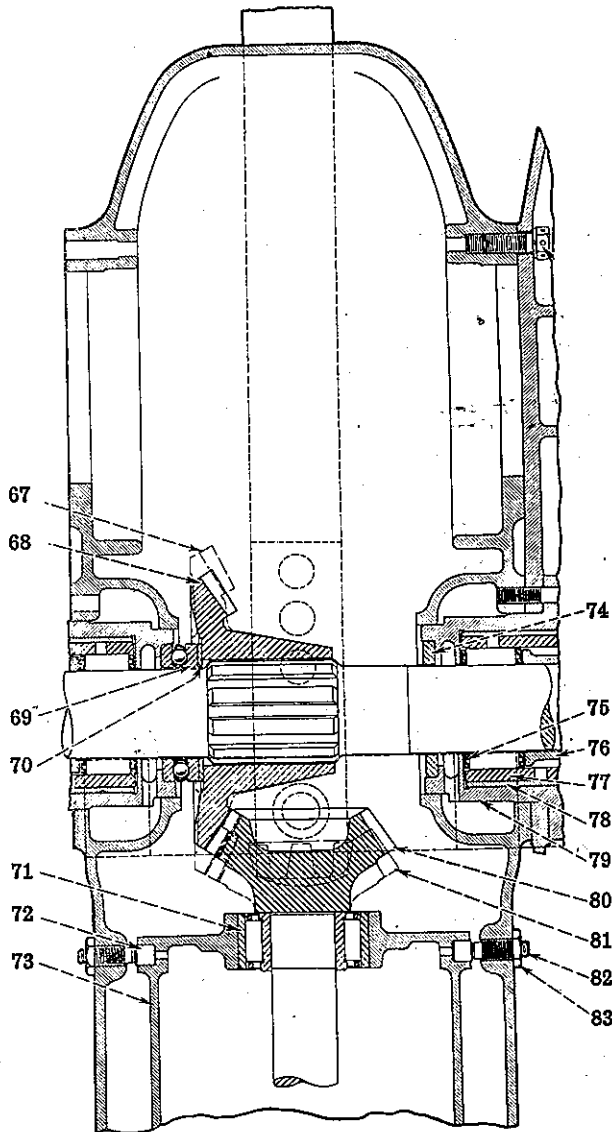


Illustration No. 80—Sprocket drive assembly (right side).
(Detail of bevel gear shaft).

(For list of parts, see pages 98 and 99)

SPROCKET DRIVE ASSEMBLY—Continued

(See illustrations Nos. 79 and 80)

Ref. No.	I H C Part No.	DESCRIPTION
1	16531D	Track link bushing.
2	17899D	Track link, outer, R.H.
3	16529D	Track link pin, $\frac{1}{4} \times 1\frac{1}{2}$ ".
4	16532D	Track link felt washer.
5	17692D	Oil seal diaphragm.
6	1980D	Oil seal guard.
7	17693D	Oil seal shield.
8	17694D	Oil seal diaphragm ring.
9	17691D	Sprocket housing oil seal pressure plate, inner.
10	17107D	Oil seal pressure plate driving stud.
11	17695D	Oil seal packing.
12	17753D	Sprocket shaft cap.
13	17752DX	Sprocket drive shaft nut.
14	12801D	Sprocket shaft lock nut.
15	17755D	Sprocket drive shaft nut lock.
16	17757D	Sprocket drive shaft adjusting lock pin.
17	17756D	Sprocket drive shaft adjusting lock.
18	17383D	Oil seal spring.
19	17106D	Oil seal pressure plate spring centering pin.
20	17677D	Sprocket housing oil seal pressure plate, outer.
21	17885D	Oil seal dirt deflector gasket.
22	17680D	Oil seal dirt deflector.
23	13308DA	Sprocket drive shaft taper roller bearing, outer.
24	{ 17754D	Oil seal guard stud, upper.
	{ 17114D	Oil seal guard stud, lower.
25	17760D	Bevel gear shaft outer bearing cover gasket.
26	17737D	Drive bevel gear shaft outer ball bearing.
27	17673D	Sprocket drive pinion thrust washer, outer.
28	17765D	Bevel gear shaft outer bearing cover.
29	4513D	Drive bevel gear shaft outer nut.
30	{ 2016DX	Track frame, L. H.
	{ 2017DX	Track frame, R. H.
31	17776D	Track frame pivot locking pin.
32	17787DX	Track frame pivot.
33	{ 17926DA	Track shield, outer, L. H.
	{ 17927DA	Track shield, outer, R. H.
34	17829D	Track roller lubrication fitting.
35	.....	Sprocket drive pinion (24 teeth) (order 1978DX).
36	17666D	Sprocket drive pinion roller bearing.
37	{ 17928DA	Track shield, inner, L. H.
	{ 17929DA	Track shield, inner, R. H.
38	{ 2008D	Track frame pivot bracket, L. H.
	{ 2009D	Track frame pivot bracket, R. H.
39	10718DA	Bell housing dowel pin.
40	{ 2000DX	Sprocket drive gear case, L. H.
	{ 2001DX	Sprocket drive gear case, R. H.
41	17731DX	Brake band, complete.
42	{ 16541D	Track shoe, 12" (parallel type).
	{ 16541DA	Track shoe, 12" (offset type).
43	17901D	Track link, inner, R. H.
44	1995D	Sprocket (29 teeth).

Continued on page 99.

SPROCKET DRIVE ASSEMBLY—Continued

(See illustrations Nos. 79 and 80)

Ref. No.	I H C Part No.	DESCRIPTION
45	{ 1996DAX	Sprocket drive gear case cover, L. H., complete.
	{ 1997DAX	Sprocket drive gear case cover, R. H., complete.
46	1981DX	Sprocket shaft bearing cage.
	{ 17696D	Sprocket shaft bearing cage shim (.062").
47	{ 17697D	Sprocket shaft bearing cage shim (.031").
	{ 17698D	Sprocket shaft bearing cage shim (.015").
	{ 17699D	Sprocket shaft bearing cage shim (.007").
48	17766D	Sprocket drive gear case cover gasket.
49	17674DX	Sprocket drive gear carrier bolt.
50	13320DA	Sprocket drive shaft taper roller bearing, inner.
51	.....	Planetary idler shaft carrier (order 17655DX).
52	15627D	Planetary idler thrust washer pin, outer.
53	17648D	Planetary idler gear thrust washer.
54	17669D	Planetary idler gear roller bearing.
55	17648D	Planetary idler gear thrust washer.
56	17647D	Planetary idler shaft pin.
57	17646D	Planetary idler thrust washer pin, inner.
58	17635D	Worm gear carrier thrust washer.
59	17636D	Planetary drive pinion nut lock.
60	17637D	Planetary drive pinion nut.
61	.....	Sprocket drive pinion thrust washer, inner (order 1978DX).
62	17638D	Planetary drive pinion (18 teeth).
63	17644DX	Worm gear dowel bolt.
64	17690D	Steering worm.
65	1978DX	Sprocket drive pinion carrier.
66	17732D	Brake band lining.
67	17872D	Drive bevel gear (41 teeth) (special).
68	17642DX	Drive bevel gear (35 teeth) (regular).
*69	17640DX	Drive bevel gear shaft thrust bearing.
	{ 17649D	Drive bevel gear adjusting washer (.125").
	{ 17650D	Drive bevel gear adjusting washer (.135").
*70	{ 17651D	Drive bevel gear adjusting washer (.145").
	{ 17652D	Drive bevel gear adjusting washer (.115").
	{ 17653D	Drive bevel gear adjusting washer (.105").
71	12323DA	Drive bevel pinion shaft roller bearing.
72	12694D	Transmission case thrust plug.
73	829DBX	Transmission case.
74	17641DX	Bevel gear shaft bearing cage oil retainer, L. H.
75	17662D	Drive bevel gear shaft roller bearing.
76	1974D	Drive bevel gear shaft roller bearing spacer.
77	17655DX	Worm gear carrier.
78	17676D	Worm gear carrier bushing.
79	1975D	Drive bevel gear shaft bearing cage.
80	17639D	Bevel pinion and shaft, regular.
81	17873D	Bevel pinion and shaft (22 teeth) (special).
82	17633D	Bevel pinion thrust stud.
83	17634D	Bevel pinion thrust stud jam nut, $\frac{5}{8}$ ".

***Caution:** When ordering repairs or replacement of the drive bevel gear shaft thrust bearing (17640-D), be sure to select the correct thickness of adjusting washer. See washers listed above (17649D to 17653D inclusive).

STEERING WORM AND SPROCKET DRIVE ASSEMBLY

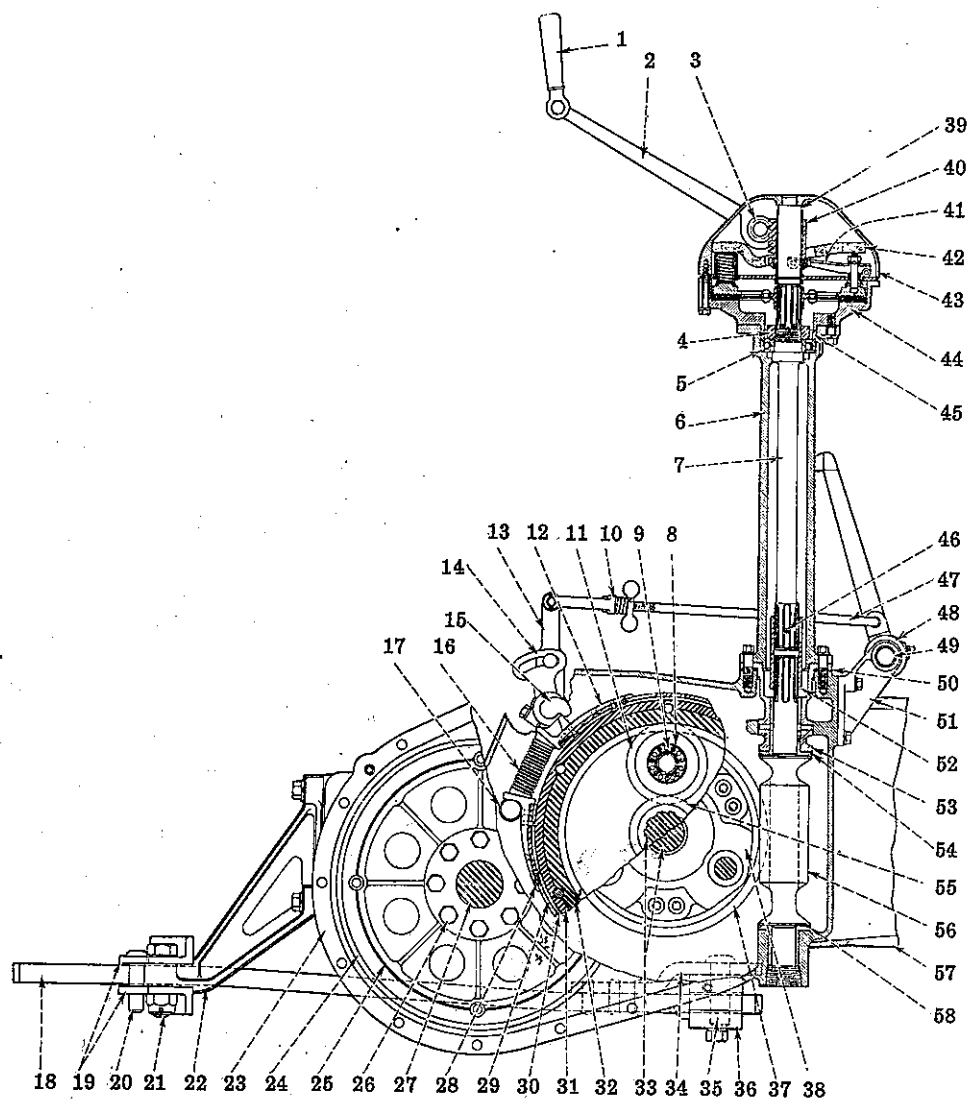


Illustration No. 81

Steering worm and sprocket drive assembly.

STEERING WORM AND SPROCKET DRIVE ASSEMBLY—Continued

(See illustration No. 81)

Ref. No.	I H C Part No.	DESCRIPTION	Ref. No.	I H C Part No.	DESCRIPTION
1	.....	Steering clutch lever handle (order 16462 D).	35	17759D	Drawbar pivot pin.
2	{ 17712D	Steering clutch lever, L. H.	36	17763D	Drawbar pivot support.
3	{ 17713D	Steering clutch lever, R. H.	37	.....	Steering worm gear, 40 teeth (order 17655DX).
4	{ 17714D	Steering clutch release shaft.	38	.....	Planetary idler shaft carrier (order 17655DX).
5	{ 10551D	Steering clutch shaft nut, 1½".	39	17742D	Steering clutch release rack support.
6	{ 17767D	Steering clutch shaft ball bearing.	40	.....	Steering clutch release rack (order 17860D).
7	1999D	Steering clutch post.	41	17860D	Steering clutch, complete.
8	17772DX	Steering clutch shaft, complete.	42	17775D	Steering clutch felt.
9	17669D	Planetary idler gear roller bearing.	43	{ 1984DX	Steering clutch cover, L. H., complete.
10	.....	Planetary idler gear shaft (order 17655DX).	44	{ 1985DX	Steering clutch cover, R. H., complete.
11	15641H	Brake rod adjustable yoke.	45	1994D	Steering clutch support.
12	17654D	Planetary idler gear, 21 teeth.	46	17778D	Steering clutch support spacer.
13	17734D	Brake band cam bracket.	47	3997T	Steering post shaft coupling pin.
14	17720D	Brake cam lever.	48	{ 17701D	Brake cam lever rod.
15	{ 17139D	Brake cam lever holder, L. H.	49	{ 17747D	Brake pedal, L. H.
16	{ 17140D	Brake cam lever holder, R. H.	50	{ 17748D	Brake pedal, R. H.
17	{ 17716D	Brake cam, L. H.	51	{ 17686D	Brake pedal shaft, L. H. (order 1991DX).
18	{ 17717D	Brake cam, R. H.	52	{ 17687D	Brake pedal shaft, R. H. (order 1992DX).
19	{ 17709D	Brake band spring.	53	{ 17688D	Steering worm cage shim (.062").
20	{ 17777D	Brake band stop.	54	{ 17689D	Steering worm cage shim (.031").
21	17762DX	Drawbar tongue, complete.	55	{ 17685D	Steering worm cage shim (.015").
22	17764D	Drawbar guide.	56	{ 17638D	Steering worm cage shim (.007").
23	17758D	Drawbar stop pin.	57	1991DX	Brake pedal shaft bracket, L. H.
24	17771DX	Drawbar guide bolt, complete.	58	1992DX	Brake pedal shaft bracket, R. H.
25	{ 17768D	Drawbar guide bracket, L. H.	59	17725D	Steering post shaft coupling.
26	{ 17769D	Drawbar guide bracket, R. H.	60	1979DX	Steering worm cage, complete.
27	2000DX	Sprocket drive gear case, L. H.	61	17685D	Steering worm bushing, upper.
28	2001DX	Sprocket drive gear case, R. H.	62	17638D	Planetary drive pinion, 18 teeth.
29	.....	Sprocket drive gear, 64 teeth (order 1977DX).	63	17690D	Steering worm.
30	1977DX	Sprocket drive gear carrier.	64	828DDX	Main frame, complete.
31	17674DX	Sprocket drive gear carrier bolt, complete.	65	17684D	Steering worm bushing, lower.
32	17678D	Sprocket drive shaft.			
33	17733D	Brake band stop bracket.			
34	17731DX	Brake band, complete.			
35	17732D	Brake band lining.			
36	1978DX	Sprocket drive pinion carrier.			
37	.....	Planetary ring gear, 60 teeth (order 1978DX).			
38	17643D	Drive bevel gear shaft.			
39	17761D	Drawbar yoke end.			

STEERING CLUTCH ASSEMBLY

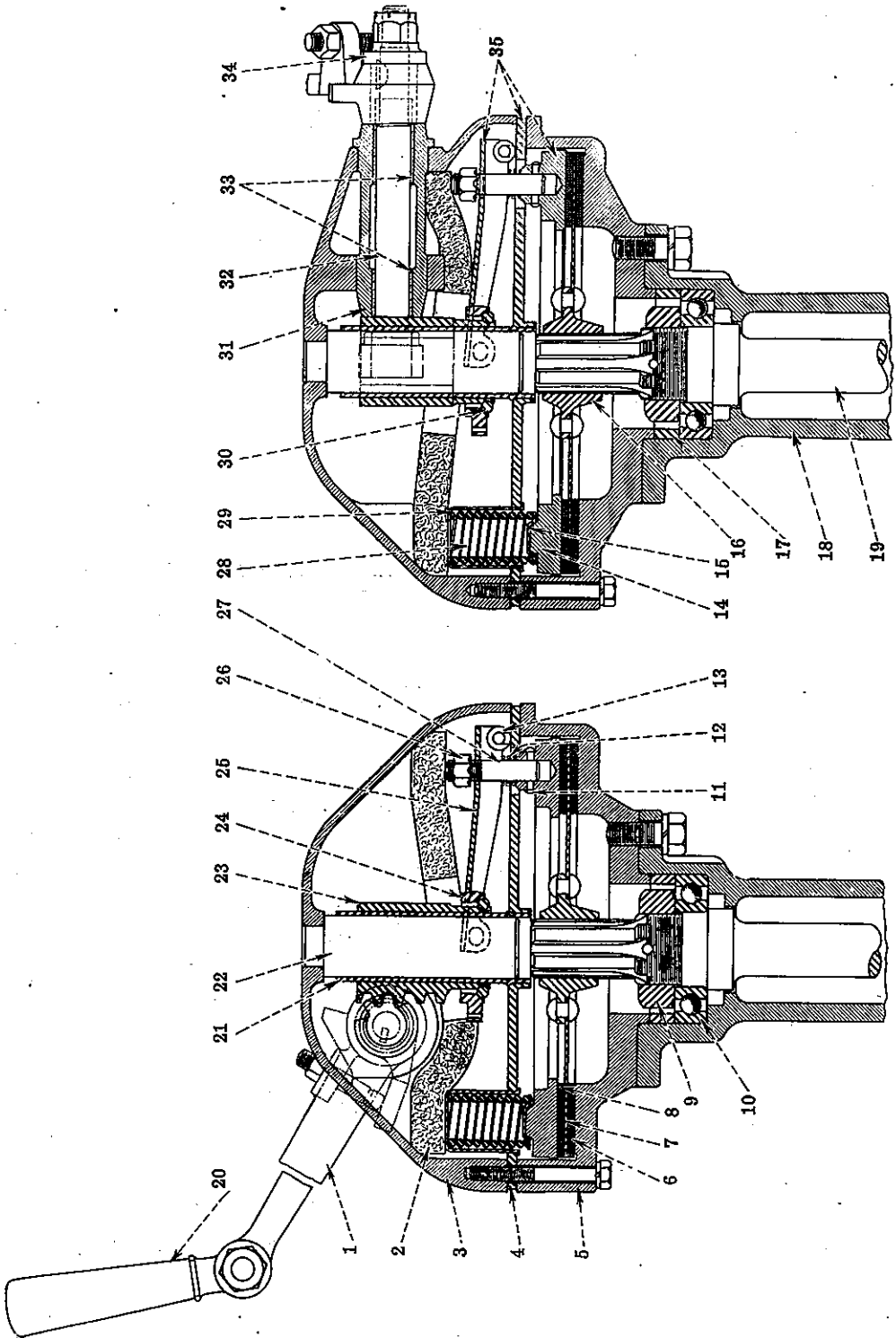


Illustration No. 82
Steering clutch assembly.

STEERING CLUTCH ASSEMBLY—Continued

(See illustration No. 82)

Ref. No.	I H C Part No.	DESCRIPTION
1	17712D	Steering clutch lever, L. H.
2	17713D	Steering clutch lever, R. H.
2	17775D	Steering clutch felt.
3	1984DX	Steering clutch cover, L. H., complete.
3	1985DX	Steering clutch cover, R. H., complete.
4	.....	Steering clutch back plate (order 14225D).
5	1994D	Steering clutch support.
6	20097V	Steering clutch facing.
7	20079VAX	Steering clutch plate, complete.
8	20096V	Steering clutch facing.
9	10551D	Steering clutch shaft nut.
10	17767D	Steering clutch shaft ball bearing.
11	14244D	Steering clutch release lever stud pin.
12	.....	Steering clutch release lever roller (order 20076VX)
13	20091V	Steering clutch release lever spring.
14	20081VAX	Steering clutch pressure plate, complete with stud.
15	20094V	Steering clutch spring insulator.
16	.....	Steering clutch plate center (order 20079VAX).
17	17778D	Steering clutch support spacer.
18	1999D	Steering clutch post.
19	17772DX	Steering clutch shaft, complete.
20	16462D	Steering clutch lever handle, complete.
21	.....	Steering clutch sleeve support (order 17860D).
22	17742D	Steering clutch release rack support.
23	.....	Steering clutch release rack (order 17860D).
24	20085V	Steering clutch trunnion collar.
25	20076VX	Steering clutch release lever, complete with roller.
26	20083V	Steering clutch adjusting hex. nut.
27	20082V	Steering clutch release lever stud.
28	20093VA	Steering clutch spring.
29	20090V	Steering clutch pressure spring cup.
30	20089V	Steering clutch snap ring.
31	1983DX	Steering clutch release shaft sleeve, complete.
32	17714D	Steering clutch release shaft.
33	17704D	Steering clutch release shaft bushing.
34	17705D	Steering clutch lever stop, L. H.
34	17706D	Steering clutch lever stop, R. H.
35	17860D	Steering clutch, complete.

TRACK ROLLER AND FRAME ASSEMBLY

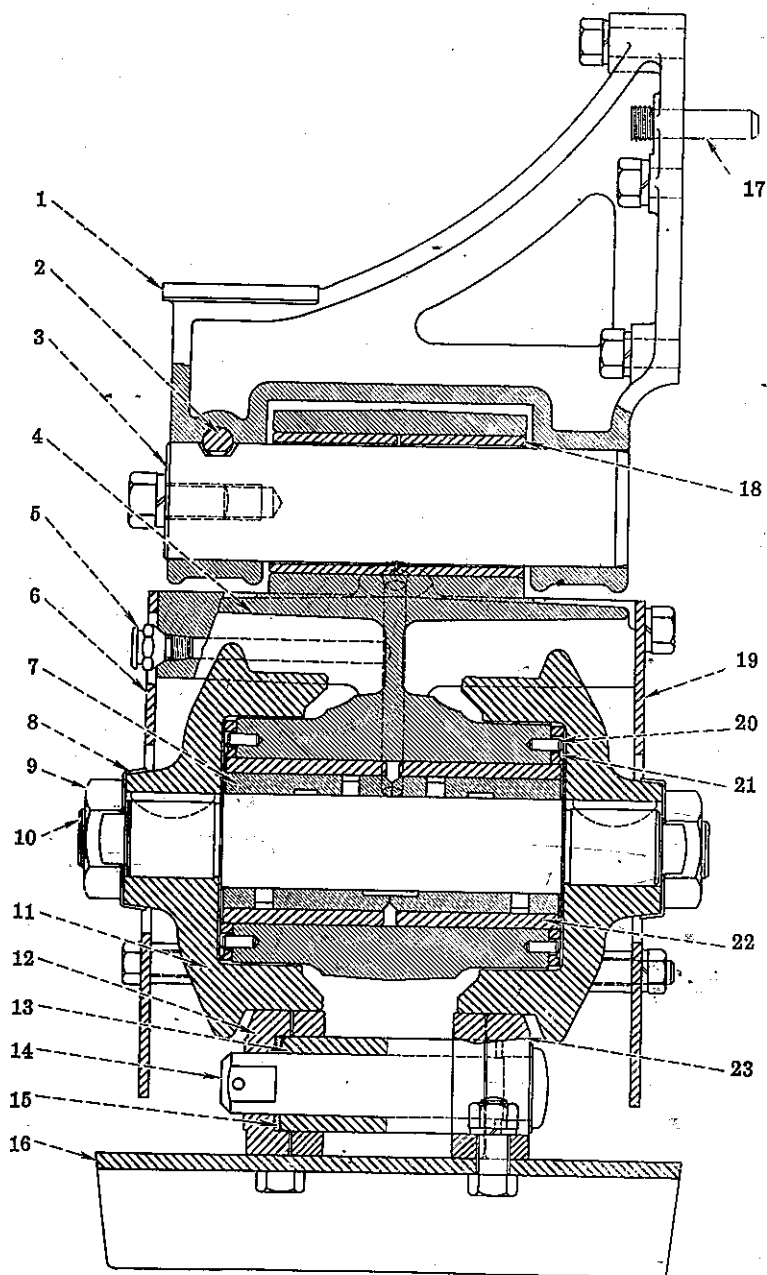


Illustration No. 83

Track roller and frame assembly.

TRACK ROLLER AND FRAME ASSEMBLY—Continued

(See illustration No. 83)

Ref. No.	I H C Part No.	DESCRIPTION
1	{ 2008D	Track frame pivot bracket, L. H.
	{ 2009D	Track frame pivot bracket, R. H.
2	17776D	Track frame pivot locking pin.
3	17787DX	Track frame pivot.
4	{ 2016DX	Track frame, L. H.
	{ 2017DX	Track frame, R. H.
5	17829D	Track roller lubrication fitting (Alemite No. 1511).
6	17926DA	Track shield, outer, L. H.
7	17927DA	Track shield, outer, R. H.
8	17774D	Track roller bushing.
9	15710D	Track roller shaft nut lock.
10	15644D	Track roller shaft nut, 1½".
11	16537D	Track roller shaft.
12	17877D	Track roller side.
	17898D	Track link, outer, L. H.
	17899D	Track link, outer, R. H.
13	16531D	Track link bushing.
14	16529D	Track link pin, ¾ x 1½".
15	16532D	Track link felt washer.
16	16541D	Track shoe, 12" (parallel type).
	16541DA	Track shoe, 12" (offset type).
17	10718DA	Track pivot shaft bracket dowel pin.
18	17784D	Track frame pivot bushing.
19	17928DA	Track shield, inner, L. H.
	17929DA	Track shield, inner, R. H.
20	17874D	Track roller thrust washer pin.
21	17875D	Track roller thrust washer.
22	17876D	Track roller bushing, outer.
23	17900D	Track link, inner, L. H.
	17901D	Track link, inner, R. H.

TRACK ASSEMBLY

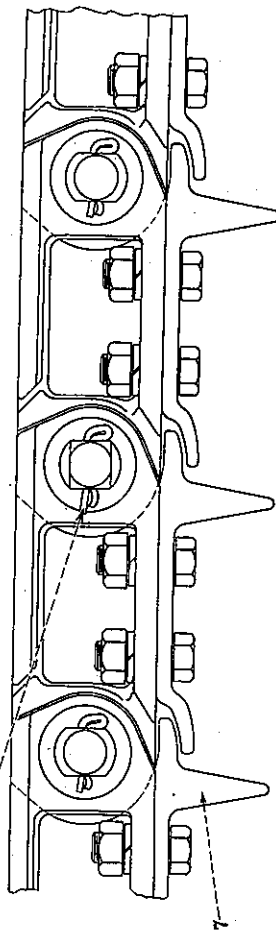
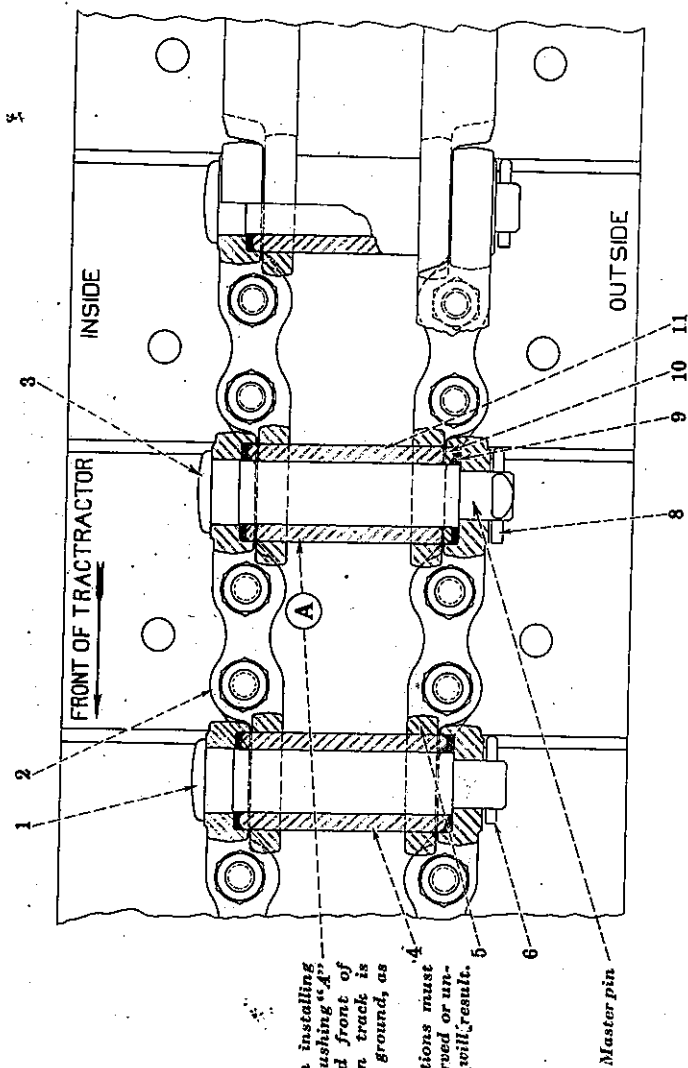


Illustration No. 84

Left hand track assembly (offset type link).

TRACK ASSEMBLY—Continued

(See illustration No. 84)

Ref. No.	I H C Part No.	DESCRIPTION
1	16529D	Track link pin.
2	{ 17900D	Track link, inner, L. H.
3	{ 17901D	Track link, inner, R. H.
4	17948D	Track link master pin, $\frac{1}{2} \times 2"$.
5	16531D	Track link bushing.
6	{ 17898D	Track link, outer, L. H.
7	{ 17899D	Track link, outer, R. H.
8	.....	Track link pin cotter pin, $\frac{1}{4} \times 1\frac{1}{2}"$.
9	{ 16541D	Track shoe, 12" (parallel type).
10	{ 16541DA	Track shoe, 12" (offset type).
11	.....	Track link master pin cotter pin, $\frac{1}{4} \times 2"$.
12	16532D	Track link felt washer.
13	17897D	Track link filler washer.
14	17896D	Track link master bushing.
15	16544D	Track link, outer
16	16545DX	Track link, inner, complete
17	16553D	Track link, center, complete
18	16561D	Track link, inner and outer, complete

Parallel Type
Link only.

1 Rail Assy. Cpt. R.H.

See instructions on page 61.

FRONT IDLER ASSEMBLY

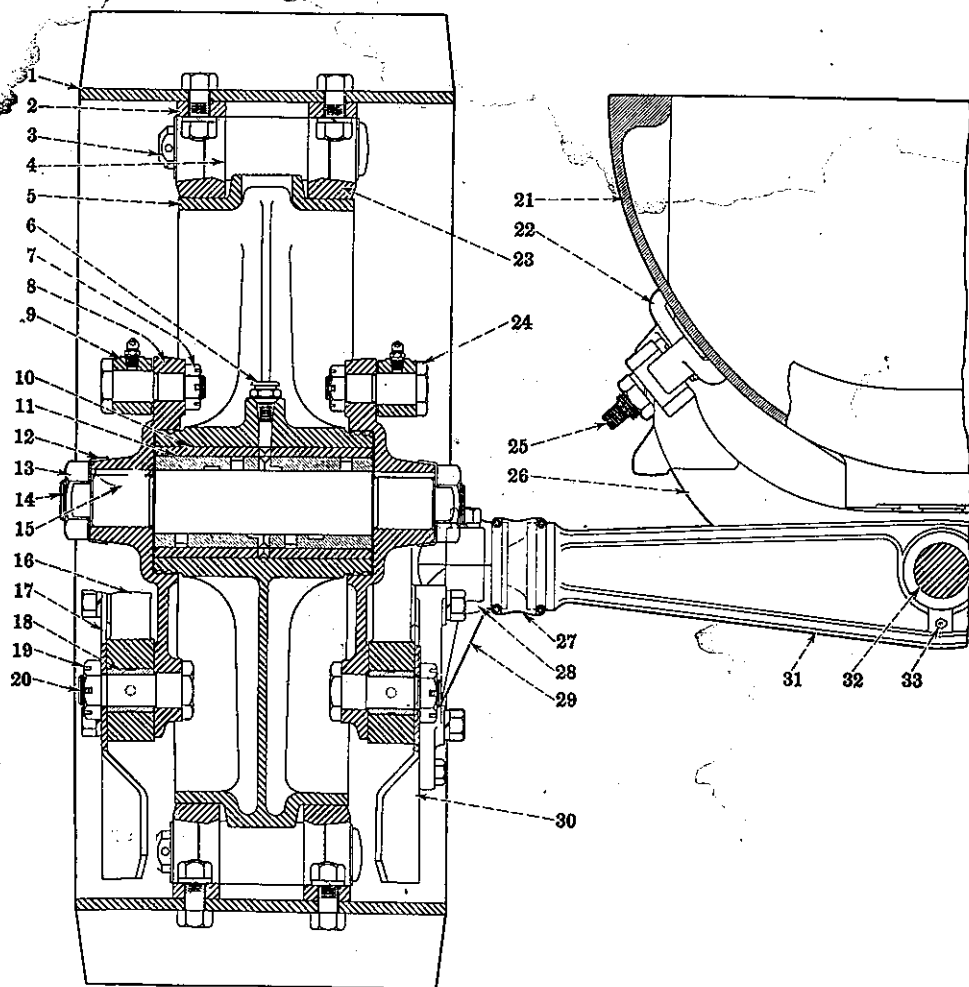


Illustration No. 85
Front idler assembly (front view).

FRONT IDLER ASSEMBLY—Continued

(See illustration No. 85)

Ref. No.	I H C Part No.	DESCRIPTION
1	{16541D 16541DA	Track shoe, 12" (parallel type). Track shoe, 12" (offset type).
2	{17898D 17899D	Track link, outer, L. H. Track link, outer, R. H.
3	16529D	Track link pin.
4	16531D	Track link bushing.
5	2007DX	Front idler.
6	17829D	Front idler lubrication fitting (Alemite No. 1511).
7	10495D	Track spring yoke pivot nut, 1/2".
8	{17790D 17791D	Front idler arm, R. H., inner and L. H., outer. Front idler arm, R. H., outer and L. H., inner.
9	2006DX	Track spring yoke.
10	17783D	Front idler bushing, outer. ✓
11	17774D	Front idler bushing. ✓
12	15710D	Front idler shaft nut lock.
13	15644D	Front idler shaft nut, 1 1/4".
14	16537D	Front idler shaft.
15	13058D	Front idler shaft key.
16	{2016DX 2017DX	Track frame, L. H. Track frame, R. H.
17	{17926DA 17927DA	Track shield, outer, L. H. Track shield, outer, R. H.
18	17819D	Track frame front bushing.
19	17152D	Track frame front pin nut.
20	17820DA	Front idler arm pivot pin.
21	828DDX	Main frame, complete.
22	2020D	Front axle pivot support rear pad.
23	{17900D 17901D	Track link, inner, L. H. Track link, inner, R. H.
24	17149D	Track spring yoke pivot.
25	17856D	Front axle pivot support rear adjusting screw.
26	2019D	Front axle pivot support, rear.
27	17770D	Front axle ball socket boot.
28	1998D	Front axle ball socket cap.
29	{2003DX 2002DX	Front axle ball socket, R. H. Front axle ball socket, L. H.
30	{17928DA 17929DA	Track shield, inner, L. H. Track shield, inner, R. H.
31	17830D	Front axle.
32	17792D	Front axle pivot.
33	H59603	Front axle pivot lubricator (Zerk Z-387AA).

FRONT IDLER ASSEMBLY—Continued

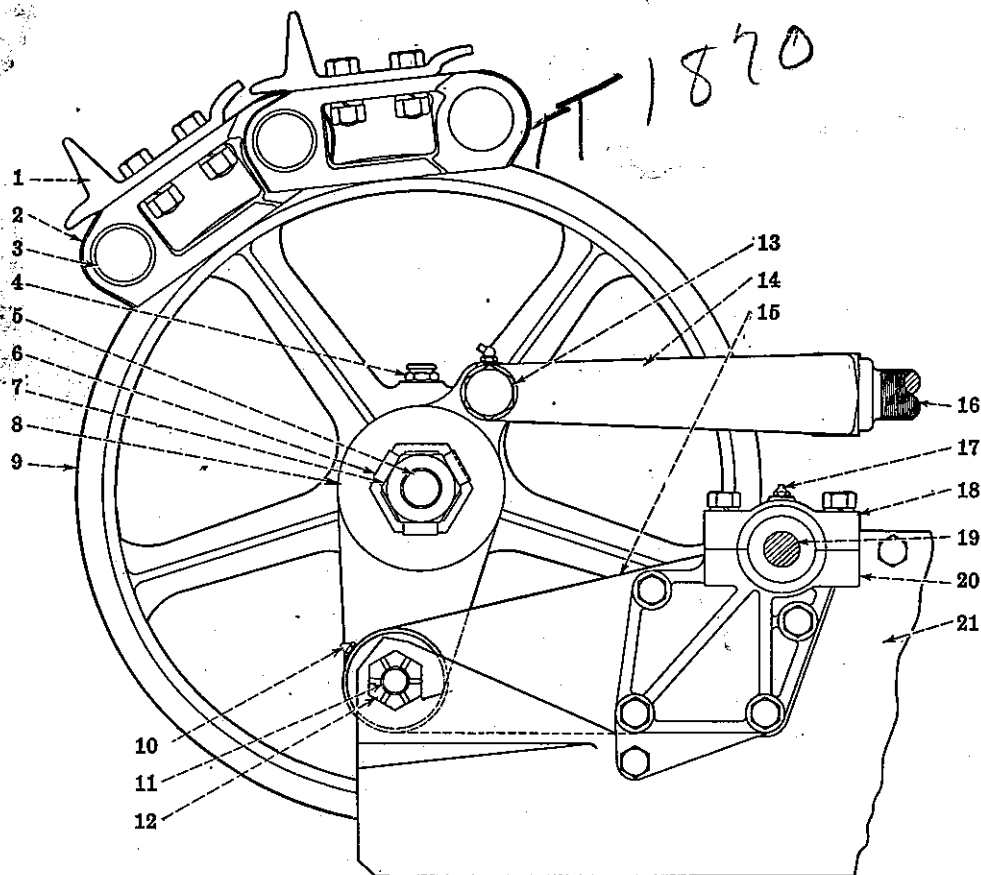


Illustration No. 86

Front idler assembly (side view).

see page 71-

FRONT IDLER ASSEMBLY—Continued

(See illustration No. 86)

Ref. No.	I H C Part No.	DESCRIPTION
1	{ 16541D 16541DA	Track shoe, 12" (parallel type). Track shoe, 12" (offset type).
2	{ 17900D 17901D	Track link, inner, L. H. Track link, inner, R. H.
3	16529D	Track link pin.
4	17829D	Front idler lubrication fitting (Alemite No. 1511).
5	16537D	Front idler shaft.
6	15710D	Front idler shaft nut lock.
7	15644D	Front idler shaft nut, 1½".
8	{ 17790D 17791D	Front idler arm, R. H., inner. Front idler arm, L. H., inner.
9	2007DX	Front idler.
10	14186D	Front idler arm pivot pin lubricator.
11	17820DA	Front idler arm pivot pin.
12	17152D	Track frame front pin nut, 7/8".
13	17149D	Track spring yoke pivot.
14	2006DX	Track spring yoke.
15	{ 2017DX 2016DX	Track frame, R. H. Track frame, L. H.
16	.....	Track spring yoke adjusting rod (order 2006DX).
17	14186D	Front axle ball socket lubricator (Z-35A).
18	1998D	Front axle ball socket cap.
19	17830D	Front axle.
20	{ 2003DX 2002DX	Front axle ball socket, R. H. Front axle ball socket, L. H.
21	{ 17928DA 17929DA	Track shield inner, L. H. Track shield inner, R. H.

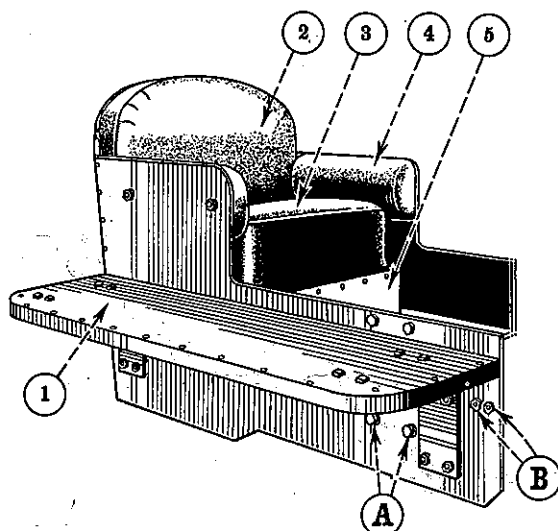


Illustration No. 87—Seat and fenders.

Ref. No.	I H C Part No.	DESCRIPTION
1	{17833D 17834D	Fender, complete (L. H.). Fender, complete (R. H.).
2	17808D	Seat cushion back.
3	17815DX	Seat cushion.
4	16350D	Seat cushion side.
5	.....	Tool box (seat frame).
A	.....	Cap screws (fender side to steering post).
B	.....	Bolts with nuts (for brake pedal stops).

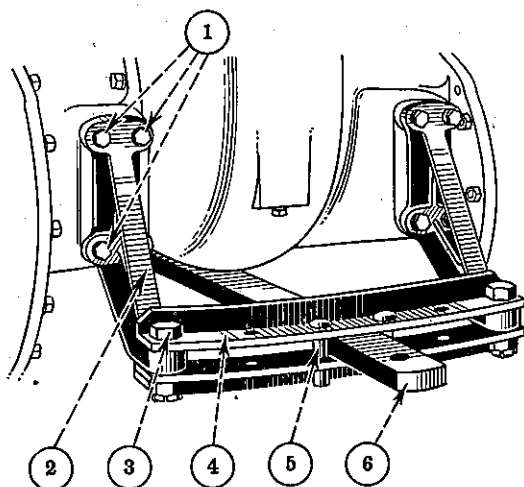


Illustration No. 88—Swinging drawbar.

Ref. No.	I H C Part No.	DESCRIPTION
1	.....	Drawbar bracket cap screws, $\frac{3}{8}$ ".
2	{17768D 17769D	Drawbar bracket, L. H. Drawbar bracket, R. H.
3	17771DX	Drawbar guide bolt.
4	17764D	Drawbar guide.
5	17758D	Drawbar stop pin.
6	17762DX	Drawbar tongue.

TOOLS

Ref. No.	I H C Part No.	DESCRIPTION
..	10720D	Socket wrench for $\frac{9}{16}$ " nuts.
..	12335D	"S" wrench.
..	12737D	"S" wrench for $\frac{1}{4}$ " and $\frac{5}{16}$ " nuts.
..	13067D	Adjustable wrench, 11".
..	13071D	Adjustable wrench, 12".
..	17862D	Alemite gat gun (capacity 21 ounces).
..	17863D	Alemite gat gun hose with coupling.
..	E 1021	Cold chisel.
..	G 3170	"S" wrench for $\frac{3}{4}$ " nuts.
..	G 3173	"S" wrench for $\frac{5}{16}$ " cap screws.
..	G 3525	"S" wrench for $\frac{3}{8}$ ", $\frac{7}{16}$ " and $\frac{1}{2}$ " nuts.
..	G 3526	"S" wrench for $\frac{3}{8}$ " nuts.
..	G 8899	Punch, $\frac{7}{8}$ x $4\frac{3}{4}$ ".
..	H59599	Alemite-Zerk compressor (Model Z3A).
..	2585T	Wood handle monkey wrench, 12".
..	2587T	Gas pliers, 8".
..	2588T	Screw driver, 5".
..	7695TM	Oil can.
..	13095V	Spark plug wrench.

BELT PULLEY AND POWER TAKE-OFF ASSEMBLY (Special)

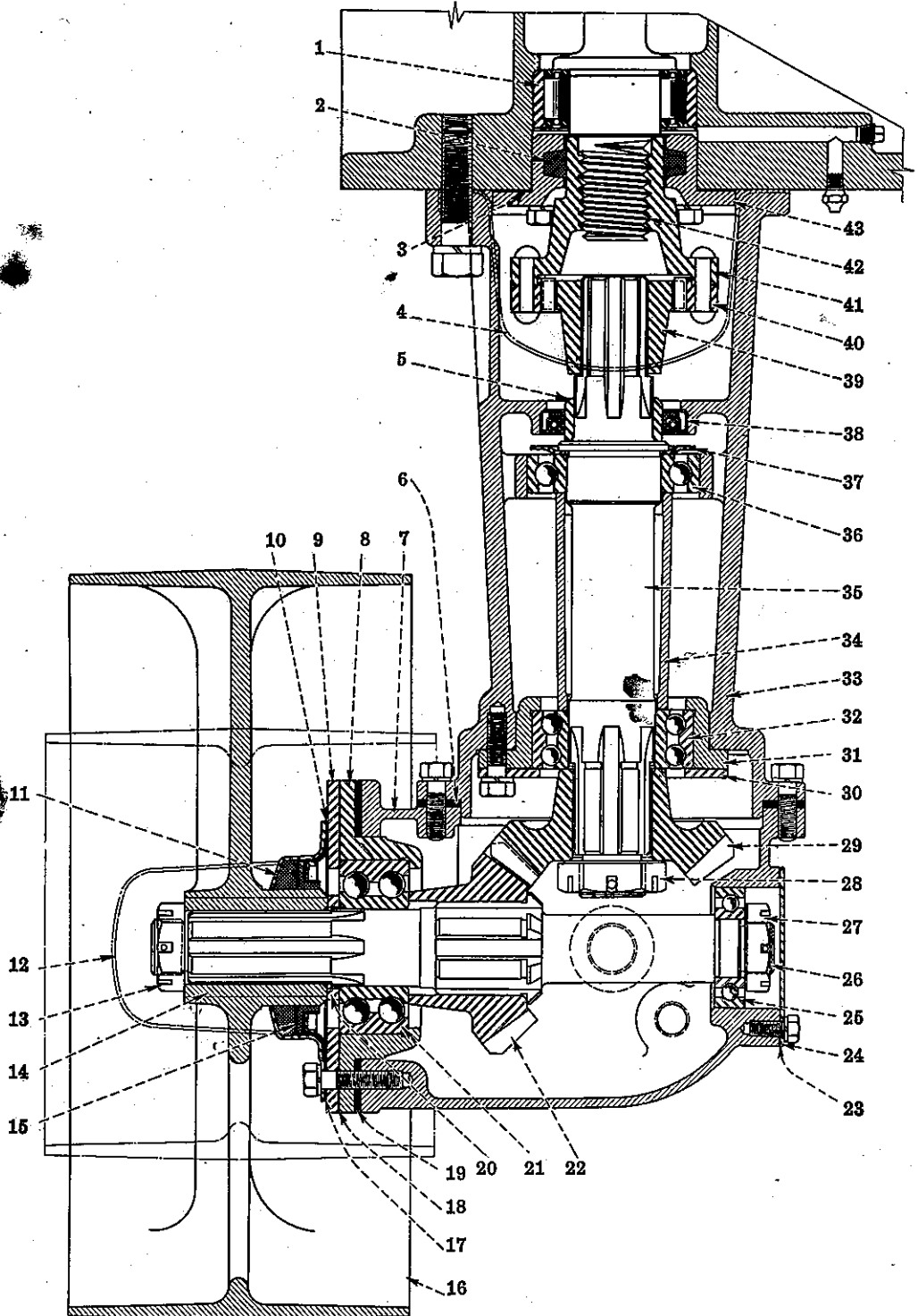


Illustration No. 89—Belt pulley and power take-off assembly (special) (top view).

BELT PULLEY AND POWER TAKE-OFF ASSEMBLY (Special)

(See illustration No. 89)

ATTACHMENT NO.

15955D—is Power Take-Off Attachment only.

18096D—is Belt Pulley Attachment for TRACTORs already equipped with Power Take-Off Attachment 15955D.

18102D—is Belt Pulley Attachment which includes the Power Take-Off for TRACTORs not equipped with Power Take-Off Attachment 15955D.

Ref. No.	ATTACHMENT USED ON			DESCRIPTION
	15955D	18096D	18102D	
	10775DA	.....	10775DA	Power shaft roller bearing, complete (includes 4739TA and 12138DA).
1	12138DA	.....	12138DA	Power shaft roller bearing separators and rollers, complete.
	4739TA	.....	4739TA	Outer race for power shaft roller bearing.
2	4624D	.....	4624D	Power shaft bearing retainer felt.
3	15967D	.....	15967D	Power shaft bearing retainer gasket.
4	18087D	18087D	Pulley coupling hub cover.
5	18081D	18081D	Pulley drive shaft ring.
	18091D	18091D	Pulley gear box carrier shim (heavy).
6	18092D	18092D	Pulley gear box carrier shim (medium).
	18093D	18093D	Pulley gear box carrier shim (light).
7	2035D	2035D	Belt pulley gear box.
8	2032D	2032D	Pulley shaft bearing sleeve.
9	18097D	18097D	Pulley shaft bearing retainer.
10	662DB	662DB	Pulley carrier cap.
11	11309D	11309D	Pulley carrier cap felt washer.
12	10903D	10903D	Belt pulley removal cap.
13	10516D	10516D	Pulley shaft nut, L. H., $1\frac{5}{8} \times \frac{9}{16}$ ".
14	18083D	18083D	Belt pulley shaft nut spacer.
15	11313DA	11313DA	Pulley carrier oil seal washer and retainer, complete.
	819D	819D	Belt pulley, $15\frac{1}{2}$ " dia., 7" face.
16	873D	873D	Belt pulley, $12\frac{1}{2}$ " dia., 8" face (special).
	878D	878D	Belt pulley, $8\frac{3}{4}$ " dia., 8" face (special).
	917D	917D	Belt pulley, 19" dia., 7" face (special).
17	12369D	12369D	Pulley carrier cap gasket.
18	18099D	18099D	Pulley shaft bearing retainer gasket.
	18088D	18088D	Pulley shaft bearing sleeve shim (heavy).
19	18089D	18089D	Pulley shaft bearing sleeve shim (medium).
	18090D	18090D	Pulley shaft bearing sleeve shim (light).
20	18082D	18082D	Pulley shaft bearing spacer.
21	13188D	13188D	Pulley shaft ball bearing, L. H.
22	18085D	18085D	Pulley drive bevel pinion, 16 teeth.
23	18098D	18098D	Pulley shaft bearing cover gasket.
24	18095D	18095D	Pulley shaft bearing cover.
25	42842VA	42842VA	Pulley shaft ball bearing, R. H.
26	18080D	18080D	Pulley shaft.
27	4221D	4221D	Pulley shaft bearing nut, R. H., $1\frac{7}{16} \times \frac{1}{2}$ ".
28	4647D	4647D	Pulley drive shaft nut, $2 \times \frac{5}{8}$ ".
29	10531DB	10531DB	Pulley drive bevel gear, 19 teeth.
30	18094D	18094D	Pulley drive shaft bearing retainer.
31	2034D	2034D	Pulley drive shaft bearing sleeve.
32	18079D	18079D	Pulley drive shaft bearing, rear.
33	2031D	2031D	Pulley gear box carrier.
34	2033D	2033D	Pulley drive shaft bearing spacer.
35	18084D	18084D	Pulley drive shaft.
36	18101D	18101D	Pulley drive shaft bearing, front.
37	18086D	18086D	Pulley drive shaft oil slinger.
38	18100D	18100D	Pulley drive shaft oil seal.
39	15770D	15770D	Pulley coupling inner ring, 16 teeth.
40	15771D	15771D	Pulley coupling outer ring, 16 teeth.
41	15961D	15961D	Pulley coupling outer ring hub.
42	10739D	.....	10739D	Power shaft.
43	1840D	.....	1840D	Power shaft bearing retainer.
..	15955D	.....	.....	Power take-off attachment, complete.
..	18096D	Belt pulley attachment, complete.
..	18102D	Belt pulley attachment, complete.

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