OPERATING INSTRUCTIONS FOR GRAVELY ESTATE SPRAYER

INSTRUCTIONS AND PARTS LIST FOR HARDIE PUMP

Instructions for operation of the pump and parts list are attached. Read these carefully for complete knowledge of the proper care and maintenance of these important parts of your GRAVELY Sprayer.

CONDENSED INSTRUCTIONS FOR OPERATION

1. Attach Sprayer to Tractor by means of the four bolts at the front of the Tractor. The Sprayer attaches to the Tractor in the same way as all other GRAVELY Power Attachments.

2. Start engine of the tractor, set throttle to normal working speed of engine. (Caution: Do not open throttle wide open, or race motor.)

3. Check lubrication, always see that all lubricating units are filled with a good grade of oil, such as Mobiloil A.

4. Turn the pump over by hand several times to make sure everything is working free.

5. Put Sprayer in gear by operating the clutch on the front casting of the Tractor.

6. Open Discharge Valve, located on the connection leading to the hose and gun.

7. Open the Hardie Gun and begin spraying, by twisting the handle. If the gauge reads between 250 and 300 pounds pressure, the Tractor speed is right and the pump is working correctly.

8. If the gauge reads low, advance throttle slightly. If pressure is too low still, adjust the pump pressure according to directions in attached instruction folder. (Adjustment data found on page two of folder, first paragraph in second column. Refer to numbered illustration on front page for parts.)

V-BELT ADJUSTMENT

If the belts are loose or slipping, an adjustment is provided. The small pulleys in each drive are split, and provided with a nut. Tightening this nut will pull the two sections together and tighten the belt. Be sure to loosen set-screw in nut before making this adjustment, and tighten again after the adjustment has been made.

If you find that after several seasons operation the belts will not tighten sufficiently for efficient operation, replace by ordering from your local GRAVELY Dealer.

GRAVELY TRACTORS, INC.

DUNBAR, WEST VIRGINIA

HARDIE MODEL NO. 99 PUMP

This Hardie Spray Pump is a high grade product, correctly engineered, carefully assembled and tested. Use good judgment in its care and operation and it will serve you long and efficiently. Study the mechanism of this pump and learn the parts subject to wear from service.

Hardie construction enables you to make replacements easily and quickly. Whenever sprayer service is required the first step is to locate the trouble. Many cases conditions outside the pump may be the cause of the trouble. Always check the piping for leaks or loose connections, suction screens, drain cocks, pump speed, gun or nozzle disc, etc. previous to making any pump adjustment.

ASSEMBLING OUTFIT

(See special instruction sheet covering installation)

Service before starting outfit.

General—Close all drain plugs. They are opened at the factory before shipment.

LUBRICATION OF PUMP AND ENGINE

All oil is drained before shipping. Fill plunger guides No. 582A13 when each individual plunger is at the extreme top of stroke with high grade motor oil, such as Mobiloil "A". By this distinctive feature we lubricate the complete plunger assembly, plunger guide, plunger body, plunger tube and plunger cup. This complete lubrication adds countless hours to the working life of the plunger cup. Fill crankshaft and countershaft oil cups No. 195F9 to overflowing with a high grade motor oil such as Mobiloil "A".

Fill the plunger body No. 577A36 half full of medium motor oil. After a few days run withdraw oil and refill to top with heavy transmission fluid such as Mobiloil "CW." Fill hard oiler No. 195A1 on gear guard with medium cup grease, forcing small amount into teeth of the gears.

A few drops of oil occasionally placed on regulator stem where it passes through packing nut is helpful to the proper operation of the regulator.

Fill crankcase of engine with a high grade motor oil such as Mobiloil "A" for summer and Mobiloil "Arctic" for winter. For further instructions regarding engine see Engine Instruction Book.

Hardie's system of individual lubrication of all moving parts, the supply of clean filtered oil to all bearings, is an important factor to enduring service which the Hardie pump gives you. Therefore, all places to be lubricated should be inspected and filled daily at least, or oftener if outfit is performing hard or continuous service.

The outfit is now ready to run. Turn the equipment over a few times by hand to be sure everything is working free. Before starting actual spraying, take the few minutes required to test the pump and power plant together; first remove suction hose from tank or close valve in suction line if your suction is of the type which cannot be removed, and then start power and run for few minutes. If this run is satisfactory return suction hose to tank or open valve and start spraying. If when spraying starts the pressure is set other than desired, turn adjusting screw No. 620G15 in or upward to decrease or outward or downward to increase pressure. Make these adjustments with discharge valves closed.

CARE AND MAINTENANCE

In ordinary operation while but slight attention is needed, yet proper lubrication is essential. All places to be lubricated should be inspected daily as a matter of precaution and oil added when required. Keep pump clean.

Drain pump thoroughly in freezing weather. Remove suction hose from tank or close suction valve. Open all drain plugs and discharge valves and when solution has stopped flowing run pump a few minutes leaving plugs open. All bearings should be kept to a snug fit. Inspect them monthly. Shims are provided for take-up. Loose main or countershaft bearing may cause stripping of the gears or other serious damage. Noise is sometimes caused by starved pump and if a noisy condition is not corrected by tightening regulator packing nut No. 681A2 check suction strainer to see that this is free so solution can get through.

Loss of Pressure — A loss or variation of pressure may come from several causes. Do not adjust regulator until you check the following:

1. Clogged suction screen. This must be clean, or liquid cannot enter the pump.

2. Loose connection or missing gaskets in suction line, or partial opened suction valve, broken or leaky suction hose, or suction pipe. Drain cocks not closed.

3. Leaking outlet valves.

4. Worn gun or nozzle disc. Opening should not be over 5/64".

5. Too slow pump speed. Often increasing pump speed is all that is necessary.

6. Suction valves temporarily stuck. Remove cap and loosen with screw driver.

7. Worn out valve seats or valve balls. If ball when placed on seat and held to light does not shut off all light, replace with new seat or ball as indicated by this inspection. In replacing be sure to have the number of new seats needed available before removing old seats. Then remove valve cap and cage. Next take out valve ball with tool provided. Now pull valve seat with valve seat puller which we supply. Before putting in the new seat take a clean, dry cloth and wipe out all dirt, grease or moisture from the valve seat well as this well must be absolutely clean and dry. Then wipe off valve seat carefully to be sure no grease or dirt is on it and then

seat is ready to be dropped into place. Tap lightly with a piece of wood to put seat down in place. No gasket is required under seat. Use no oil. Replace cap and cage and if gasket under cap is broken we would suggest replacing. Tighten down cap after one day's run when new gasket is used.

8. Worn out regulator seat permitting too great an overflow. To replace see No. 7. Improperly adjusted regulator. See regulator adjustment.

9. Worn plunger cups. Worn out cups will leak and give immediate evidence of their conditions. See plunger cup change for details.

CARE AND ADJUSTMENT OF PRESSURE REGULATOR

After the regulator has been set at the desired pressure, only occasionally tightening of the stem packing nut No. 681A2 is ordinarily needed. When adjustment is all taken up put in a new packing. When it is necessary to remove regulator to replace diaphragm or valve stem and disc release tension on spring by unscrewing adjusting nut upwards. Remove cap screws in base of regulator yoke, make replacements and replace yoke on pump tightening down cap screws alternately to secure even tension on them.

REPLACEMENT OF PLUNGER CUPS

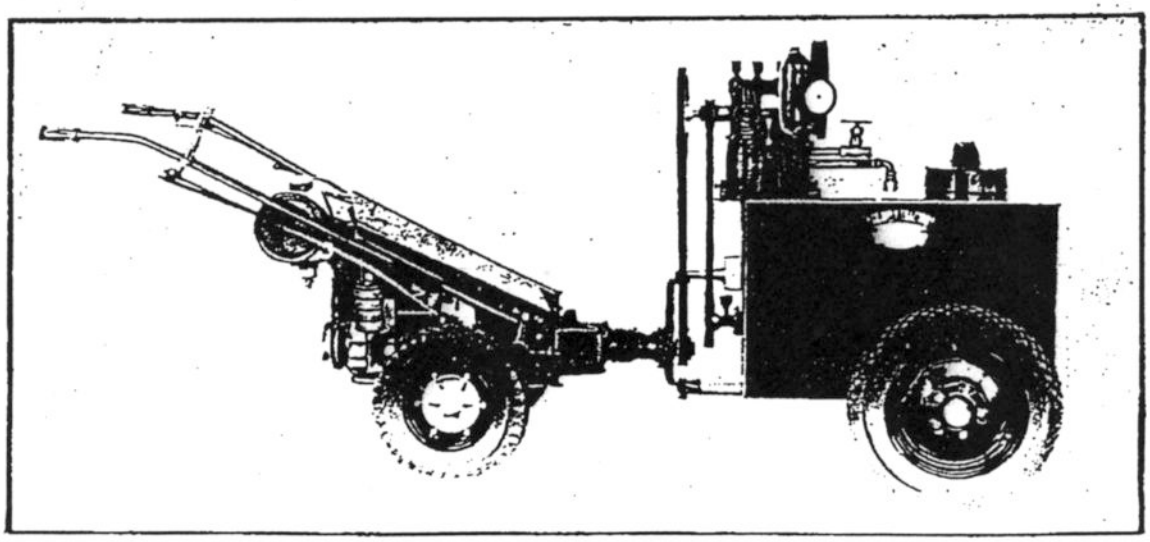
Remove the entire plunger assembly by taking out the four plunger guide studs and plunger rod cap. If a vise is not available, refasten the plunger assembly to the crankshaft with the plunger body above a horizontal position. Push the plunger cylinder back, exposing the entire cup. Remove the cotter key, cup follower and worn cup. Put on the new cup, tighten follower securely and insert cotter key.

Inspect the plunger well and plunger guide gasket, and replace if indicated. See that plunger well is free from all dirt. Oil the cup and replace plunger assembly in proper position in the pump, bringing the plunger tube down on the cup by hand. This will leave the bottom edge of the cup projecting below the plunger tube. Insert plunger guide studs at least three turns. Connect the plunger rod to the crankshaft, matching the markings on the rod. Then rotate the pump by HAND to draw the cup upward into the tube. Refill oil cups and plunger guide and plunger. Tighten studs alternately to a tight firm even fit.

END OF SEASON CARE

After the last spraying of the season, flush out the pump with clear water before draining. After flushing open all drain cocks, close suction line and run pump for five minutes.

Some growers then fill pump with oil, or crankcase drainage for the winter. Other growers remove all the valve assembly, placing the valve balls in oil over the winter. This last method is preferable as it serves as a valve inspection and replacements if needed can be made before spraying starts again. Grease the threads within the valve well.



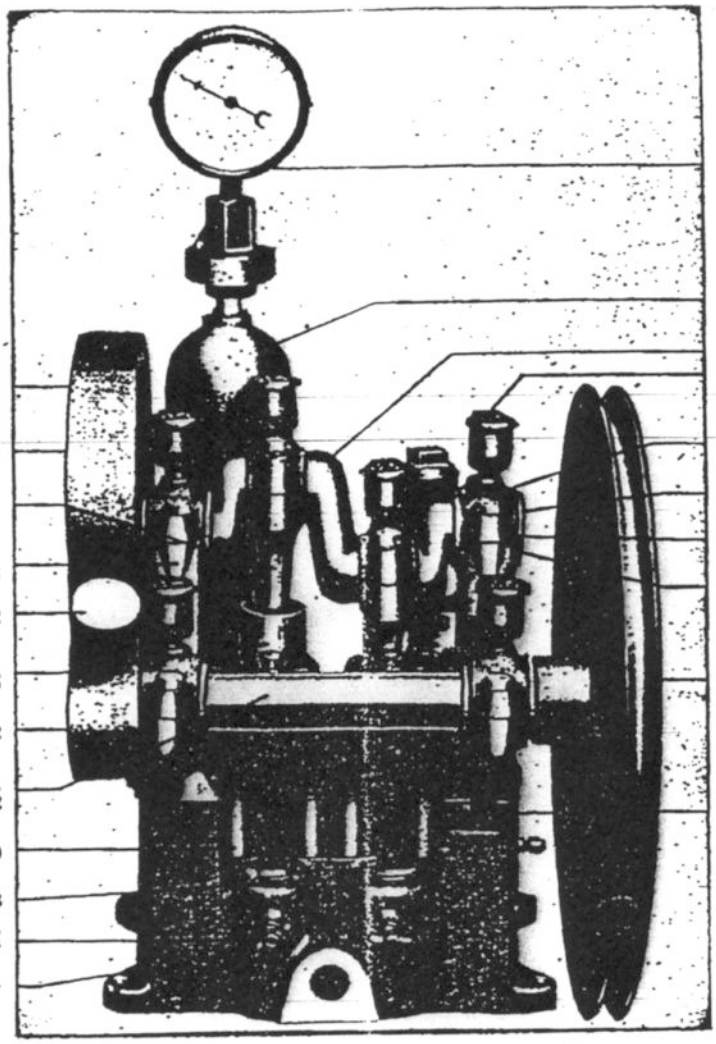
GRAVELY TRACTORS, INC.

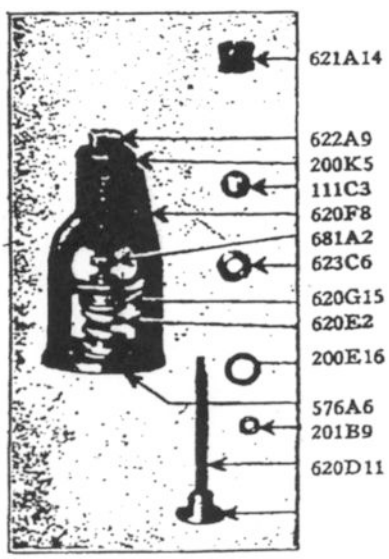
DUNBAR, WEST VIRGINIA

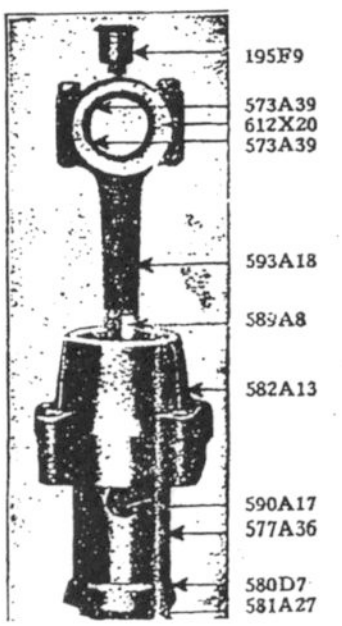
HARDIE MODEL NO. 99 PUMP

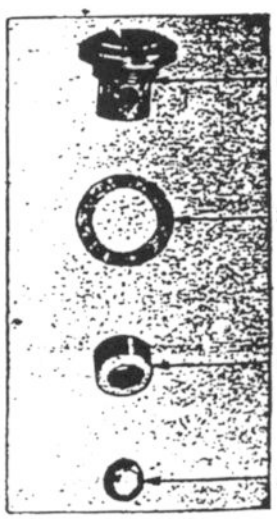
SERVICE INSTRUCTIONS AND REPAIR PARTS LIST

Applying to 1⅝" Pump Model No. 99
Beginning with Serial No. 99—1950
See Other Side For Description









HARDIE MODEL NO. 99 PUMP

SERVICE INSTRUCTIONS AND REPAIR PARTS LIST

Applying to 1⅝" Pump Model No. 99

Beginning with Serial No. 99—1950

See Other Side for Cuts

MISCELLANEOUS REPAIRS

Part No.	No. Used	
111C3	4	Valve ball, ⅝", stainless steel
150A7	1	Pressure gauge, 350 lbs.
150A15	1	Pressure gauge with Saver, 350 lb.
151A2	1	Pinion 16T, 1" bore, 1" F.
151A29	1	Gear 64T, 1¼" bore, 1" F.
154B10	1	Gear guard bracket RH
154B11	1	Gear guard bracket LH
154C6	1	Gear guard ring
170A15	3	Woodruff key, No. 15
195A2	1	Grease cup, ⅛", No. 0
195F9	4	Oil cup, ¼"
233H	1	Galv. close nipple, ½" A. C.
427A10	1	Air chamber assembly
432A25	1	Stand with caps, less bearings G. S.
432A26	1	Stand with caps, less bearings S. S.
433A28	1	Stand with caps and bearings G. S.
433A29	1	Stand with caps and bearings S. S.
572A41	1	Bed
573A29	4	Die cast bearing, upper
573A30	4	Die cast bearing,, lower
575A23	4	Stand cap (crank or countershaft)
610A41	1	Countershaft (Estate Sprayer)
610A42	1	Countershaft (Greenhouse Sprayer)
611A25	1	Crankshaft
612X19	4	Set shims (crank or countershaft bearing)
620G21	1	Dowel pin, ⅛"x⅜"
622A18	4	Valve cap and cage assembly
623D1	4	Taper valve seat, ⅞"O.D., ½"I.D.
680A1	4	Drain cock, ⅛"

REGULATOR REPAIRS

111C3	1	Valve ball, ⅝", stainless steel
201B9	2	Regulator stem packing
431A11	1	Regulator, complete
576A6	1	Regulator diaphragm
620D11	1	Regulator stem and disc
620E2	1	Regulator spring
620F8	1	Regulator yoke
620G15	1	Regulator adjusting nut
621A14	1	Regulator cage
622A9	1	Regulator cap
623C6	1	Regulator valve seat
681A2	1	Regulator packing nut

PLUNGER REPAIRS

Part No.	No. Used	
125A17	2	Bronze bushing, ⅝"OD, ½"ID, ⅛"L
133B6	2	Spring cotter, 1/16"x¾", per doz.
195F9	2	Oil cup, ¼"
195G3	2	Drive oil hole cover, ⅜"
430A62	2	Plunger assembly complete with tube
454A62	2	Plunger assembly less tube and guide
573A39	4	Upper or lower bearing
577A36	2	Plunger body
580D7	2	1⅝" Thermoid cup
581A27	2	Plunger cup follower
582A13	2	Plunger guide
589A8	2	Wrist pin lock pin
590A17	2	Wrist pin
593A18	2	Plunger rod
601G16	2	Plunger tube, 1⅝"ID, 2"OD, 2⅞"L
612X20	2	Set shims for plunger rod bearing

GASKETS

200E16	1	Regulator seat gasket
200F20	5	Regulator and valve cap gasket
200F24	4	Plunger tube and guide gasket

CAP SCREWS

281E10	8	Cap screw, 1/4"x1" gear guard arm and regulator
282E36	8	Cap screw, 1/4"x3¾" plunger guide
281F12	8	Cap screw, ⅜"x1¼" stands
281F10	6	Cap screw, ⅜"x1" for bottom of stands
281F14	4	Cap screw, ⅜"x1½" plunger rod

WRENCHES

326A8	1	Regulator adjusting tool (also part of seat puller)
326A36	1	Ball lifter, ⅝"
326A41	1	Valve cap wrench
326F1	1	Valve seat puller

replace by ordering from your local GRAVELY Dealer.

This Repair List supersedes all others of previous date. Prices are subject to change without notice.

GRAVELY TRACTORS, INC.

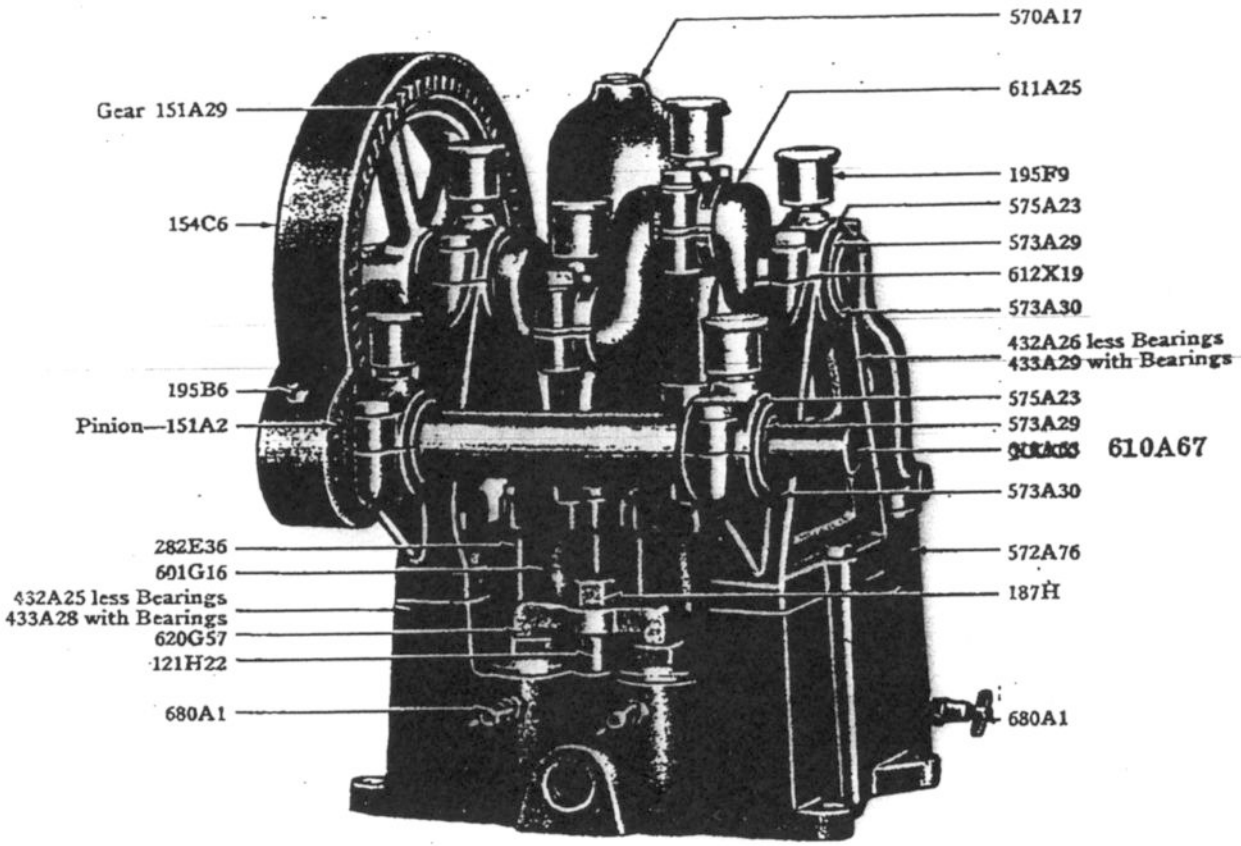
DUNBAR, WEST VIRGINIA

HARDIE MODEL NO. 99 PUMP

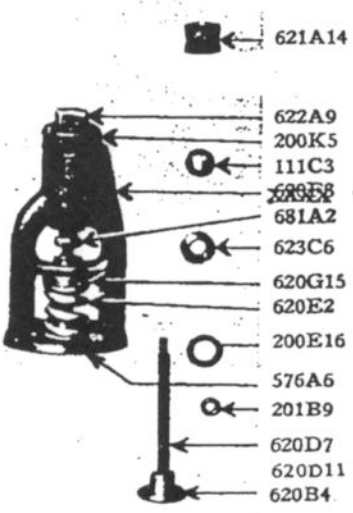
REPAIR PARTS LIST

Applying to 1⅝" Pump Model No. 99 — Beginning with Serial No. 99—10500

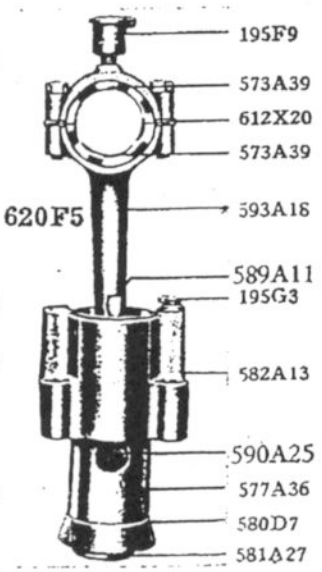
See Other Side For Description



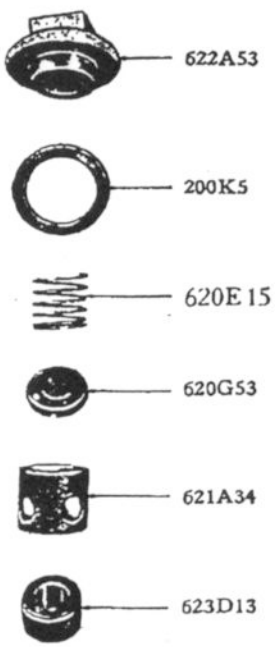
PRESSURE REGULATOR



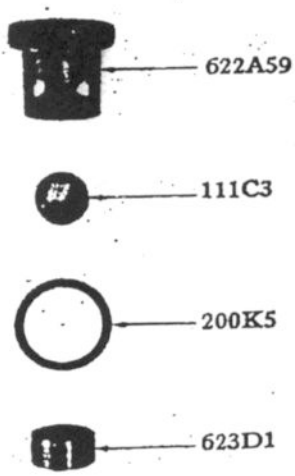
PLUNGER



SPRING TYPE VALVE



BALL TYPE VALVE



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HARDIE MODEL NO. 99 PUMP

REPAIR PARTS LIST

Applying to 1⅝" Pump Model No. 99

Beginning with Serial No. 99—10500

See Other Side for Cuts

MISCELLANEOUS REPAIRS

Part No.	No Used	
121H22	2	Stud ⅜"x2¼" (Valve Clamp)
150A7	1	Pressure gauge, 350 lbs.
151A2	1	Pinion 16T, 1" bore, 1" F.
151A29	1	Gear 64T, 1¼" bore, 1" F.
154B10	1	Gear guard bracket RH
154B11	1	Gear guard bracket LH
154C6	1	Gear guard ring
170A15	3	Woodruff key, No. 15
195H36	1	⅛" Zerk fitting—67½° Angle
195J1		Cored wicking (per ft.) oil cup No. 195F9
195F9	4	Oil cup, ¼"
432A25	1	Stand with caps, less bearings G. S.
432A26	1	Stand with caps, less bearings P. S.
433A28	1	Stand with caps and bearings G. S.
433A29	1	Stand with caps and bearings P. S.
570A17	1	Air chamber
572A76	1	Bed
573A29	4	Die cast bearing, top half, crank and countershaft
573A30	4	Die cast bearing, bottom half, crank and countershaft
575A23	4	Stand cap (crank or countershaft)
610A67	1	Countershaft
611A25	1	Crankshaft
612X19	4	Set shims (crank or countershaft bearing)
680A1	4	Drain plug, ⅛"

SPRING TYPE VALVES

620E8	4	Valve Springs
620G53	4	Valve Poppet
620G57	2	Valve Clamp
621A34	4	Valve Cage
622A53	4	Valve Cap
623D13	4	Valve Seat

BALL TYPE VALVES

622A59	4	Cap and Cage
111C3	4	Ball
623D-1	4	Valve Seat
620G59	2	Valve Clamp

Part No.	No. Used	

REGULATOR REPAIRS

111C3	1	Valve ball, 5/8", stainless steel
192E	1	Hex jam nut, ⅛"
201B9	2	Regulator stem packing
431A11	1	Regulator, complete
620B4	1	Regulator diaphragm disc
620D7	1	Regulator stem
620D11	1	Regulator stem and disc (assembly)
620E2	1	Regulator spring
620F5	1	Regulator yoke
620G15	1	Regulator adjusting nut
621A14	1	Regulator cage
622A9	1	Regulator cap
623C6	1	Regulator valve seat
681A2	1	Regulator packing nut

PLUNGER REPAIRS

125A17	2	Bronze bushing, 5/8"OD, ½"ID, ⅛"L
133B6	2	Spring cotter, 3/32"x¼", per doz.
195F9	2	Oil cup, ¼"
195G3	2	Drive oil hole cover, ¼"
282F36	8	Cap screw, ⅛"x3¾" plunger guide
430A62	2	Plunger assembly complete with tube
454A62	2	Plunger assembly less tube and guide
573A39	4	Upper or lower bearing
577A36	2	Plunger body
580D7	2	1⅝" cup
581A27	2	Plunger cup follower
582A13	2	Plunger guide
589A11	2	Wrist pin lock pin
590A25	2	Wrist pin
593A18	2	Plunger rod assembly
601G16	2	Plunger tube, 1⅝"ID, 2"OD, 2⅞"L
612X20	2	Set shims for plunger rod bearing

GASKETS

200E16	1	Regulator seat gasket
200K5	5	Copper gasket—Valve caps
200F24	4	Plunger tube and guide gasket
576A6	1	Regulator diaphragm (rubber)

SPECIAL TOOLS

195J1	1	Oil gun
326A8	1	Regulator adjusting tool
326A36	1	Ball lifter, 5/8"
326F9	1	Valve seat puller