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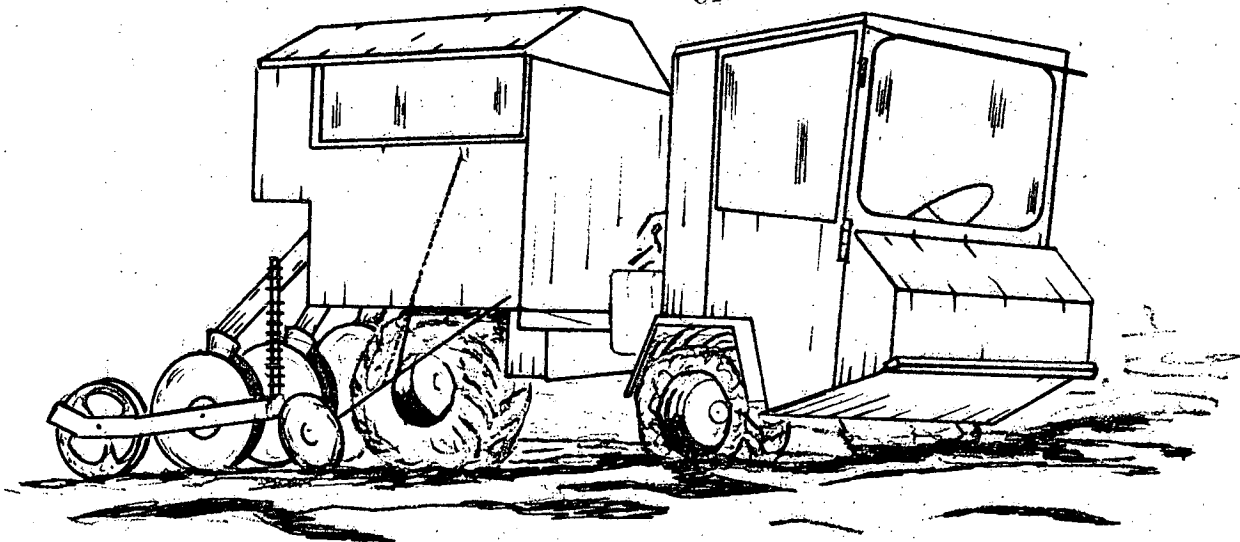
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AN ALL TERRAIN SEEDER FOR EXPERIMENTATION OF EARLY SEEDING DATES

G. B. HERGERT

INSTRUCTION MANUAL

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E.R.S. contr. # 332

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An All Terrain Vehicle for Experimentation of Early Seeding Dates - Instruction Manual

G. B. Hergert,
Engineering Research Service,
Research Branch,
Agriculture Canada,
Ottawa, Ontario K1A 0C6.

1.0 Introduction. The purpose of the All Terrain Seeder (3) is to seed on land not accessible by standard farm tractors in early spring. Seed applicators are supplied for both broadcast and furrow placement. Seed dispensing equipment is for either two four or one eight row plots. The following is a resume of instructions, specifications and details on the operation of the equipment, primarily to acquaint operators with the equipment, and secondly to give others a detailed description.

2.0 Vehicle - LOBO ALL TERRAIN VEHICLE manufactured by Trackless Vehicles Ltd.¹

A parts list, specification sheets and driving instructions are available from the manufacturer. The LOBO used for this project differs from the standard industrial model in the following ways:

2.1 Engine. A 25 horsepower Onan² 2 cylinder, 4 cycle gasoline engine was supplied. Parts list and instructions available from the manufacturer.

2.2 Power Steering. Power steering was supplied on this unit as an experimental feature. The pump is driven from the front of the engine. Oil level should be checked periodically as with an automobile. Adjustment is provided for belt tightening. A plug is situated on the valve assembly. This should be replaced with a grease nipple and greased slightly once a year. Too much grease will foul the valve. Do not leave grease nipple in place.

¹Trackless Vehicles Ltd., Courtland, Ontario.

²Onan Generators (Canada) Ltd., 233 Cambell Rd., Guelph, Ontario.

2.3 Gas Tank. Because of the idle to full power cycling during operation of the seeder, flooding of the carburetor with gas became a problem. To alleviate this situation, the gas tank was raised above the level of the carburetor and the engine fuel pump was bypassed. This provides a steady flow of gas to the carburetor by eliminating surges caused by the fuel pump.

2.4 Alternator. As the electrical load of the seeder components and the electro-hydraulic lift is high, an auxiliary alternator, producing up to 40 amps, was installed (See Delco Remy instructions³). The alternator is driven from a 5 inch pulley attached to the motor shaft adapter for the clutch. A regulator is located in the motor compartment (See Fig. 4 for wiring diagram). An ammeter is located on the dashboard of the LOBO. The alternator is wired in parallel to the engine alternator with only the ground and battery connections common to both.

2.5 Tires. Because of the additional weight placed on the rear section of the LOBO, the floatation tires cannot be filled to a uniform air pressure. Tire pressures should be adjusted so that the lugs of each tire, measured at the sidewall when a tire lug is on a perpendicular line between the floor and wheel centre, are $\frac{1}{2}$ to $\frac{3}{4}$ inch from floor level. This maneuver will level the frame of the vehicle and will provide equal load radius to each wheel to eliminate forced slippage. Tubes are used in the original tubless tires as a safety factor against air loss while traversing rough ground at high speeds.

³Delco Remy, distributors in all major cities.

2.6 Front Cab. The front cab was constructed for the protection of the vehicle operator in early spring operations. The doors are removable by opening the door and lifting up. The cab is made of embossed aluminum over a square tubing frame and has safety glass windows front and back.

2.7 Rear Cab. The rear cab houses the seeder operator, the seed dispensing equipment and provides storage space for seed samples. The cab is made of embossed aluminum sheeting over an angle iron frame. Vinyl curtains are attached to all four openings and may be rolled up when not required. Two racks to hold seed envelope boxes are located on each side of the operator, and have clamps for locking the boxes in place.

3.0 Seeding Dispensing Section. Two cone systems are incorporated into the seeding section of the seeder. An Øyjord cone with an 8 row divider is used to supply seed or fertilizer to 8 rows. Two Craftsman cones, each with a 4 row divider are used to supply seed only to four rows each.

3.1 Øyjord Cone. The Øyjord cone is situated at the centre of the cone platform. A full description is given elsewhere (3,5,6) and literature is available from the manufacturer⁴. Three types of loading devices supplied with the cone (Fig. 1) are described below.

3.11 Øyjord Loading Cup. The standard loading cup for the Øyjord cone is of different design than those normally associated with cone seeders. The principal advantage is that a baffle covers the seed outlet hole at the base of the cone. This saves seed by eliminating the loss of seed through the discharge hole when the cone is loaded. Also, a plate is supplied which permits partial rows to be seeded by using a portion of the cone only.

When using the Øyjord cone, the baffle must be first advanced to the cover the base plate hole. The seed must be spread evenly in the cup to insure an even distribution in the row (This method is preferred on sloping land). The cup cannot be attached to the trip lever (4.2)

⁴Jen A. Schou Mek. Verksted 1441, Drobak, Norway.

3.12 Lien Funnel. The Lien funnel (B) operates in the same manner as the Craftsman cone cups, and the lift mechanism is attached to the common lift bar. Seed is poured into the funnel and is dropped to the cone periphery when the funnel is raised. An allowance must be made in the amount of seed used, as a small amount of seed will fall through the discharge hole as the funnel is lifted, and fall into the pathway.

3.13 Bulk Hopper. The bulk hopper (C) may also be fitted to permit continuous seeding of larger plots. The bulk hopper is essentially a fluted run feeder with a large sized flute wheel mounted vertically on the centre post of the Øyjord cone. An adjustable gate controls the amount of feed. A graduated scale is provided to repeat settings.

Always be sure that the brace from the hopper to the roof of the cab is in place to prevent side loading and binding on the cone shaft.

3.14 Øyjord Cone Drive. The drive to the Øyjord cone can be disconnected by moving a small bolt in a slot on a drive hub located below. The cone drive should be disengaged when only the four row cones are used. Built into the same hub is a one way clutch⁵ which allows the Øyjord cone to be advanced when using the Øyjord loading cup. This assembly should be disassembled every three years and a small quantity of grease spread on the interior of the clutch.

3.2 Craftsman Cones⁶. The two Craftsman (1) cones are geared to a common shaft and operate together. A common tripping lever is used to trip both cups simultaneously. Scrapers are fitted to the outlet positions of the cones to scrape seed from the cone periphery into the outlet spout (Fig. 7). Care must be taken to see that the scrapers are adjusted properly

⁵Torrington Co., RCB-162117, 925 Millwood Rd., Toronto 17.

⁶Craftsman Machine Co., 201 Princess St., Winnipeg 2.

and are free to turn slightly to counteract any irregularities in the cone surface. The Craftsman Cones can only be disconnected by moving the mitre gears on the drive shaft located under the cone platform. Better life will result if the mitre gears are greased regularly, but a lubrication program must be carried out regularly if any lubrication is put on the gears. DO NOT USE FERTILIZER IN THE CRAFTSMAN CONES.

3.3 Øyjord Divider⁴. The Øyjord divider is situated below the Øyjord cone. The divider is powered by an electric motor through a timing belt drive. A switch is located on a control panel in the rear cab. The divider may be dismantled by removing a pin at the front bracket (under the cone platform), loosening a lock screw and swinging the entire assembly down and back. The hoses will limit the amount of movement. If necessary, remove hoses from openers. The Øyjord divider, like others of this type, must be fed directly to the centre and must be level. Brass reducing orifices to fit into the inlet funnel are supplied with the unit. The smallest possible orifice should be used. Leveling may be done by removing the funnel top and using the machined flange as a reference (See 3.51 for details). The hose spouts of the divider have been modified by machining grooves to accept spring ring clips over the vinyl boots preventing the boots from falling off.

3.4 Four Way Dividers⁶. A four way divider (2) is mounted below each Craftsman Cone. The spinner of each is direct mounted on the shaft of an automotive heater fan motor and controlled by a switch and rheostat on the control panel. Speed of the spinner is reduced to prevent seed damage. The dividers may be removed from the machine by (A) loosening one pivot bolt at the front (front of machine) of the divider far enough

to let the front of the divider drop (C) loosening one of the screws at the rear leveling clamp. Here again, it is important that the spinner be level and fed to the direct centre of the spinner. Brackets holding the divider permit leveling and positioning. The primary bracket (angle iron fastened to cone platform) is slotted to allow positioning movement parallel to the direction of travel. The pivot bolts allow movement at 90° for positioning. A pivot and adjusting screw at the front of each divider permits leveling from side to side. The leveling clamp at the rear (rear of machine) permits leveling front to rear by adjusting the set screws. Oriface bushings can be fitted into the spout of the Craftsman cones to confine seed to the centre of the spinner.

3.5 Cone Platform. The cones and dividers are attached to a raised platform on the back of the rear section of the LOBO. The complete cone platform, complete with cones, dividers and drive shafts, is removable as an integral unit by removing two bolts from each support.

3.51 Leveling. Before any leveling of the cone platform or dividers is done, be sure that air tire pressure is adjusted so that each tire sits on an equal load radius (See 2.5). The frame of LOBO should then be level, providing the vehicle is on a level floor. The next procedure is to level the cone platform on the supports. Short slots are supplied in the rear holes to facilitate leveling. If further leveling, beyond the capacity of the slots is required, clamp the support and platform together and redrill. After the cone platform is level, the dividers may be leveled as explained (3.3 and 3.4).

4.0 Controls. Operator controls, excluding the wheel clutch, are situated inside of the rear cab within convenient reach of the operator.

4.1 Control Panel. A control panel is located on the left side of the seat and contains the following items:

- A switch for the 8 row divider
- A single switch to control both 4 row dividers
- A rheostat control for each 4 row divider motor (screw driver slot)
- A buzzer button for signals to the front cab
- A buzzer to receive signals from the front cab
- A fuse to protect the electrical system

4.2 Trip Lever. A trip lever is located directly in front of the operator to lift the two four row cones simultaneously and, if connected, the Lien funnel attachment to the Øyjord cone. The adjustable links may be adjusted to trip all cones simultaneously or in sequence.

4.3 Hydraulic Lift. A control lever for the hydraulic lift is situated below and to the rear of the seat. The lever controls a valve and also starts the electric motor which operates the pump (Fig. 6).

4.4 Marker Chain. The soil markers, fastened to each side of the rear cab, are controlled from the inside of the rear cab by a chain passing the rear of the seat. The markers are counterbalanced and do not require fastening for operation. Hooks are supplied to hold both markers in the up position. When in use, the chain is free to slide over a bearing plate adjacent to the hook. A hook is supplied in the chain to disassemble the chain to allow the operator to pass.

4.5 Wheel Clutch. A dog type clutch is included in the drive from the left rear wheel to the cone platform drive shaft. The clutch is free to slide on the shaft and engages between any two wheel nuts.

4.6 Row Length Adjustment. Row lengths are adjusted by changing the ratio between the wheel and the platform shaft. An adjustable pulley is supplied for length adjustment. The adjustment of the row lengths is limited to rows of 18 to 24 ft with the pulley supplied. However, if greater adjustment is required, a belt variator such as Gerbing⁷ Model 4040 should be used.

4.7 Øyjord Divider Clutch (See 3.3)

5.0 Seed Placement

5.1 Openers. The seeder is supplied with eight Fionna⁸ double disc openers chosen because of their light weight and because of ease of mounting. The openers may be spaced as close as 12 cm. To increase penetration the openers were modified with the addition of a spring loaded push rod. Originally without the push rods, maximum down pressure on each opener was 51 K gm (23 lb). With the additional spring pressure the down pressure on each disc is increased to 140 K gm (64 lb). Down pressure is adjustable at two places. The original adjustment is a horizontal placed spring at the attachment point of the opener frame. Four loops are bent into the spring end. The desired loop is to be hooked over the fork supplied on the opener frame. The push rod spring pressure is adjusted on the UNDERSIDE of the springs on the push rod. Pushing the bottom of this spring up will increase spring pressure (See Fig. 2 and 3). Holes are

⁷Gerbing; Renold Chains, 153 Graveline, Montreal 9.

⁸Fionna; J.F. Farm Machinery, Exeter, Ontario.

provided at the top of the push rod. These holes primarily adjust the depth of the openers. However, adjustment of the depth also effects the down pressure adjustment by changing the distance between the bottom of the spring and the push yoke. These adjustments are relatively easy to do and may require adjustment to suit each type of soil preparation.

5.11 Row Spacing. To adjust width between rows, two bolts must be loosened, the clamping bolt at the front of the frame and a set of screws at the bottom of the swivel yoke for the push rods. Space the openers approximately to the spacings desired and then adjust each disc accurately by measuring at the disc penetration point starting either at the centre or at the left hand side.

5.2 Combination Packer-Covering Wheels. Spring loaded concave packing wheels are attached to the disc opener frames. Each wheel is independent and free to float in relation to the discs. Spring rods provide down pressure on the wheels and are adjustable in a similar manner to the disc openers with both tension and position adjustable. Increased tension on the packer wheels will reduce the down pressure on the openers as the spring reaction bracket is attached to the opener (Fig. 2).

5.3 Broadcast Spouts. Broadcasting or surface seeding of plots can be done in two ways. If seed is to be retained in rows, the seed can merely be dispensed with the openers in the up position. If seed is to be spread evenly over the plot area, broadcast spouts are supplied which are to be attached to the upper tool bar when the openers and packer wheels are removed. Baffles inside of the spouts spread the seed as the seed falls (Fig. 5).

The spouts are used to broadcast seed in a confined plot. For field broadcasting the Øyjord divider can be replaced with a spinning disc distributor, powered by an electric motor. The Øyjord dispensing equipment is used to feed the broadcaster.

5.4 Tool bar. Two tool bars are used to attach the openers. One tool bar is attached directly to the LOBO frame and is the attachment point for the front of the disc openers. The second tool bar is hydraulically controlled and is the attachment point for the push rods. The moveable tool bar is mounted on a parallel linkage and is controlled by a double acting hydraulic cylinder. The linkage has adjustments to position the tool bar and to change the travel range. Position of the tool bar is changed by moving a collar at the top of the control rod situated between the tool bar linkage and the pivot arm operated by the cylinder. Range of travel is adjusted by moving the end of the push rod to any of the three holes in the tool bar linkage. The closer to the pivot point, the greater the travel. Hydraulic pressure source is a 12 volt electric-hydraulic pump unit mounted in the rear cab (See 4.3) (Fig. 6)..

Full pressure on the disk openers is obtained only when a gap exists between the top of the push rod swivel and the pins through the push rod at the top end of the push rod.

The rear tool bars are adaptable to attachment of other types of seed placement or tool covering apparatus. The front or lower tool bar should be used to pull the main load and the upper tool bar used mainly to lift the apparatus or to exert down pressure if required.

6.0 Ground Speed Drives. Ground speed drive to the cones is available in two ways. A drive mechanism is attached near the rear left wheel with a sliding dog clutch as described in 4.5. This method is susceptible to error due to slippage under some conditions. A second method provided is a spider wheel (See Figs. 5, 8) which attaches to the tool bars. A slotted bracket permits the wheel to float when the tool bar is in the down position, but lifts the spider wheel when the openers are lifted. A bracket is supplied to hold the spider in a transport position. Care must be taken when using the spider wheel that turns are not made with the spider in the down position as deflection will cause the chain to jump off or to stretch (Fig. 8).

7.0 Markers. A marker is provided on each side of the rear cab. Each is adjustable to suit different plot widths. Both are counterbalanced together and change from side to side with a tug on the chain connecting the two (See 4.4). A sight is attached to the front of the LOBO to permit visual alignment of the vehicle on the marker track. A second sight should be placed on the windshield of the LOBO to give a double sighting.

8.0 References

1. Cherewick, W.J. 1954. An improved experimental plot seeder. Can. J. Agr. Sci. 34: 642 - 643.
2. Hergert, G.B. and F.B. Dyck. 1970. A four-way divider for plot seeders. Can. J. Plant Sci. 50: 513 - 515.
3. Hergert, G.B. 1972. A cereal seeder for working in early spring soft soil conditions. Proc. 3rd Int. Conf. on Mech. of Field Experiments, Brno, Czechoslovakia. July.
4. Lien, M. 1963. A universal experimental seed drill. J. Agric. Eng. Res. 8: 4 (Correspondence to Editor).
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6. Øyjord, E. 1968. Norwegian plot seeders. Proc. 2nd Int. Conf. on Mech. of Field Experiments, Braunschweig, Germany. #15.

Commercial Data

Trackless Vehicles Ltd., Courtland, Ontario - Brochure, specifications, operating instructions and parts list for LOBO ATV.

Craftsman Machine Co., 201 Princess St., Winnipeg 2, Manitoba - Brochure and specifications on cone dispensers.

International Assoc. on Mechanization of Field Experiments, 1432 Aas, NH2, Norway - I.A.M.F.E. handbook giving specifications of Øyjord seed dispensers.

Monarch Road Machinery Co., Hydraulics Division, Grand Rapids, Michigan - Brochure, instructions and parts list for "Dyna-Might" electric hydraulic power unit. Type H.E.P.

Alco Equipment Ltd., Winnipeg, Manitoba - Parts list on hydraulic cylinder X577.

Delco-Remy, distributors in all principal cities - Instructions and parts list for Delcotron Generator Form No. DR5009.

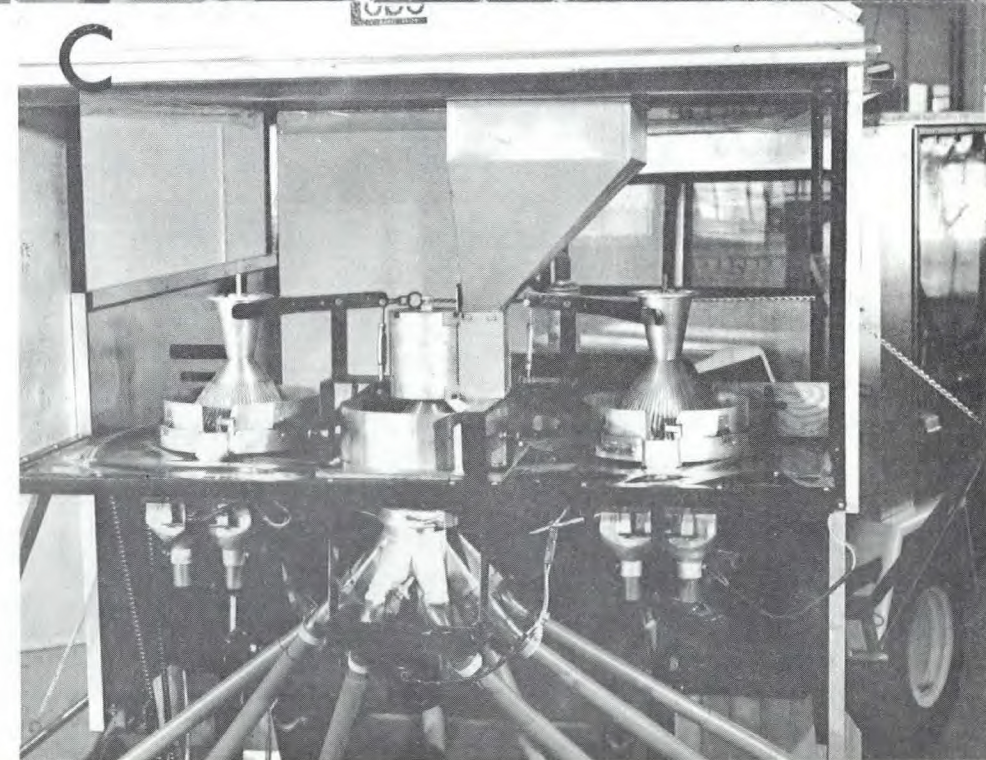
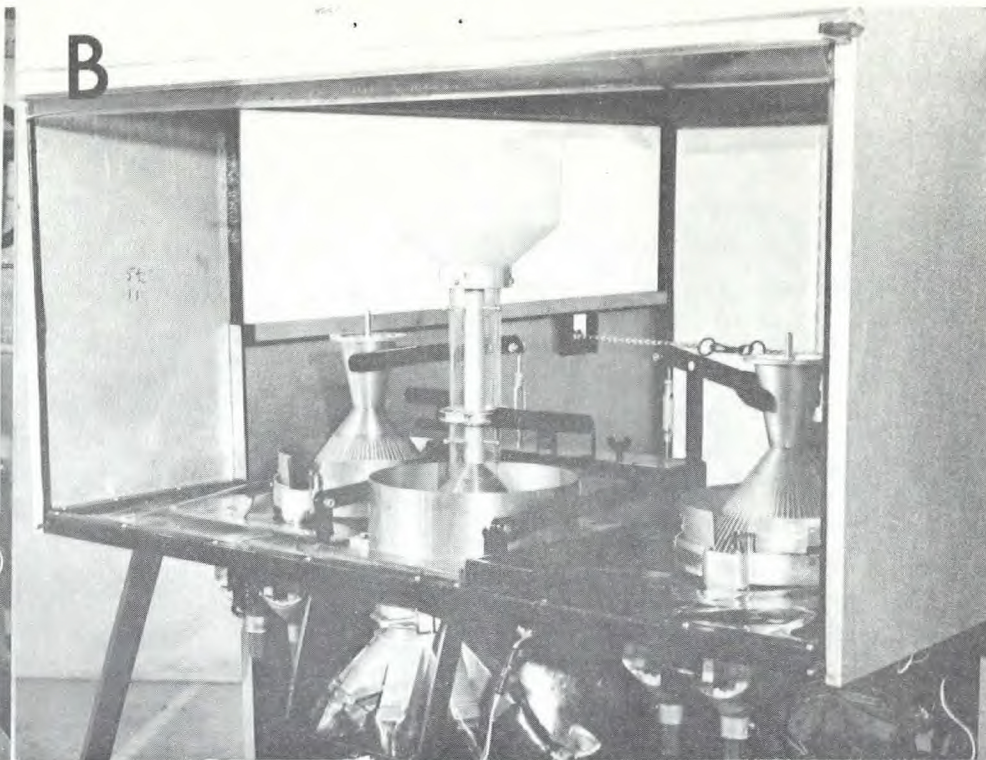
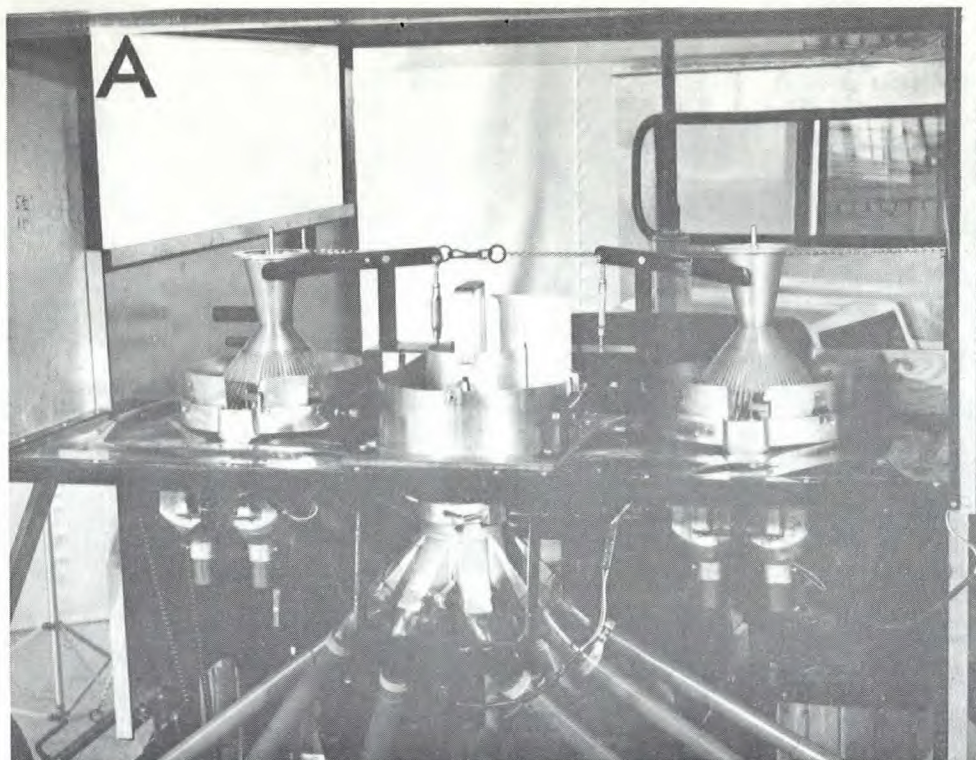
Jens A. Schou Mek. Verksted 1441, Drøbak, Norway - Brochure and specifications on Øyjord cone and dividers.

Torrington Co., 925 Millwood Rd., Toronto 17 - Brochure for drawn cup roller clutch.

Renold Chains, 153 Graveline, Montreal 9 - Brochure for dual groove, variable speed pulleys and controls.

J.F. Farm Machinery, Exeter, Ontario - Brochure for Fionna seed drills.

Onan Generators (Canada) Ltd., 233 Cambell Rd., Guelph, Ontario - Engine brochure, instruction and operators manual.



ØYJORD CONES

THREE TYPES OF LOADING APPARATUS
ARE AVAILABLE FOR FITTING TO THE
ØYJORD CONE.

A. ØYJORD LOADING CUP.

B. LIEN FUNNEL - SAME OPERATION AS
CRAFTSMAN CONES.

C. BULK HOPPER.

Fig. 1

ADJUSTMENTS OF LIFT RANGE AND PRESSURE OF DISC OPENERS

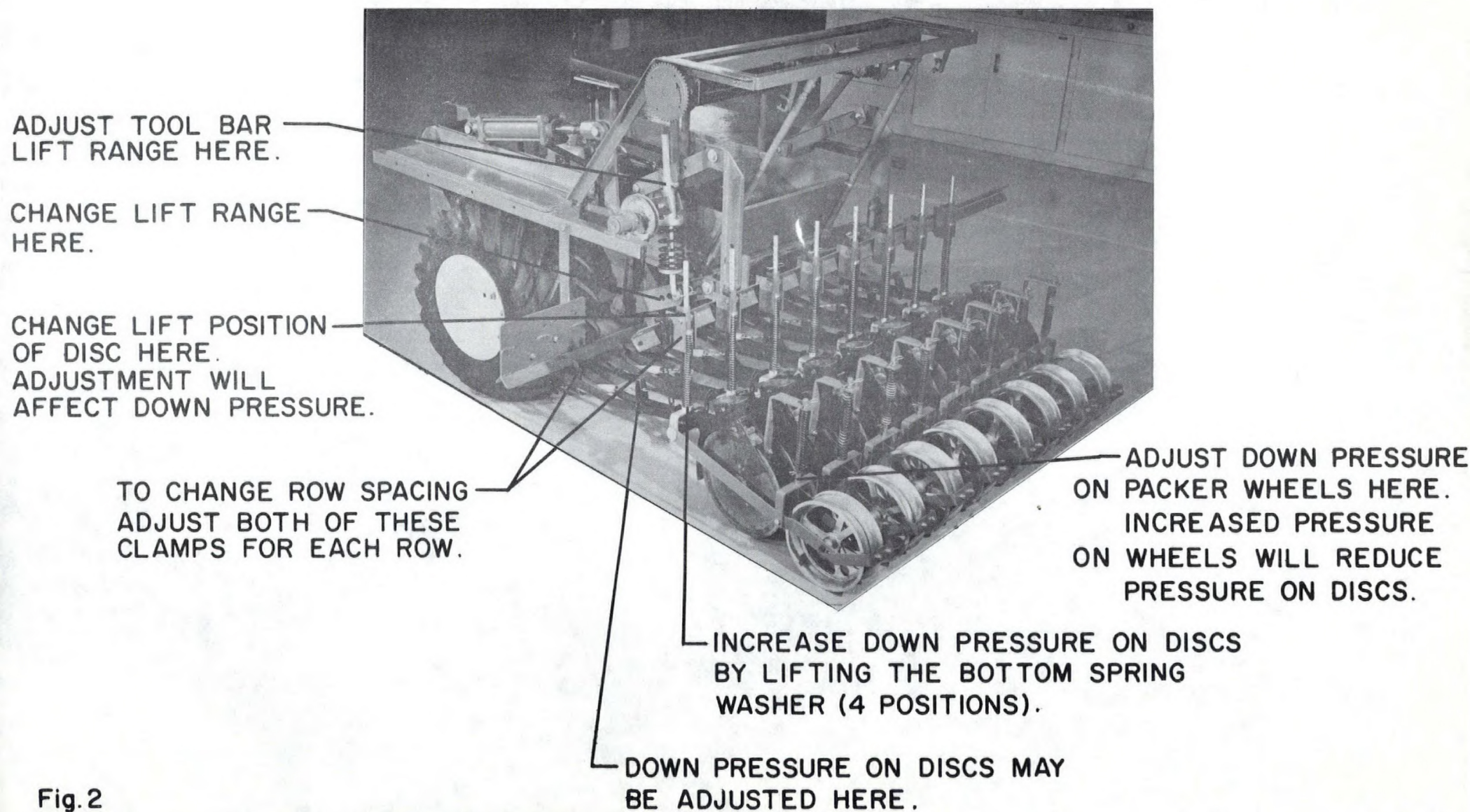
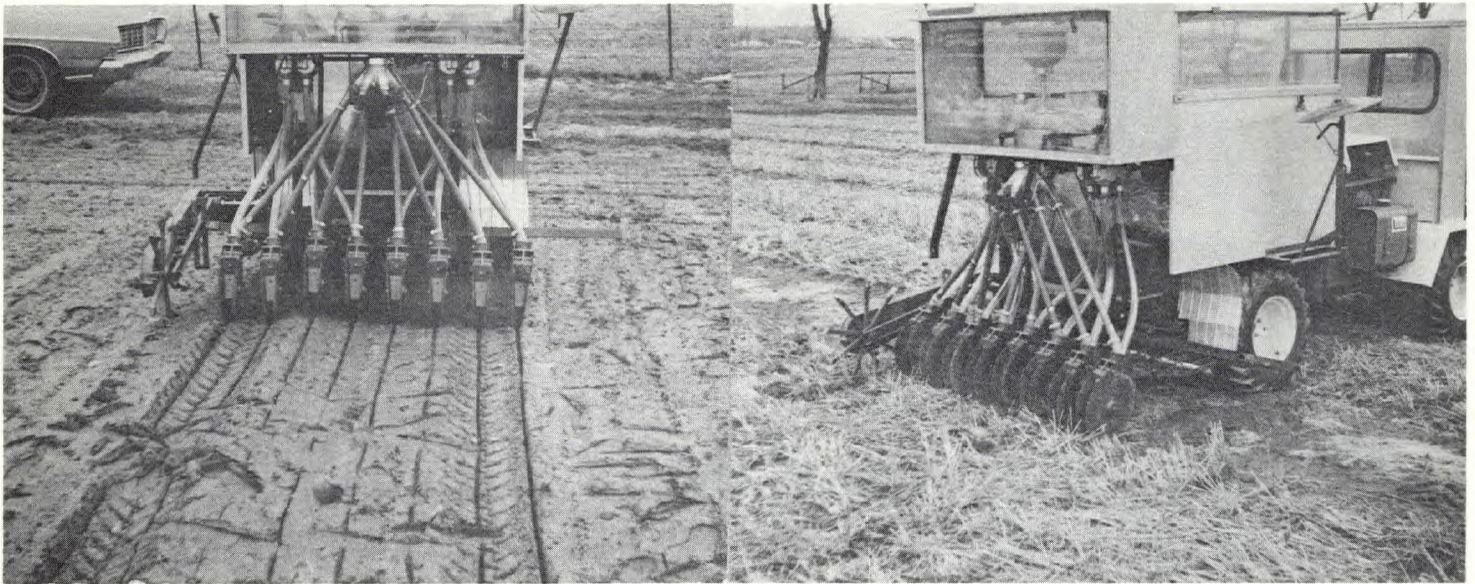


Fig.2



DISC OPENERS WITHOUT PRESSURE RODS.

Fig. 3

REGULATOR CONNECTIONS

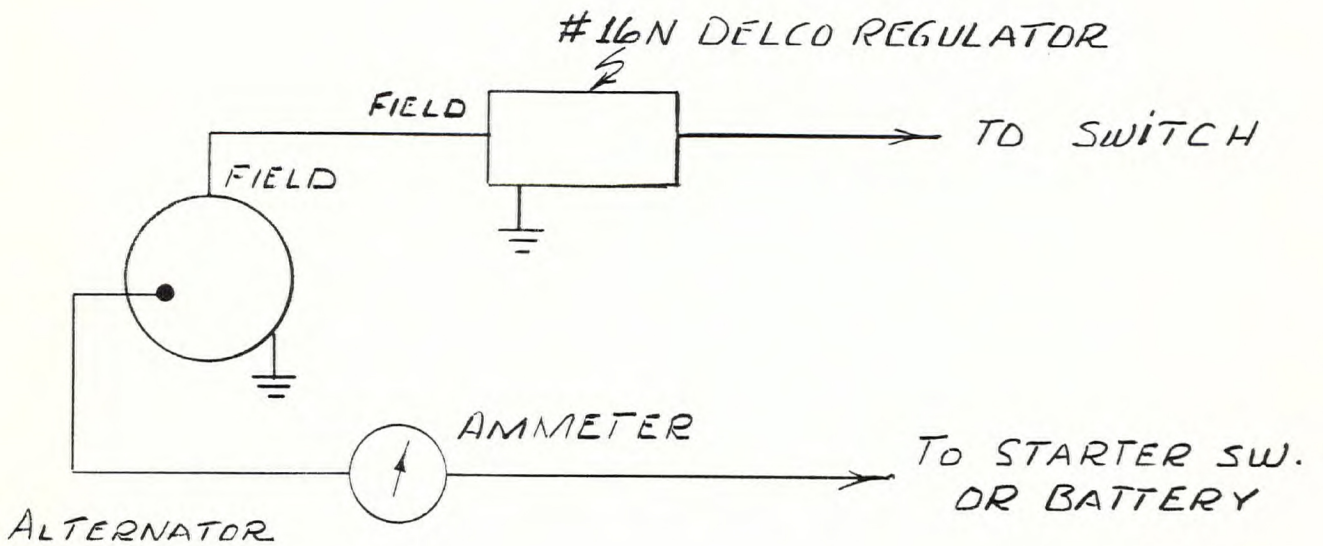
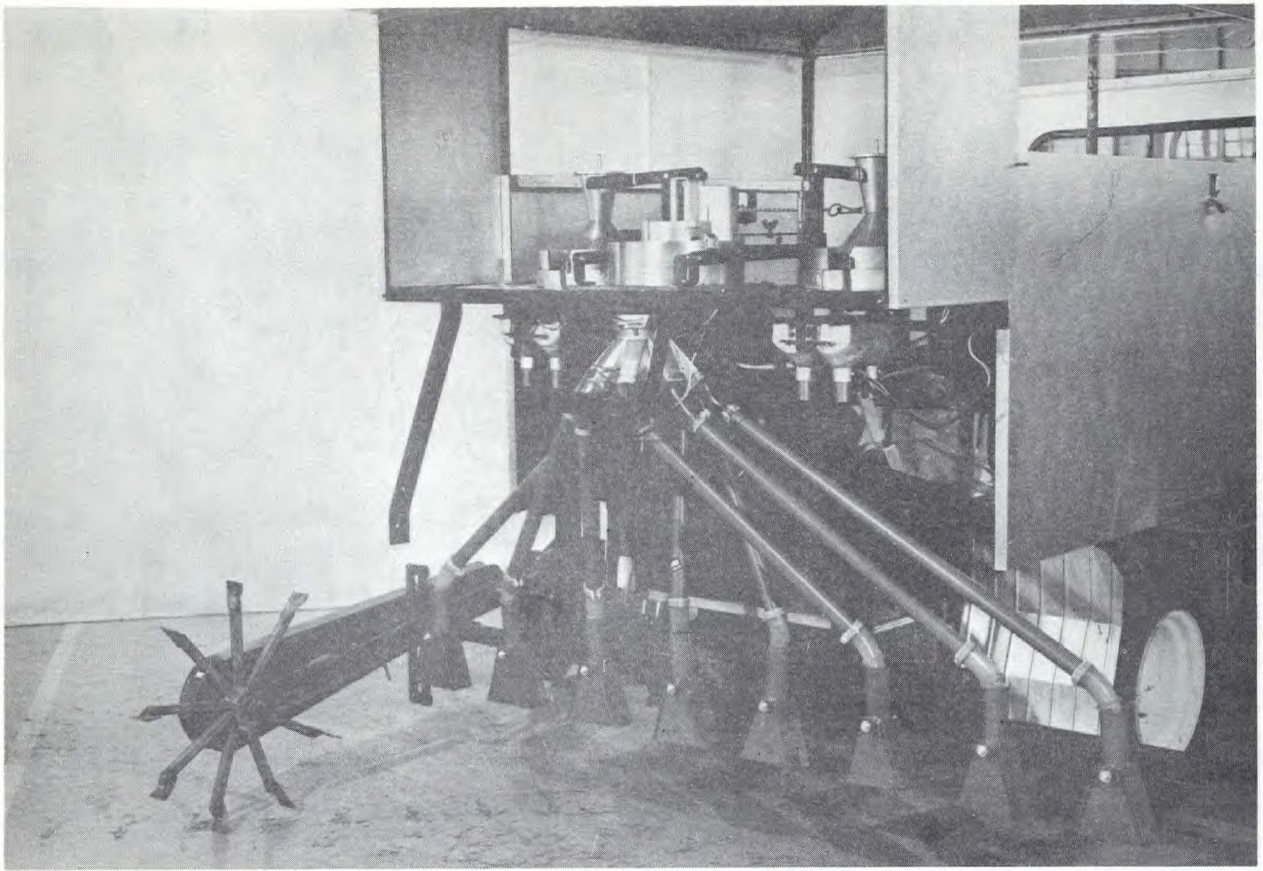
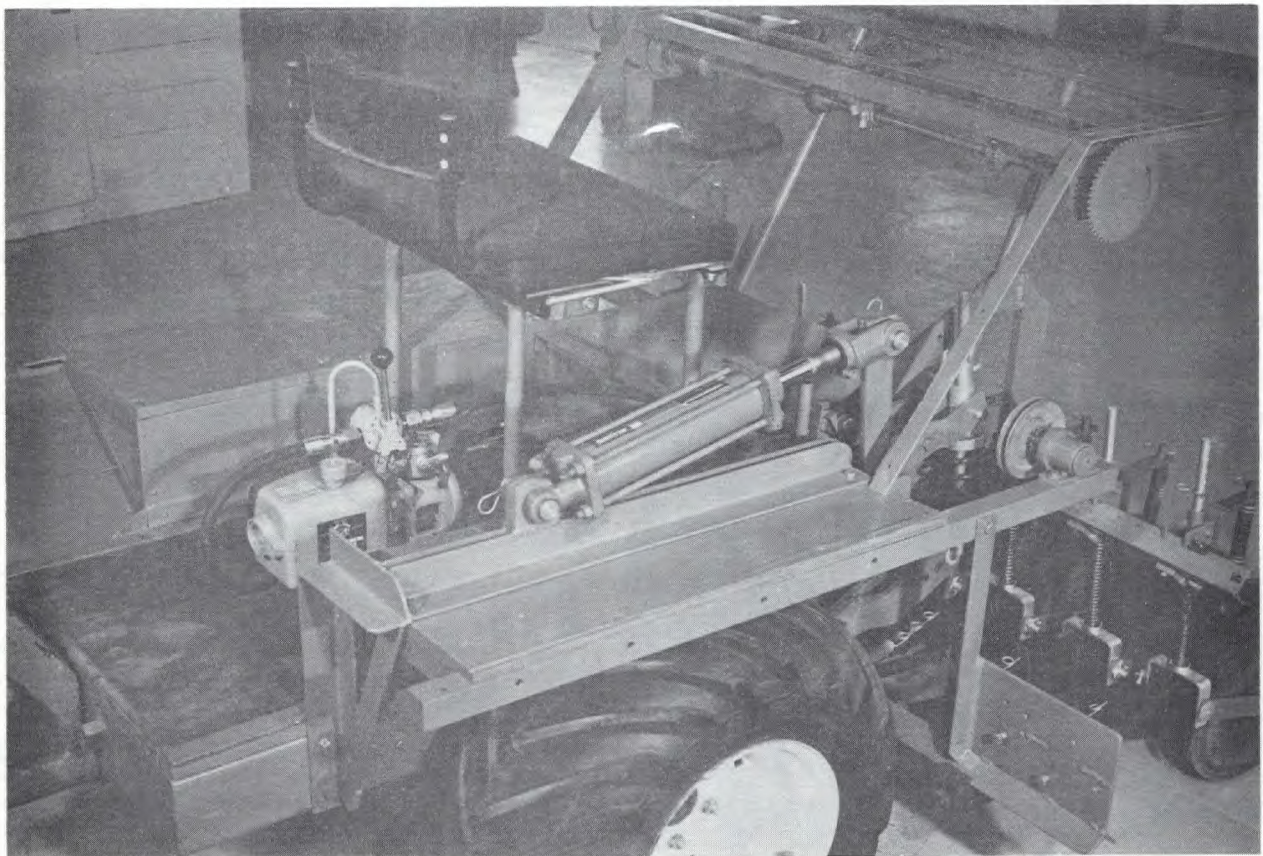


Fig. 4



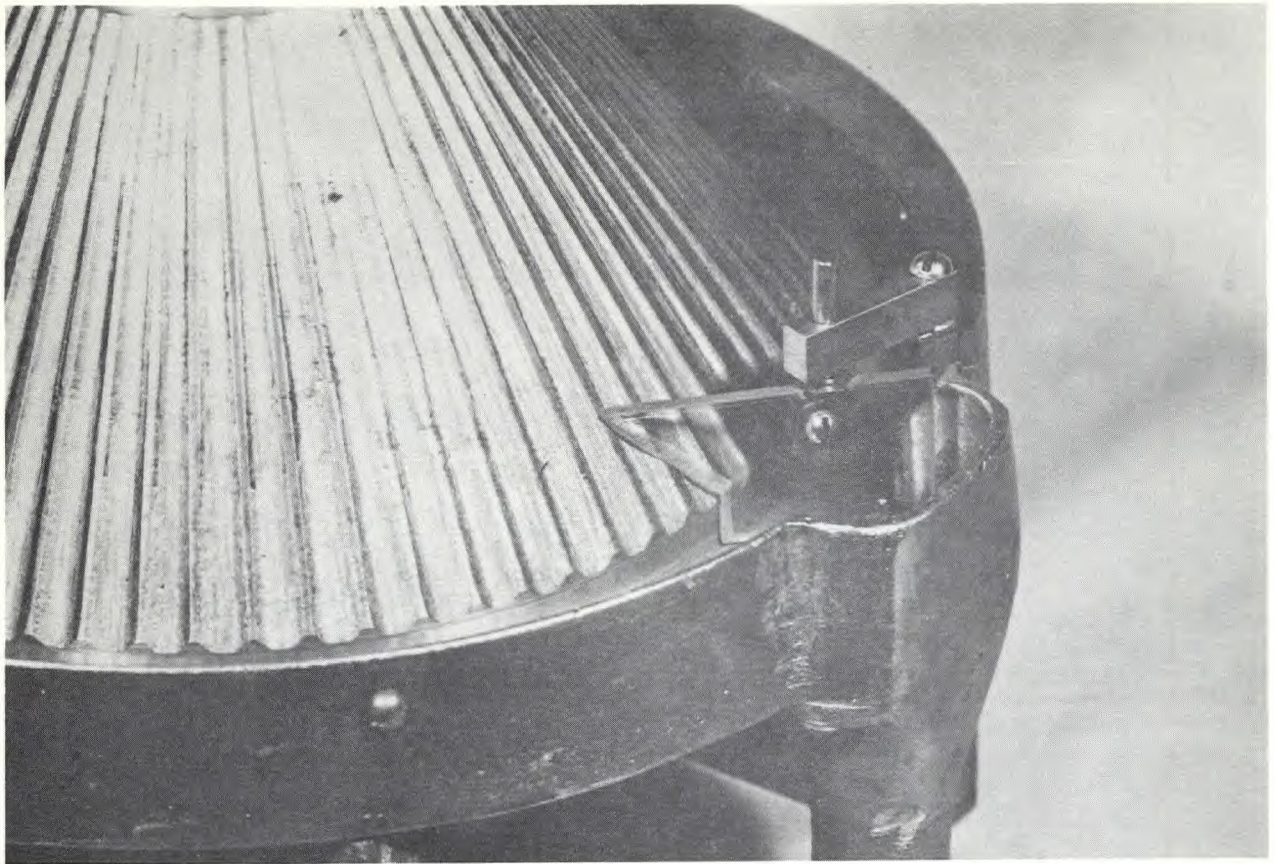
REAR VIEW SHOWING BROADCAST SPOUTS

Fig. 5



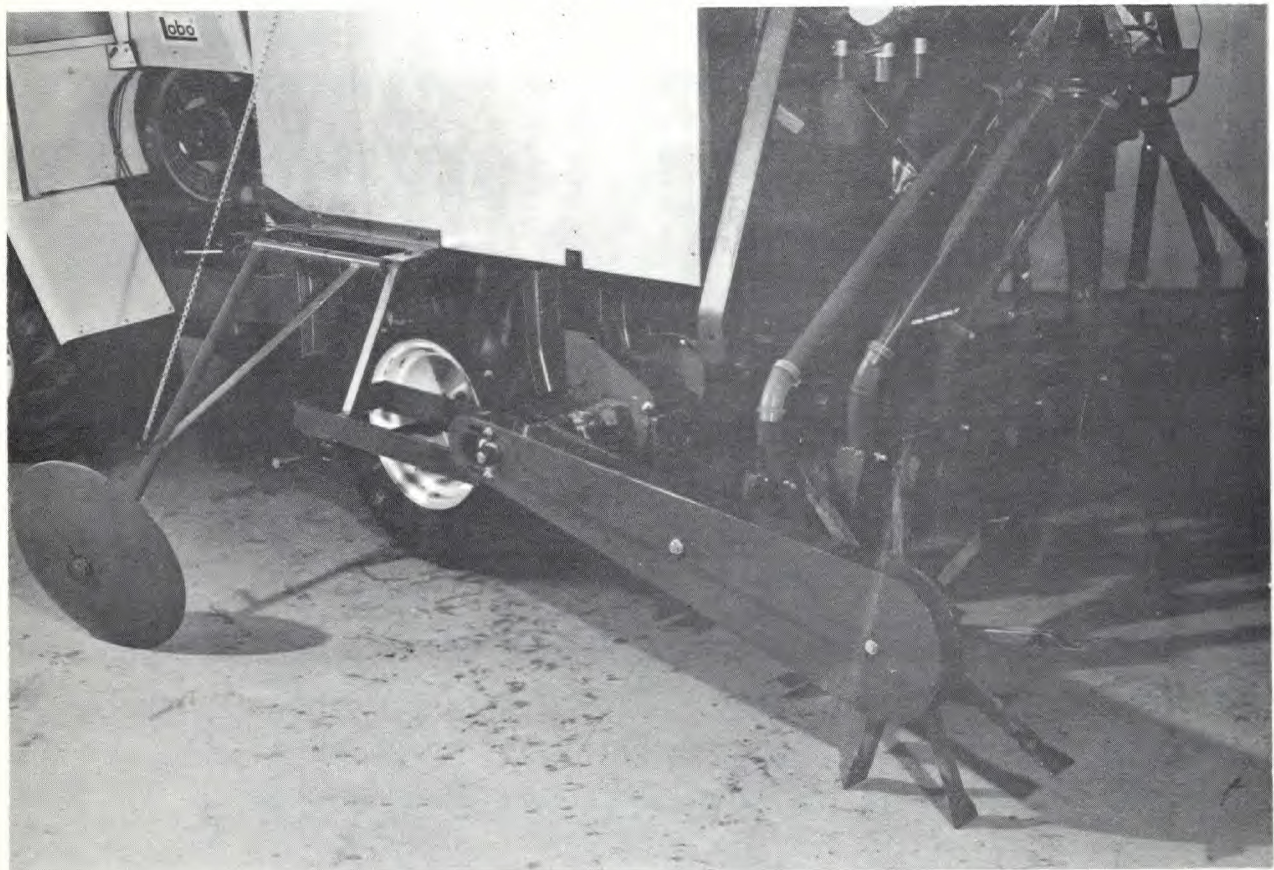
ELECTRIC — HYDRAULIC LIFT

Fig. 6



MODIFIED SCRAPER FOR CRAFTSMAN CONES.

Fig. 7



OPTIONAL GROUND WHEEL DRIVE.

Fig. 8