

Update— **Field Equipment for Precommercial Thinning and Slash Treatment**

Dan W. McKenzie—*Mechanical Engineer*
and
Bill Makel—*Forester*

Technology & Development Center
San Dimas, California 91773

TEO1125
Technical Services, Timber



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FORWARD

This publication is the result of a San Dimas Technology and Development Center project.

Projects are initiated by the Forest Product Sales Technology Committee, a group which meets yearly to discuss field needs ranging from initial sale layout to the transport of products. Work is prioritized and future projects are developed to address needs which appear to be multi-regional in scope.

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Bob Simonson
Program Leader—Timber

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INTRODUCTION

The USDA Forest Service has long been interested in effective equipment for precommercial thinning and the treatment of both thinning and logging slash. This is the third edition of this publication that has been issued by the San Dimas Technology and Development Center (SDTDC) to cover such equipment. Prior editions were as follows:

Date	Pub No.	Title	Material Pres.
7/78	7824 1203	Field Equipment for Precommercial Thinning and Slash Treatment	Description of 23 different models with field data, as reported to the Center, on 12 of them.
6/84	8424 1204	Field Equipment for Precommercial Thinning and Slash Treatment—Update	Parameters and information on 33 different models with results reported to the Center on the use of 16 of these.

Each year, new equipment comes on the market and older equipment is modified or removed from production. This latest update only contains equipment currently in production or available by special order. See the previous two editions for information on out-of-production equipment.

The data and discussions presented in the sections that follow are provided to assist field units in renting or procuring the proper mechanical equipment to meet the large variety of site prescription objectives that exist Service-wide. We wish to emphasize that the data presented are as reported to us. It is not intended to be anything but a quick guide to selection criteria and a list of currently available equipment.

FIELD EQUIPMENT SELECTION CRITERIA

The following factors should be considered when selecting a heavy-duty machine to perform either precommercial thinning or slash treatment.

Vertical vs Horizontal-Shaft Reduction Heads

A vertical-shaft reduction head has its main shaft in a vertical position (like that in a rotary lawn mower), and a horizontal-shaft reduction head has its main shaft horizontal to the ground (like that in a reel lawn mower). The horizontal-shaft reduction head machine has some major advantages over the vertical shaft reduction head machine. The horizontal-shaft machines are capable of cutting closer to the ground and, from field observations,

appear to be safer because they do not tend to throw material in all directions. Thrown material is not only a serious safety hazard to personnel, but also can damage leave trees. Further, depending on machine design, they can be a closer coupled machine and have very good operator visibility.

A tabulation of some of the advantages and disadvantages^{1/} for the two types of heads is presented in table 1.

Table 1. Comparison of vertical- and horizontal-shaft reduction heads.

VERTICAL SHAFT

Advantages

1. Low hp requirements
2. Long blade life
3. High kinetic blade energy
4. Cuts, even when blades dull
5. Low hp-hr/ton (energy per ton) expended

Disadvantages

1. Can leave high stubs
2. Large safety zones required
3. Small bearing area at blade attachment points can accelerate blade wear at these points
4. Can have poorer operator visibility
5. Can be longer machine overall

HORIZONTAL SHAFT

Advantages

1. Capable of cutting close to ground
2. Can be closer coupled machine
3. Can have good operator visibility
4. Can have large blade bearings
5. Both ends of blade usually supported
6. Can have high kinetic drum energy (flywheel effect)

Disadvantages

1. Higher power needed to drive cutters
2. Usually low kinetic blade energy^{2/}
3. With low kinetic energy, poor cutting when blades dull^{2/}
4. Blade changing can be difficult

^{2/}Machines now being developed have high kinetic energy blades that shatter wood fibers even when dull.

^{1/} Lambert, M.B., Evaluation of power requirements and blade design for slash cutting machinery. St. Joseph, MI: Am. Society of Agric. Eng. Pap. No. 74-1570; 1974. 36 p.

Fixed vs Free-Swinging Cutters

Reduction heads can have cutters (teeth, blades, or flails) that are fixed or free-swinging. A fixed-tooth reduction head has cutters that are fixed in relation to the main shaft (see figs. 26 & 35). A reduction head with free-swinging cutters has blades or flails that can move or swing in relation to the main shaft (see figs. 6 or 9).

Most available equipment have free-swinging flails that, in general, shred slash material very fine. This is OK, but not necessary. Reduction heads with fixed-tooth cutters tend to breakup material into large chunks. This meets the Forest Service objective of reducing the fire hazard by dividing the fuel and bringing it closer to the ground to reduce the rate of fire spread and make fire control easier. Fixed-tooth reduction heads generally run slower, require less power, can cut down very large trees, and can reduce very large stumps to ground level or below. Because reduction heads with fixed-tooth cutters generally turn slower than reduction heads with free-swinging cutters, reduction heads with fixed-tooth cutters do not tend to throw material very far. They also create less dust, and dust can be a major problem that severely reduces production.

When there are many rocks on the ground, reports indicate free-swinging cutters work better. However, fixed-tooth machines have been designed to handle some rock with out much problem. It has been found that with good operator position, good visibility, and some operator care and concern, rocks can be avoided well enough so as not to be a serious problem most of the time. The type of material that a fixed-tooth machine can handle, as a general rule, is anything that can be cut with an ax.

A free-swinging blade or flail should be timed so that after striking a target (e. g., tree, slash, log, or rock) and the blade or flail has been pushed back, it is swinging forward and in the correct position (extended out) for the next impact after one revolution of the reduction head. Timing is important because it affects the magnitude of the flail's impact and reduces or eliminates cutter head vibration. Reduction heads with free-swinging flails work much better if the flails are swinging forward at the time of the target impact. A reduction head does not work as well if the flails are swinging backwards or away from the target at the time of impact because the force of impact is reduced and vibration is increased.

Free-swinging flail timing is determined by the geometry of the reduction head; it is independent of reduction head rpm. The geometry that determines timing is the product of the square root of the ratio of the radius from the center of the reduction head to the center of the flail connecting pin (R) to the center of percussion of the flail (L). (See figure 1). Timing is most effective when this product is 1/2, 1-1/2, and 2-1/2. One eighth either side of these values is probably satisfactory and will give good results.

For a reduction head with geometry resulting in these products, the flails are swinging forward and striking the target with the most force—for they now have the velocity of the rotating reduction head plus the velocity of the swinging flail. Reduction heads with geometry resulting in product values between 3/4 and 1-1/4 and between 1-3/4 and 2-1/4 are poor, because this means the flails (when striking the target) are swinging away from the target, and have the velocity of the rotating reduction head minus the velocity of the swinging flail. This reduces the force of impact and increases vibration.

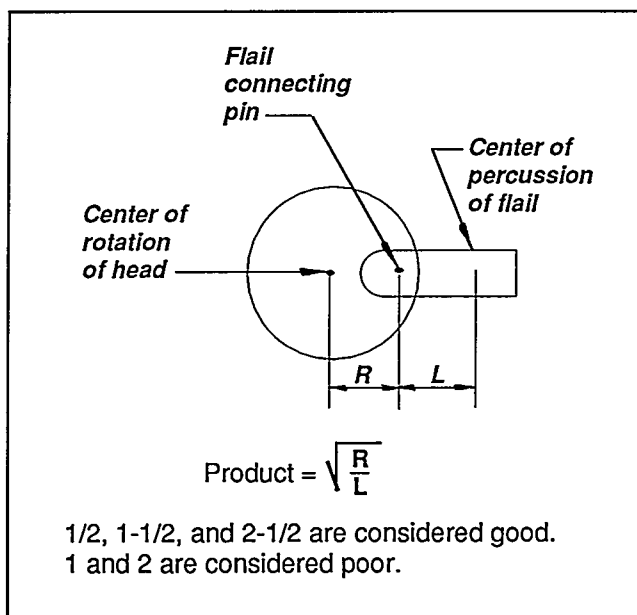


Figure 1.

Integral, Self-Propelled, Special Design vs. Attachment-Type or Towed Machines

When selecting heavy-duty field equipment for large (50+ acres) precommercial thinning and slash treatment projects, an integral, self-propelled, special-design machine should be given primary consideration over an attachment or a towed machine. Integral, self-propelled, special-design machines usually possess more desirable features than can be obtained from an attachment-type or towed machine, such as the use of a single engine, good operator position, high maneuverability and agility, and safety. However, if a prime mover is already available, using an attachment-type or towed slash treatment tool on small plots needing total treatment (such as campgrounds and road rights-of-way) may be the most economical approach. Approximately 35 percent of currently available precommercial thinning and slash treatment equipment are of the integral, self-propelled, special-design type.

Wheeled vs. Tracked Machines

The nature of the area to be treated dictates whether a wheeled or tracked vehicle should be used. Wheeled, or rubber-tired, vehicles exert more ground pressure than tracked vehicles and generally cannot operate

on as steep a slope. The maximum slope for wheeled vehicles is in the range of 15 to 20 percent; for tracked vehicles, 30 to 35 percent.

In general, the following is true:

- Tracked vehicles are more maneuverable than wheeled vehicles, since they can turn in their own length and operate on steeper slopes.
- Tracked vehicles have a lower center of gravity than wheeled vehicles.
- Tracked vehicles can be used under more severe conditions than wheeled vehicles.

However, if the area lends itself to wheeled-vehicle operation, use of a wheeled vehicle maybe more economical. Also, wheeled vehicles do not disturb the surface as much as tracked vehicles; generally require less maintenance and, therefore, cost less to operate; and can be moved between job sites under their own power (at speeds up to 15 mph on roads). Tracked vehicles have to be trucked.

Single Engine and an Effective Transmission or Auxiliary Engine

A well-designed prime mover for precommercial thinning and slash treatment should have a single engine with adequate power to both propel the vehicle and drive the slash treatment tool. The use of a single engine to power both functions keeps the weight and size of the vehicle to a minimum, while providing maximum power to perform either function. When a single engine is used, the vehicle must have a transmission system that can deliver almost full power to the slash treatment tool while propelling the vehicle at the required operating speed. The required operating speed can be stopped, near zero (most difficult), or up to 4 mph.

Also, the transmission must be able to propel the vehicle at full speed. This may require that full (or almost full) power be directed to driving the vehicle. A hydrostatic transmission is the type now most often used because of its ability to accomplish these requirements. A hydrostatic transmission usually incorporates a variable-displacement hydraulic pump driving a fixed-displacement hydraulic motor in a closed-loop hydraulic system; some designs operate at up to 6,000 psi. A variable-displacement hydraulic motor is sometimes used to gain a wider ratio without requiring gear changes. Also, speed can be easily changed with a hydrostatic transmission. This allows the operator to "push production" by moving as fast as the machine can handle the material being treated. If for a short distance no material needing treatment is present, travel speed can be increased to cover the distance as rapidly as possible. When a single

engine is used, a hydrostatic transmission for propelling the vehicle allows the engine to run at maximum rpm and deliver almost full engine power to the slash treatment tool while allowing the vehicle travel speed to vary from zero to the maximum. For all these reasons, a single engine driving a hydrostatic transmission is desirable for a slash treatment machine to meet Forest Service objectives in precommercial thinning and slash treatment.

Operator's Position and Visibility

Good operator position and comfort are very important for high productivity. To protect the operator from dust and heat, the operator's position should be enclosed and air conditioned. Also very important—the operator should have the best possible view of the immediate work area. This means a high, forward position for the operator. The Kershaw Klearway, Hydro-Ax, Brown Bear Forestry Shredder Tractor, and Shar 20 are examples of machines having excellent operator position.

An example of poor operator placement would be a slash treatment reduction head mounted on the front of a crawler tractor. Here, the operator might not have an enclosed, air-conditioned cab, and would have to look around and over the tractor engine cowl or the slash treatment head to see the immediate area to be worked which, in some cases, is impossible to do and still drive the tractor. With a pull type reduction machine the tractor operator has to look back to see the machine making operation more difficult.

Availability, Reliability, and Maintainability

Availability, in a general sense, is the degree to which a machine is in an operable state when called upon to perform. Specifically, it is the percent of total scheduled time the machine is able to operate; i.e., the percent of time the machine is not broken down. Availability is a function of how reliable its components are, and how easy it is to repair a failed machine.

Reliability is the probability that a machine will perform its intended function for a specified interval of time under stated conditions; i.e., how often the machine breaks down, or mean time between failures.

Maintainability is that characteristic of design expressed as the probability that a machine can be repaired within a given period of time; i.e., how long it will take to fix a broken machine.

In the severe operating environment faced by precommercial thinning and slash treatment equipment, machine failures are to be expected. Equipment should be relatively reliable and be capable of being quickly repaired when a failure does occur. Availability, reliability, and maintainability are equally important

whether a machine is Forest Service owned or is operated under contract. If the equipment is not reliable and maintainable, availability will be low, production will be low, and cost of operation will be excessive.

Maneuverability and Agility

Precommercial thinning and slash treatment equipment should have both good maneuverability and a high degree of agility. Maneuverability is the ability of a machine to make a series of changes in direction and position, while agility is the quickness and "grace" with which these changes in direction and position are made. Good arrangement and response of the machine's controls contribute to good maneuverability and agility.

Machines with horizontal-shaft reduction heads (having an inherently shorter coupling than single, vertical-shaft machines) usually display better maneuverability than vertical-shaft machines. Tracked vehicles, which—in general—have shorter turning radii than wheeled vehicles, usually have more maneuverability than wheeled vehicles. Reduced overhangs, light weight, and a balanced machine contribute to good equipment agility.

Good examples of highly maneuverable machines, which also have good agility, are the John Deere 750B and 850B crawler tractors. These tractors have two hydrostatic transmissions, one for driving each track. This drive arrangement allows the tracks to be counter rotated; this enables the machines to turn quickly in their own lengths. A hydrostatic transmission also eliminates any "dead band" in the controls, which is often found in other types of transmissions.

Safety

Implicit in all selection criteria is safety, especially when considering the reduction head main shaft. All necessary safety equipment and devices (such as guards, shields, rollover protection, spark arrester, etc.) should be in place and not removed before or during operation. The maximum safe operating slope should be known and the machine should not be operated in areas having greater slopes. Also, unsafe zones should be known or determined; and during operation, *no* one should be allowed into these zones.

EQUIPMENT DESCRIPTIONS

Information, valid as of November 1, 1990, collected from 14 sources that produce or offer 42 different models of heavy-duty brush and slash treatment equipment is presented here in tabular form, alphabetically by manufacturer's name. All data (including price, maximum material size, etc.) are as reported or claimed by the manufacturer. Photographs of many of the units appear with their data sheet. The American Ranger, Brown Bear, Hydro-Ax, Hydro Mower, Klearway,

Linetender, Royer Woodsman 9000W and Shar models are self-propelled, integral prime mover machines; the A2 Forester, Brown Tree Cutter and Rotoclear, models are towed by a tractor; the Forst, Rousseau FO, Royer Woodsman 6003, and Timberwolf 90 models are attached to, and carried by, a standard prime mover such as a wheeled-or-tracked loader, or a crawler, or farm tractor; the Weldco-Beales and D & M Machines is designed to be attached to the boom of an excavator.

The explanations that follow are for some entries found in the equipment data sheets. (See also the section, "Field Equipment Selection Criteria," for explanations of terms such as vertical or horizontal shaft, and fixed or free-swinging cutters.)

Under "Reduction-head Mechanisms, Type of drive:"

- "Entry"-Type of drive from the engine to the reduction head's main shaft.

Under "Prime Mover, Transmission:"

- "Entry"-Type of drive from the engine to the prime mover's wheels or tracks.

Under "Machine Data, Ground Pressure (psi):"

- "Entry"-For wheeled vehicles, the mean ground pressure is the weight on each wheel, divided by the area of the tire footprint. For some of these vehicles, the ground pressure is given at no penetration, or on a flat, hard surface. For others, the ground pressure is presented with the number of inches of penetration. This

American Ranger Mfg., Inc.

Equipment

Designation: American Ranger Model 300T
Status: Production
Cost: \$220,000

Manufacturer

Name: American Ranger Mfg., Inc.
Address: 2701 E. Winslow Avenue
Appleton, WI 54915
Telephone: (414) 731-5777

Reduction-head Mechanism

Type: Horizontal shaft
Cutters: 81 free-swinging
Timing: 1.68
Width of cut (ft-in): 8-6
Maximum material size (in): 10 and up
Working material size (in): 6
Type of drive: Hydrostatic
Rotational speed (rpm): 1,800

Prime Mover

Type: Tracked, integral, self-propelled, special design
Diesel engine net power (hp): 400
Transmission: Each track hydrostatic

Machine Data

Width (ft-in): 8-6
Length (ft-in): 23-11
Height (ft-in): 8-10
Weight (lb): 32,000
Ground pressure (psi): 5.5

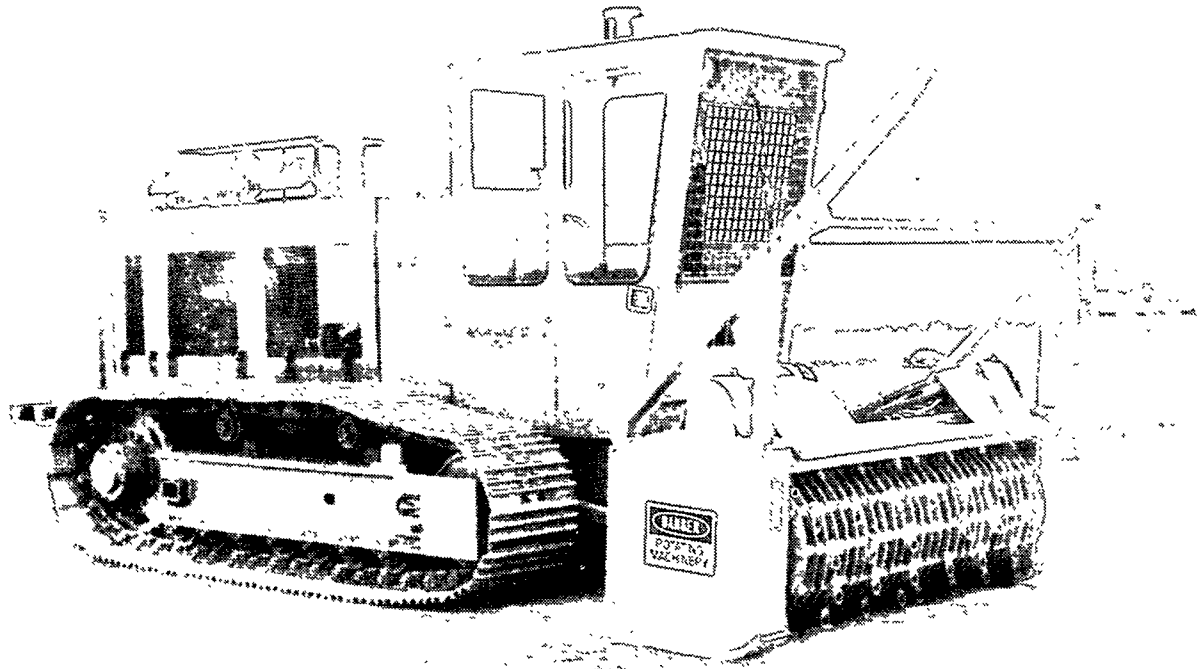
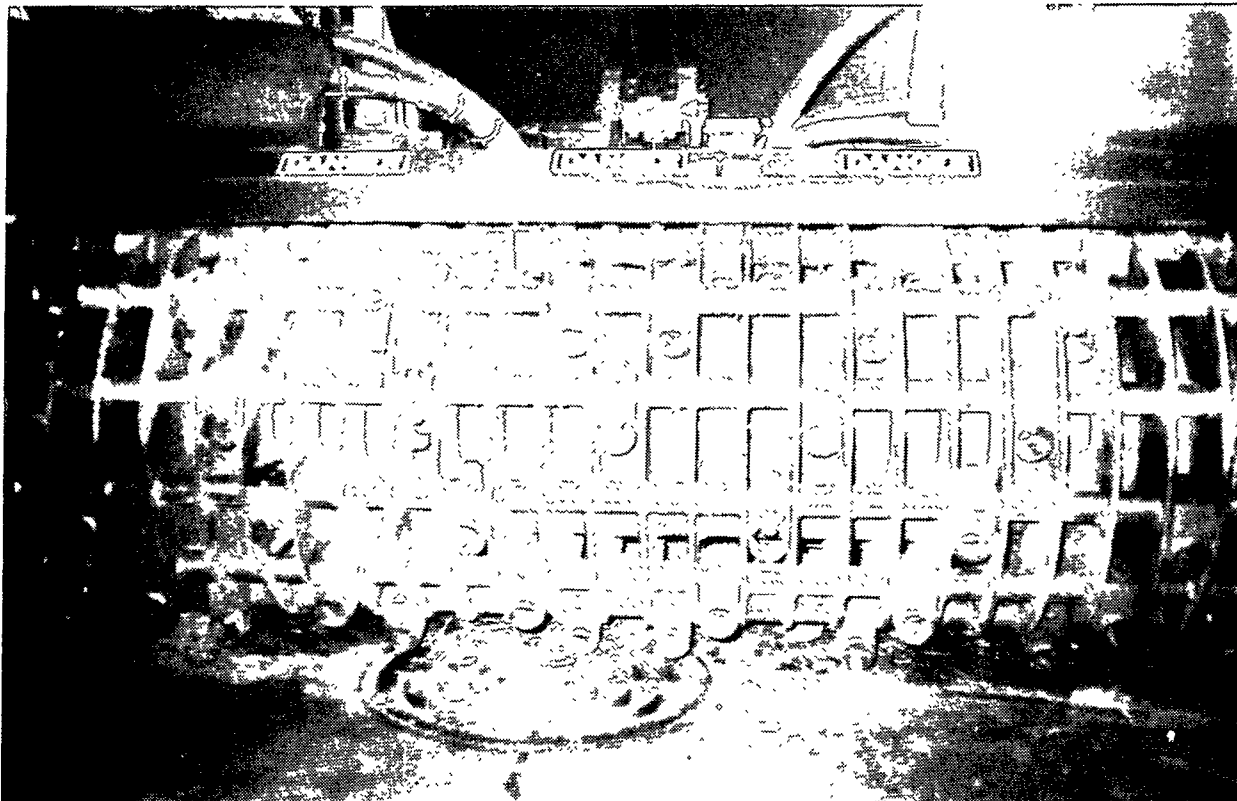


Figure 2. American Ranger Model 300T.



*Figure 3. American Ranger Model 300T cutter head
with free-swinging cutters.*

Blount Inc.

Equipment

Designation: Hydro-Ax 520 with Rotary Ax
Status: Production
Cost: \$118,000—\$128,000 depending on options

Manufacturer

Name: Blount Inc., Hydraulic Materials Handling Division
Address: P.O. Box 568
Owatonna, MN 55060
Telephone: (507) 451-8654

Reduction-head Mechanism

Type: Vertical shaft
Cutters: 2 free-swinging
Timing: 1.55
Width of cut (ft-in): 8-0
Maximum material size (in): 8
Working material size (in): 2-4
Type of drive: Hydrostatic transmission,
Variable displacement pump fixed displacement motor
Rotational speed (rpm): Variable control (1,075 max)

Prime Mover

Type: Wheeled, integral, self-propelled, special design
Diesel engine net power (hp): 130
Transmission: Hydrostatic

Machine Data

Width (ft-in): 9-0
Length (ft-in): 25-0
Height (ft-in): 9-8
Weight (lb): 23,350
Ground pressure (psi): not available

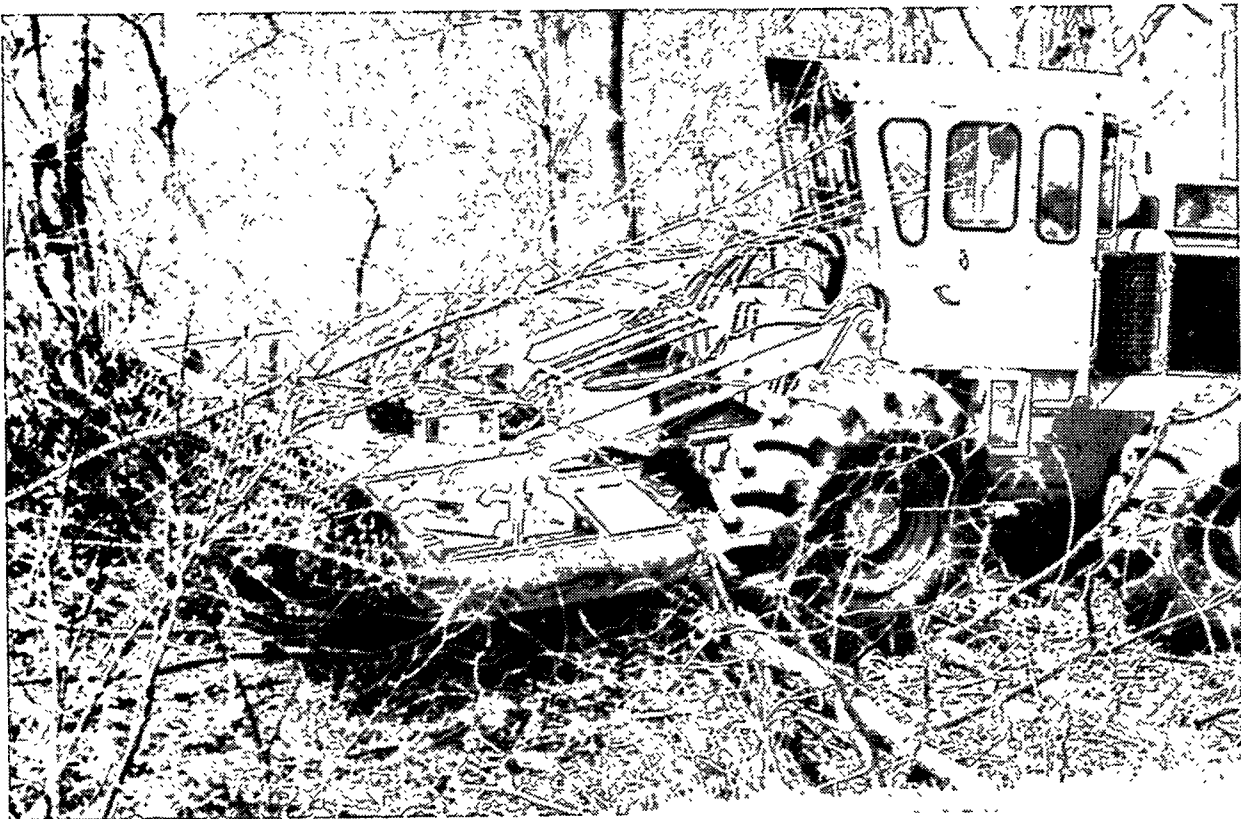


Figure 4. Blount Hydro-Ax 520 with Rotary Ax.

Blount Inc.

Equipment

Designation: Hydro-Ax 621 Hydro-Ax 720 with Rotary Ax
Status: Production Production
Cost: \$132,000—\$145,000 depending on options \$134,000—\$142,000 depending on options

Manufacturer

Name: Blount Inc., Hydraulic Materials Handling Division
Address: P.O. Box 568
Owatonna, MN 55060
Telephone: (507) 451-8654

Reduction-head Mechanism

Type: Vertical shaft Vertical shaft
Cutters: 2 free-swinging 2 free-swinging
Timing: 1.55 1.55
Width of cut (ft-in): 8-0 8-0
Maximum material size (in): 12 10-12
Working material size (in): 3-4 3-4
Type of drive: Hydrostatic transmission. Hydrostatic transmission
Variable displacement pump, Variable displacement pump,
fixed displacement motor fixed displacement motor
Rotational speed (rpm): 925 Variable control (925 max)

Prime Mover

Type: Wheeled, integral, self-propelled, Wheeled, integral, self-propelled,
special design special design
Diesel engine net power (hp): 185 185
Transmission: Hydrostatic Hydrostatic transmission,
Variable displacement pump,
fixed displacement motor

Machine Data

Width (ft-in): 9-0 9-0
Length (ft-in): 25-2 25-2
Height (ft-in): 10-6 9-8
Weight (lb): 26,680 24,350
Ground pressure (psi): ..7.5 to 10.9 (front); 5.0 to 7.2 (rear) 7.6 to 11.1 (front); 5.3 to 7.7 (rear)
Value depends on choice of tires. Value depends on choice of tires.



Figure 5. Blount Hydro-Ax 720 with Rotary Ax.

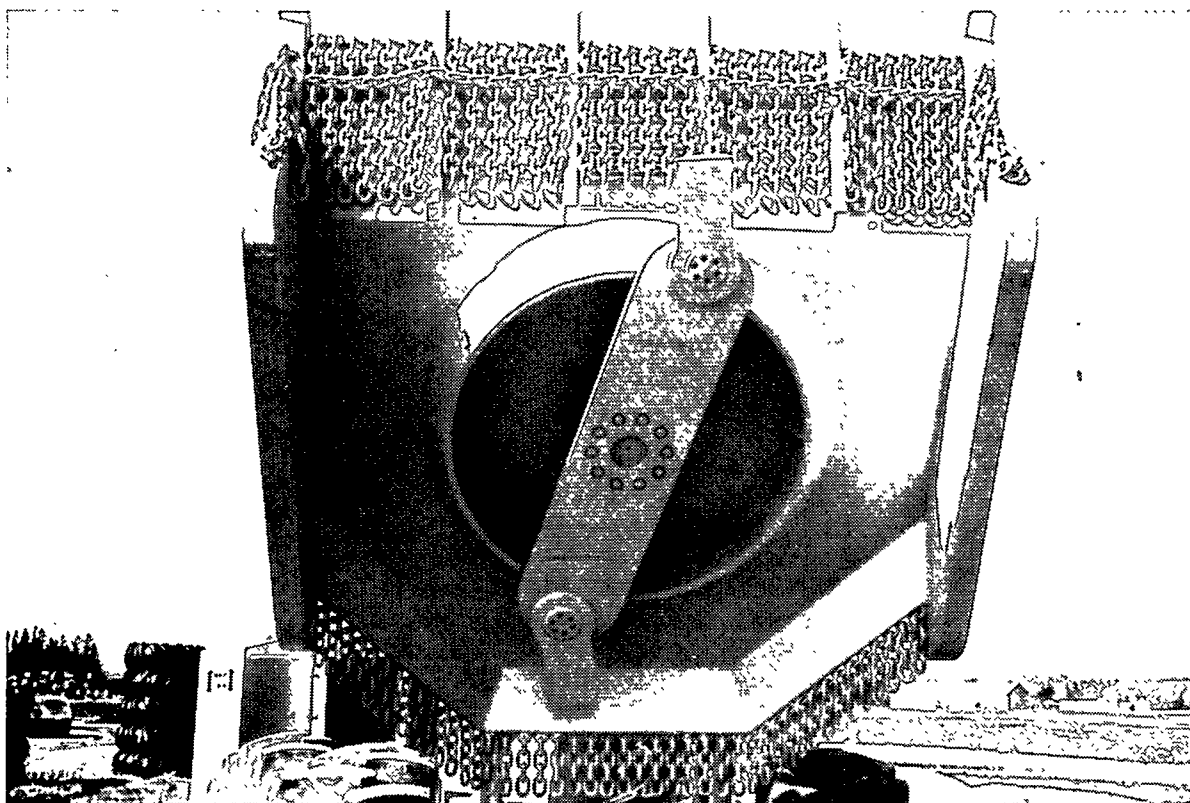


Figure 6. Blount free-swinging cutters. Timing 1.55

Blount Inc.

Equipment

Designation: Hydro-Ax 730
Status: Production
Cost: \$138,000—\$146,000 depending on options

Manufacturer

Name: Blount Inc., Hydraulic Materials Handling Division
Address: P.O. Box 568
Owatonna, MN 55060
Telephone: (507) 451-8654

Reduction-head Mechanism

Type: 2 vertical shafts
Cutters: 4 free-swinging
Timing: 1.20
Width of cut (ft-in): 10-8
Maximum material size (in): 6-8
Working material size (in): 3-4
Type of drive: Hydrostatic transmission: Variable displacement pump,
fixed displacement motor
Rotational speed (rpm): 1,550

Prime Mover

Type: Wheeled, integral, self-propelled, special design
Diesel engine net power (hp): 203
Transmission: Hydrostatic

Machine Data

Width (ft-in): 9-0
Length (ft-in): 25-5
Height (ft-in): 9-8
Weight (lb): 28,500
Ground pressure (psi): 8.2 to 12 (front); 5.5 to 8.1 (rear)
Value depends on choice of tire.



Figure 7. Blount Hydro-Ax 730.

Brown Bear Corp.

Equipment

Designation: Brown Bear Forestry Shredder Tractor
Status: Production
Cost: \$170,000 FOB factory

Manufacturer

Name: Brown Bear Corp.
Address: P.O. Box 29
Corning, Iowa 50841
Telephone: (515) 322-4220

Reduction-head Mechanism

Type: Horizontal shaft
Cutters: 72 free-swinging
Timing: 1.62
Width of cut (ft-in): 8-2
Maximum material size (in): 6-8
Working material size (in): 6
Type of drive: Hydrostatic and belt
Rotational speed (rpm): 1,400

Prime Mover

Type: Rubber tire, all wheel steer, self-propelled, special design
Diesel engine net power (hp): 300
Transmission: Hydrostatic

Machine Data

Width (ft-in): 9-5
Length (ft-in): 20-0
Height (ft-in): 10-8
Weight (lb): 25,000 (approx)
Ground pressure (psi): 7.0 to 8.9 (depending on tire option)



Figure 8. Brown Bear Forestry Shredder Tractor.

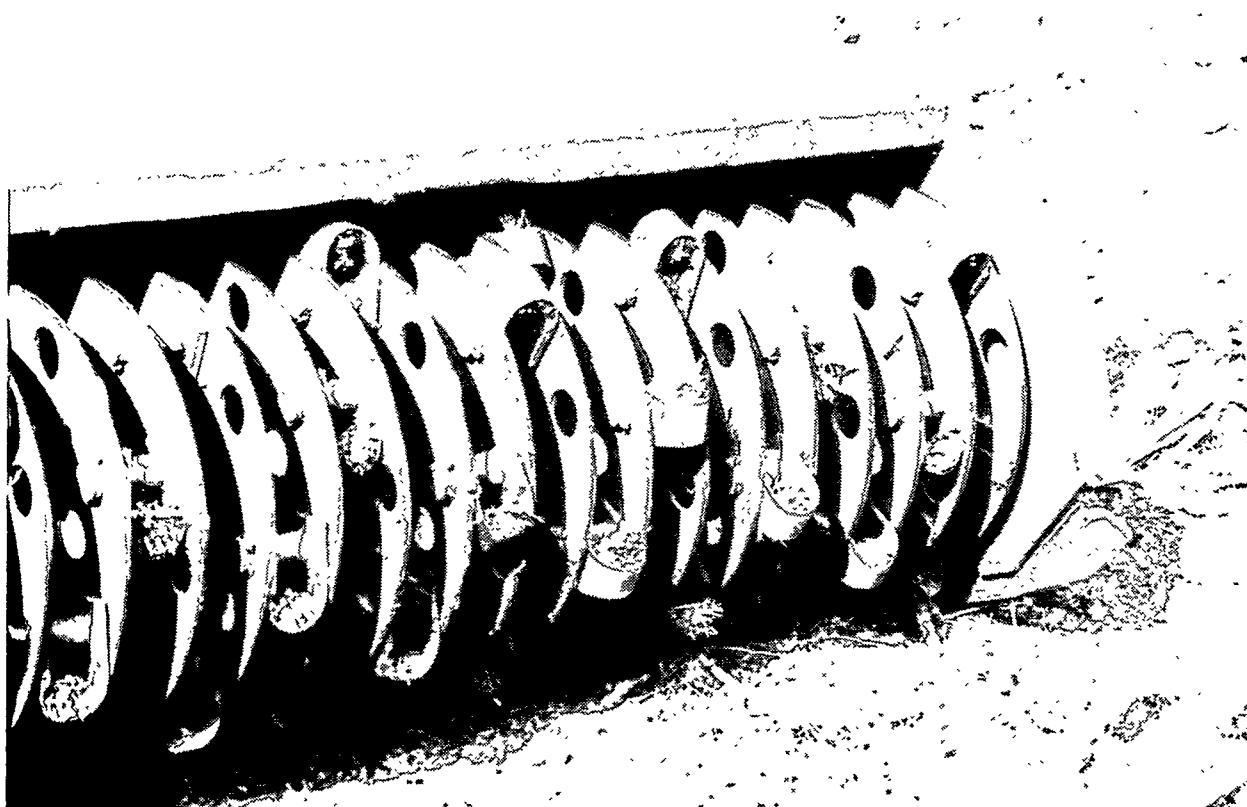


Figure 9. Brown Bear Shredder Head with free-swinging cutters.

Brown Manufacturing Corp.

Equipment

Designation: Linetender Ltr 100
Status: Production
Cost: \$74,500

Manufacturer

Name: Brown Manufacturing Corp.
Address: Route 3, Box 339
Ozark, Alabama 36360
Telephone: (205) 795-6603

Reduction-head Mechanism

Type: Vertical shaft
Cutters: 4 free-swinging
Timing: 1.54
Width of cut (ft-in): 6-0
Maximum material size (in): 12 (tree diameter)
Working material size (in): 8 (tree diameter)
Type of drive: Hydraulic
Rotational speed (rpm): 800-900

Prime Mover

Type: Wheeled, integral, self-propelled, special design
Diesel engine net power (hp): 89 (Ford, 4-cylinder)
Transmission: Mechanical (10 speed forward; 10 speed reverse)

Machine Data

Width (ft-in): 7-4
Length (ft-in): 24-0
Height (ft-in): 8-4
Weight (lb): 14,000 (tractor), 3,800 (cutter)
Ground pressure (psi): 7-9



Figure 10. Brown Manufacturing Linetender Ltr. 100.

Brown Manufacturing Corp.

Equipment

Designation:.....Linetender Ltr 200Brown Tree Cutter 80-TC-60R
Status:ProductionProduction
Cost:\$85,000\$3,800

Manufacturer

Name:Brown Manufacturing Corp.
Address:Route 3, Box 339
Ozark, Alabama 36360
Telephone:.....(205) 795-6603

Reduction-head Mechanism

Type:Vertical shaftVertical shaft
Cutters:4 free-swinging4 free-swinging
Timing:1.541.45
Width of cut (ft-in):6-05-0
Maximum material size (in):12 (tree diameter)8 (tree diameter)
Working material size (in):8 (tree diameter)6 (tree diameter)
Type of drive:HydraulicMechanical (90 HP-right angle gearbox)
Rotational speed (rpm):800-900810

Prime Mover

Type:Wheeled, integral, self-propelled,60-90 HP farm tractor (not furnished)
special design
Diesel engine net power (hp):....152 (Cummins, 6-cylinder)N/A
Transmission:HydrostaticN/A

Machine Data

Width (ft-in):7-46-10
Length (ft-in):24-09-6
Height (ft-in):8-4N/A
Weight (lb):14,000 (tractor), 3,800 (cutter)1,750
Ground pressure (psi):7-9N/A

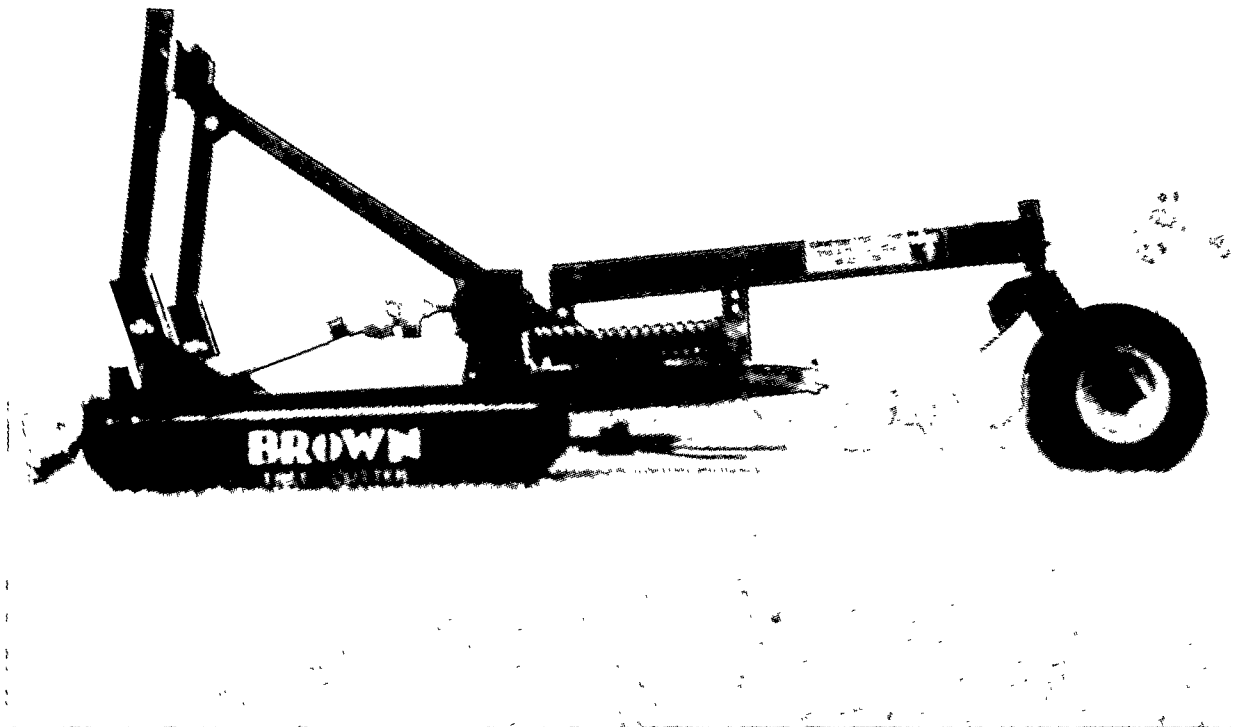


Figure 11. Brown Manufacturing Tree Cutter 80-TC-60R.

Brown Manufacturing Corp.

Equipment

Designation: Brown Tree Cutter 80-TC-72R
Status: Production
Cost: \$3,968

Manufacturer

Name: Brown Manufacturing Corp.
Address: Route 3, Box 339
Ozark, Alabama 36360
Telephone: (205) 795-6603

Reduction-head Mechanism

Type: Vertical shaft
Cutters: 4 free-swinging
Timing: 1.44
Width of cut (ft-in): 6-0
Maximum material size (in): 8 (tree diameter)
Working material size (in): 6 (tree diameter)
Type of drive: Mechanical (90 hp—right-angle gearbox)
Rotational speed (rpm): 810

Prime Mover

Type: 60-90 hp farm tractor (not furnished)
Diesel engine net power (hp): N/A
Transmission: N/A

Machine Data

Width (ft-in): 6-10
Length (ft-in): 9-6
Height (ft-in): N/A
Weight (lb): 2,100
Ground pressure (psi): N/A



Figure 12. Brown Manufacturing Tree Cutter 80-TC-72R.

Brown Manufacturing Corp.

Equipment

Designation: Brown Tree Cutter 89-TC-72R165
Status: Production
Cost: \$5,400

Manufacturer

Name: Brown Manufacturing Corp.
Address: Route 3, Box 339
Ozark, Alabama 36360
Telephone: (205) 795-6603

Reduction-head Mechanism

Type: Vertical shaft
Cutters: 4 free-swinging
Timing: 1.54
Width of cut (ft-in): 6-0
Maximum material size (in): 8 (tree diameter)
Working material size (in): 6 (tree diameter)
Type of drive: Mechanical (165 hp—right angle gearbox)
Rotational speed (rpm): 810

Prime Mover

Type: 60-90 hp farm tractor (not furnished)
Diesel engine net power (hp): N/A
Transmission: N/A

Machine Data

Width (ft-in): 6-10
Length (ft-in): 9-6
Height (ft-in): N/A
Weight (lb): 2,400
Ground pressure (psi): N/A



Figure 13. Brown Manufacturing Tree Cutter 89-TC-72R165.

Carlson Tractor & Equipment Co.

Equipment

Designation: Mini Forst Models 125, 150, 175, 200, 225, 250
Status: Production
Cost: \$11,342—\$20,998

Manufacturer

Name: Carlson Tractor & Equipment Co.—Seppi Division
Address: County Road 42 & Highway 3
Rosemount, MN 55068
Telephone: (612) 423-2222

Reduction-head Mechanism

Type: Horizontal
Cutters:* 20-40 free-swinging
Timing: 1.57
Width of cut (ft-in):* 4-1 to 8-3
Maximum material size (in): 6 (tree diameter)
Working material size (in): 2-4
Type of drive: PTO or Hydraulic (5000 psi at 40 gpm)
Rotational speed (rpm): 2,100

Prime Mover

Type: This is an attachment for mounting onto wheeled or tracked loader or bulldozer;
attaches to loader lift arms or dozer C-frame
Diesel engine net power (hp): N/A
Transmission: N/A

Machine Data

Width (ft-in):* 5-1 to 9-3 (attachment only)
Length (ft-in): 3-5 (attachment only)
Height (ft-in): 4-9 (attachment only)
Weight (lb): 1,507 to 2,662 (attachment only)
Ground pressure (psi): Depends on the prime mover

*Depends on the model chosen

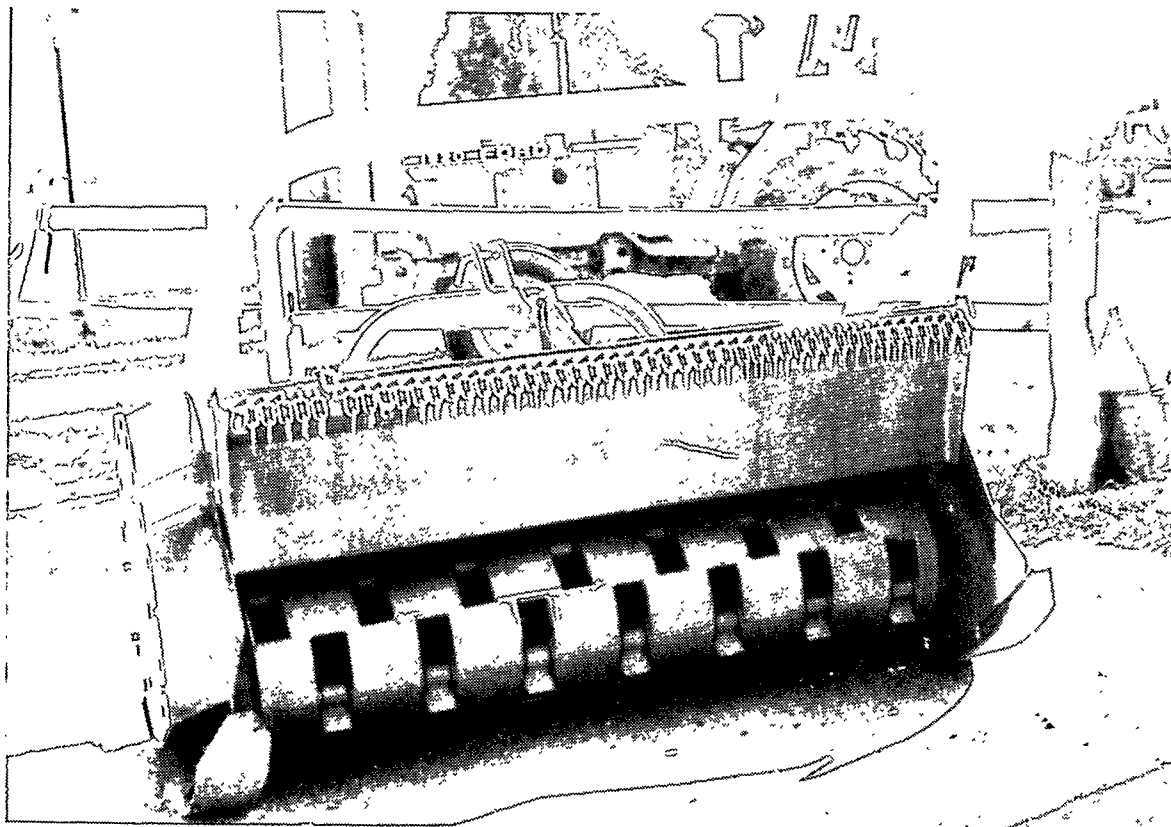


Figure 14. Carlson's Seppi Mini Forst.

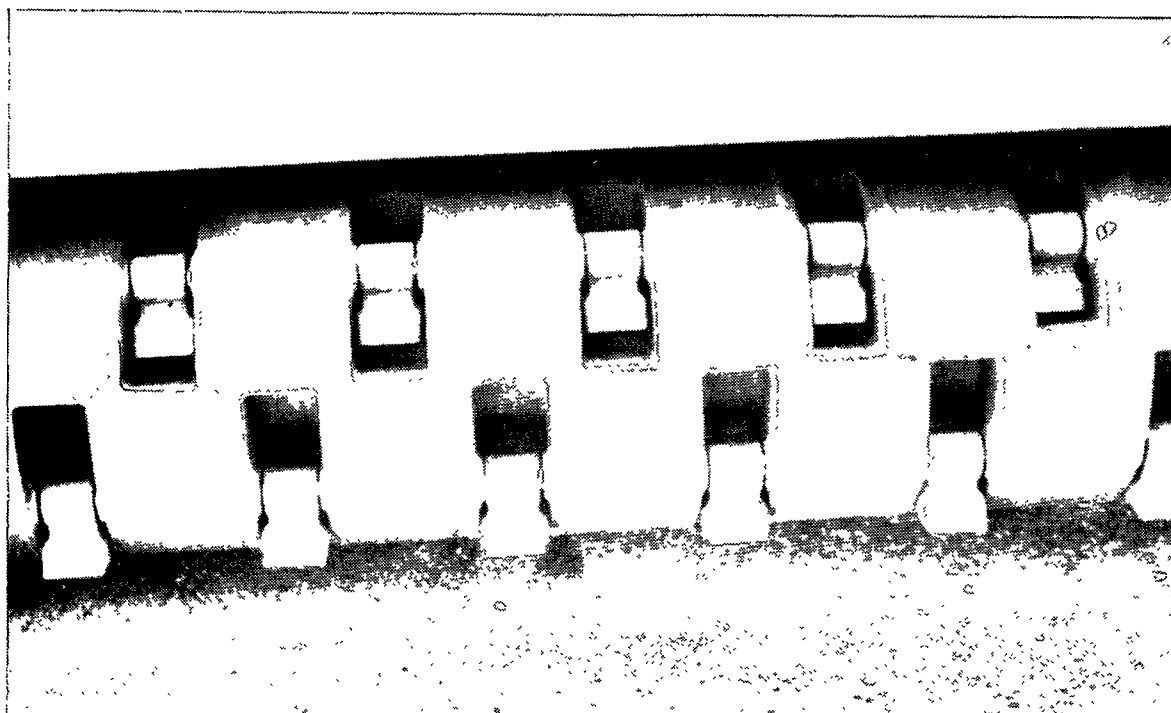


Figure 15. Carlson's Seppi Mini Forst cutter head.

Carlson Tractor & Equipment Co.

Equipment

Designation: Forst Models 125, 150, 175, 200, 225, 250
Status: Production
Cost: \$25,776—\$56,635

Manufacturer

Name: Carlson Tractor & Equipment Co—Seppi Division
Address: County Road 42 & Highway 3
Rosemount, MN 55068
Telephone: (612) 423-2222

Reduction-head Mechanism

Type: Horizontal
Cutters:* 20-40 free-swinging
Timing: 1.56
Width of cut (ft-in):* 4-1 to 8-3
Maximum material size (in): 8 (tree diameter)
Working material size (in): 3-4
Type of drive: PTO or Hydraulic (5000 psi at 40 gpm)
Rotational speed (rpm): 1,650

Prime Mover

Type: This is an attachment for mounting onto wheeled or tracked loader or bulldozer;
attaches to loader lift arms or dozer C-frame
Diesel engine net power (hp): N/A
Transmission: N/A

Machine Data

Width (ft-in):* 4-11 to 9-1 (attachment only)
Length (ft-in): 3-5 (attachment only)
Height (ft-in): 5-9 (attachment only)
Weight (lb):* 2,649 to 5,510 (attachment only)
Ground pressure (psi): Depends on prime mover

**Depends on the model chosen*

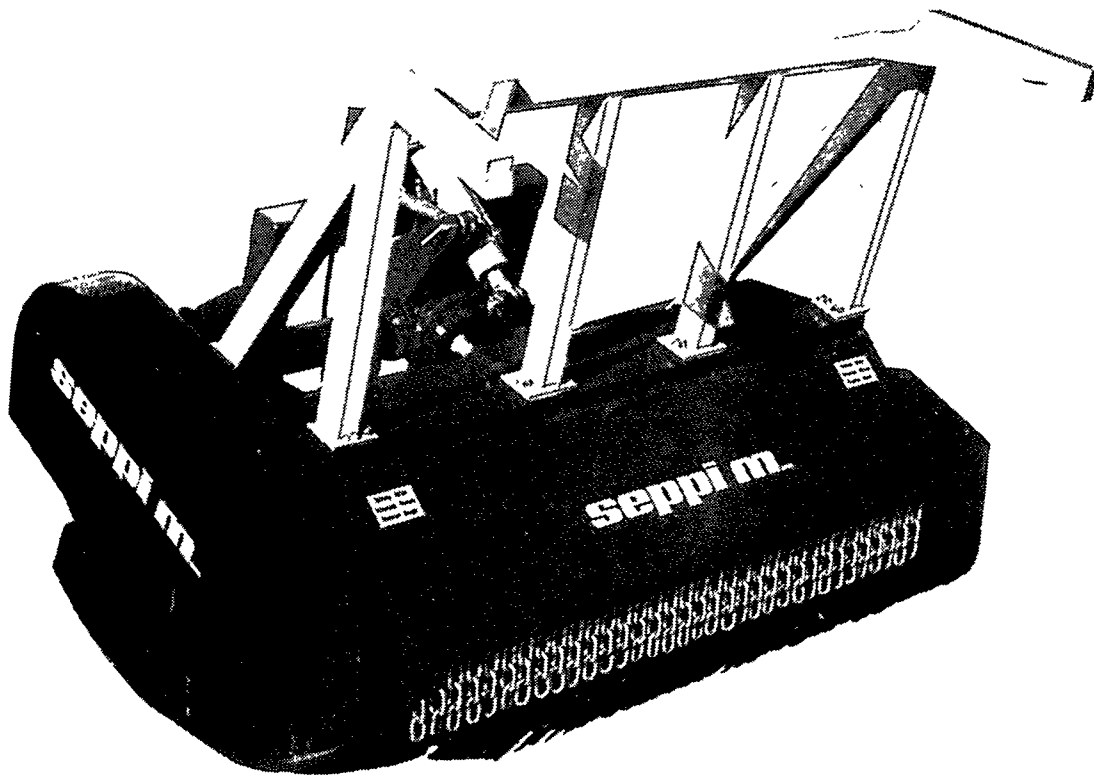


Figure 16. Carlson's Seppi Forst.

Carlson Tractor & Equipment Co.

Equipment

Designation: Forst-M Models 175, 200, 225, 250
Status: Production
Cost: \$67,826—\$95,226

Manufacturer

Name: Carlson Tractor & Equipment Co.—Seppi Division
Address: County Road 42 & Highway 3
Rosemount, MN 55068
Telephone: (612) 423-2222

Reduction-head Mechanism

Type: Horizontal
Cutters:* 28-40 free-swinging
Timing: 1.56
Width of cut (ft-in):* 5-9 to 8-3
Maximum material size (in): 12 (tree diameter)
Working material size (in): 3-4
Type of drive: self-contained, 6-cylinder diesel engine, 160 hp, belt driving cutter head
Rotational speed (rpm): 1,650

Prime Mover

Type: This is an attachment for mounting onto wheeled or tracked loader or bulldozer;
attaches to loader lift arms or dozer C-frame
Diesel engine net power (hp): N/A
Transmission: N/A

Machine Data

Width (ft-in):* 6-9 to 9-5 (attachment only)
Length (ft-in): 6-0 (attachment only)
Height (ft-in): 4-9 (attachment only)
Weight (lb):* 6,380 to 8,448 (attachment only)
Ground pressure (psi): Depends on prime mover

**Depends on the model chosen*

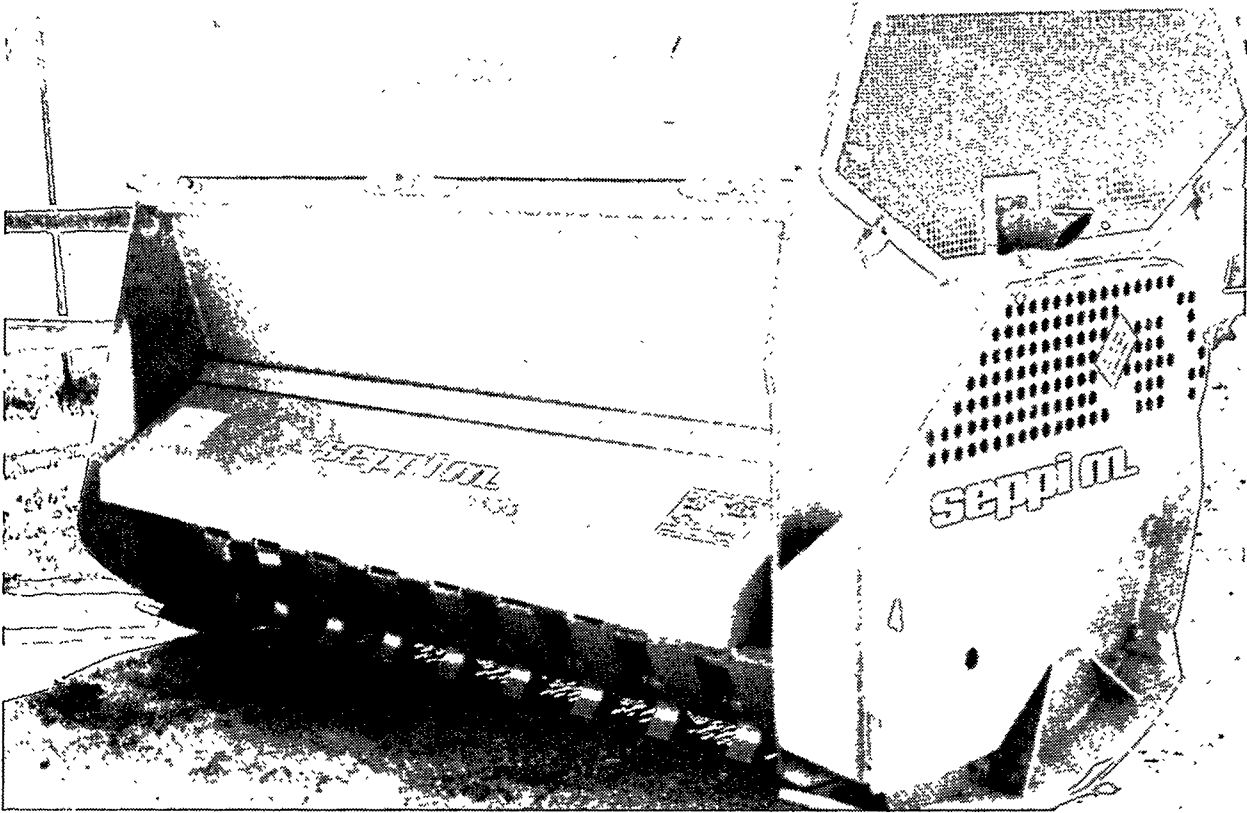


Figure 17. Carlson's Seppi Forst-M.

D & M Machine Division, Inc.

Equipment

Designation: Slashbuster Mini 360 Slashbuster Mini 360D
Status: Production Production
Cost: \$22,950 (price of head only) \$29,950 (price of head only)

Manufacturer

Name: D & M Machine Division, Inc.
Address: 8 Monte-Brady Road
Montesano, WA 98563
Telephone: (206) 249-3366

Reduction-head Mechanism

Type: Vertical Vertical
Cutters: Fixed replaceable teeth Fixed replaceable teeth
Width of cut (ft-in): 3-0 3-0
Maximum material size (in): 6 6
Working material size (in): 6 6
Type of drive: Hydraulic Hydraulic
Rotational speed (rpm): 600-800 600-800

Prime Mover

Type: This is an attachment for mounting on and This is an attachment for mounting on and
being carried by a 10,000-25,000 lb excavator. being carried by a 20,000-25,000 lb excavator.
Diesel engine net power (hp): N/A N/A
Transmission: N/A N/A

Machine Data

Width (ft-in): 3-8 (attachment only) 3-8 (attachment only)
Length (ft-in): 5-0 (attachment only) 7-0 (attachment only)
Height (ft-in): 3-0 (attachment only) 3-0 (attachment only)
Weight (lb): 900 (attachment only) 1300 (attachment only)
Ground pressure (psi): N/A N/A

D & M Machine Division, Inc.

Equipment

Designation: Slashbuster LW 360B
Status: Production
Cost: \$39,950 (price of head only)

Manufacturer

Name: D & M Machine Division, Inc.
Address: 8 Monte-Brady Road
Montesano, WA 98563
Telephone: (206) 249-3366

Reduction-head Mechanism

Type: Vertical
Cutters: Fixed replaceable teeth
Width of cut (ft-in): 3-4
Maximum material size (in): 14
Working material size (in): 14
Type of drive: Hydraulic
Rotational speed (rpm): 300-400

Prime Mover

Type: This is an attachment for mounting on and being
carried by a 25,000-40,000 lb excavator.
Diesel engine net power (hp): N/A
Transmission: N/A

Machine Data

Width (ft-in): 4-4 (attachment only)
Length (ft-in): 8-0 (attachment only)
Height (ft-in): 3-8 (attachment only)
Weight (lb): 1,800 (attachment only)
Ground pressure (psi): N/A

D & M Machine Division, Inc.

Equipment

Designation: Slashbuster LW 362
Status: Production
Cost: \$29,950 (price of head only)

Manufacturer

Name: D & M Machine Division, Inc.
Address: 8 Monte-Brady Road
Montesano, WA 98563
Telephone: (206) 249-3366

Reduction-head Mechanism

Type: Vertical
Cutters: Fixed replaceable
Width of cut (ft-in): 3-4
Maximum material size (in): 14
Working material size (in): 14
Type of drive: Hydraulic
Rotational speed (rpm): 300-400

Prime Mover

Type: This is an attachment for mounting on and being
carried by a 25,000-40,000 lb excavator.
Diesel engine net power (hp): N/A
Transmission: N/A

Machine Data

Width (ft-in): 4-4 (attachment only)
Length (ft-in): 5-0 (attachment only)
Height (ft-in): 3-8 (attachment only)
Weight (lb): 1300 (attachment only)
Ground pressure (psi): N/A

D & M Machine Division, Inc.

Equipment

Designation: Slashbuster Mini 480 Slashbuster HD 480
Status: Production Production
Cost: \$26,950 (price of head only) \$49,950 (price of head only)

Manufacturer

Name: D & M Machine Division, Inc.
Address: 8 Monte-Brady Road
Montesano, WA 98563
Telephone: (206) 249-3366

Reduction-head Mechanism

Type: Vertical Vertical
Cutters: Fixed replaceable teeth Fixed replaceable teeth
Width of cut (ft-in): 4-0 4-4
Maximum material size (in): 6 16
Working material size (in): 6 16
Type of drive: Hydraulic Hydraulic
Rotational speed (rpm): 600-800 300-400

Prime Mover

Type: This is an attachment for mounting on and being This is an attachment for mounting on and being
carried by a 14,000-25,000 lb excavator. carried by a 40,000-60,000 lb excavator.
Diesel engine net power (hp): N/A N/A
Transmission: N/A N/A

Machine Data

Width (ft-in): 5-0 (attachment only) 5-7 (attachment only)
Length (ft-in): 6-0 (attachment only) 14-0 (attachment only)
Height (ft-in): 3-0 (attachment only) 4-0 (attachment only)
Weight (lb): 1,050 (attachment only) 3,500 (attachment only)
Ground pressure (psi): N/A N/A

Forest Lease, Inc.

Equipment

Designation: Timberwolf 90
Status: Production
Cost: \$98,000

Manufacturer

Name: Forest Lease Inc.
Address: Box 38, RR No. 1 Acheson; 126 Acheson Road
Winterburn (Edmonton), Alberta, CANADA T0E 2N0
Telephone: (403) 962-8061; FAX (403) 962-8435

Reduction-head Mechanism

Type: Horizontal shaft
Cutters: 36 free-swinging
Timing: 1.55
Width of cut (ft-in): 8-0
Maximum material size (in): 16
Working material size (in): 12
Type of drive: Mechanical, belt-drive, 272 hp air-cooled diesel engine
Rotational speed (rpm): 1,200

Prime Mover

Type: This is an attachment for mounting onto wheeled or tracked loader or bulldozer;
attaches to loader lift arms or dozer C-frame
Diesel engine net power (hp): N/A
Transmission: N/A

Machine Data

Width (ft-in): 9-0 (attachment only)
Length (ft-in): 6-3 (attachment only)
Height (ft-in): 6-0 (attachment only)
Weight (lb): 11,500 (attachment only)
Ground pressure (psi): Depends on choice of prime mover

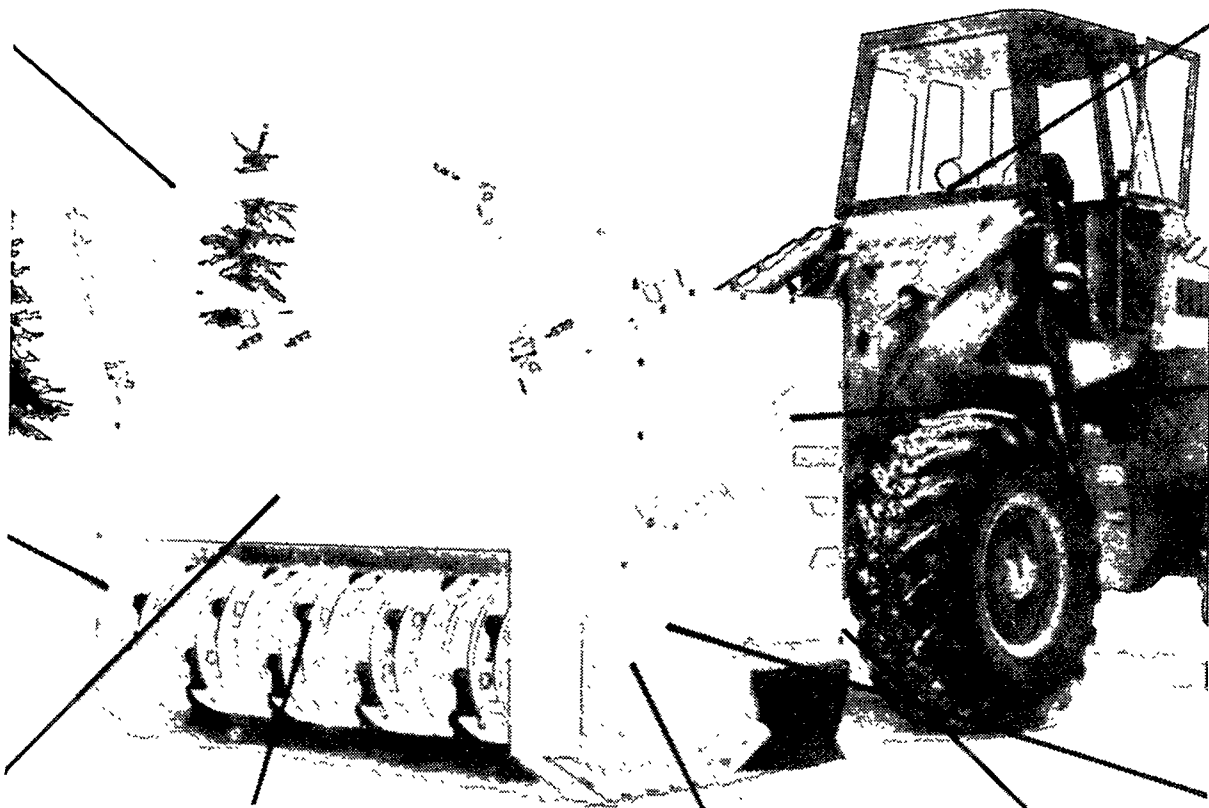


Figure 18. Forst Lease Timberwolf 90.

Kershaw Manufacturing Co., Inc.

Equipment

Designation:Klearway 10-8Klearway 10-10
Status:ProductionProduction
Cost:\$129,000\$129,000

Manufacturer

Name:Kershaw Manufacturing Co., Inc.
Address:P.O. Drawer 17340
Montgomery, AL 36117-0340
Telephone:(205) 271-1000

Reduction-head Mechanism

Type:2 vertical shafts2 vertical shafts
Cutters:4 free-swinging4 free-swinging
2 on each of 2 discs 2 on each of 2 discs
Timing:1.291.21
Width of cut (ft-in):7-89-9
Maximum material size (in):88
Working material size (in):3-53-5
Type of drive:HydraulicHydraulic
Rotational speed (rpm):2,0002,000

Prime Mover

Type:Wheeled, integral, self-propelled,Wheeled, integral, self-propelled,
special design special design
Diesel engine net power (hp):210210
Transmission:HydrostaticHydrostatic

Machine Data

Width (ft-in):7-910-0
Length (ft-in):23-624-2
Height (ft-in):8-109-1
Weight (lb):21,01024,000
Ground pressure (psi):9.106.5



Figure 19. Kershaw Klearway 10-10.

Kershaw Manufacturing Co., Inc.

Equipment

Designation:Klearway 800
Status:Production
Cost:\$88,000

Manufacturer

Name:Kershaw Manufacturing Co., Inc.
Address:P.O. Drawer 17340
Montgomery, AL 36117-0340
Telephone:(205) 271-1000

Reduction-head Mechanism

Type:2 vertical shafts
Cutters:4 free-swinging (2 on each 2 discs)
Timing:1.23
Width of cut (ft-in):7.8
Maximum material size (in):4 (diameter)
Working material size (in):Up to 4
Type of drive:Hydraulic
Rotational speed (rpm):2,000

Prime Mover

Type:Wheeled, integral, self-propelled, special design
Diesel engine net power (hp):153
Transmission:2 speed transfer case combined with hydrostatic

Machine Data

Width (ft-in):7-9
Length (ft-in):22-7
Height (ft-in):8-7
Weight (lb):16,000
Ground pressure (psi):4.6



Figure 20. Kershaw Klearway 800.

Pettibone Michigan Corp.

Equipment

Designation: Hydro Mower PM-800
Status: Special order
Cost: \$143,000

Manufacturer

Name: Pettibone Michigan Corp.
Address: P.O. Box 368
Baraga, MI 49908
Telephone: (906) 353-6611

Reduction-head Mechanism

Type: Vertical shaft
Cutters: 4 free-swinging
Timing: 1.38
Width of cut (ft-in): 8-0
Maximum material size (in): 6
Working material size (in): 4
Type of drive: Hydrostatic
Rotational speed (rpm): 1,000 (variable)

Prime Mover

Type: Wheeled, integral, self-propelled, special design
Diesel engine net power (hp): 180
Transmission: Hydrostatic with 4 speed gear box

Machine Data

Width (ft-in): 9-0
Length (ft-in): 25-8
Height (ft-in): 9-8
Weight (lb): 25,500
Ground pressure (psi): 10.5 (front); 9.6 (rear) at no penetration
with 23.1 x 26 tires

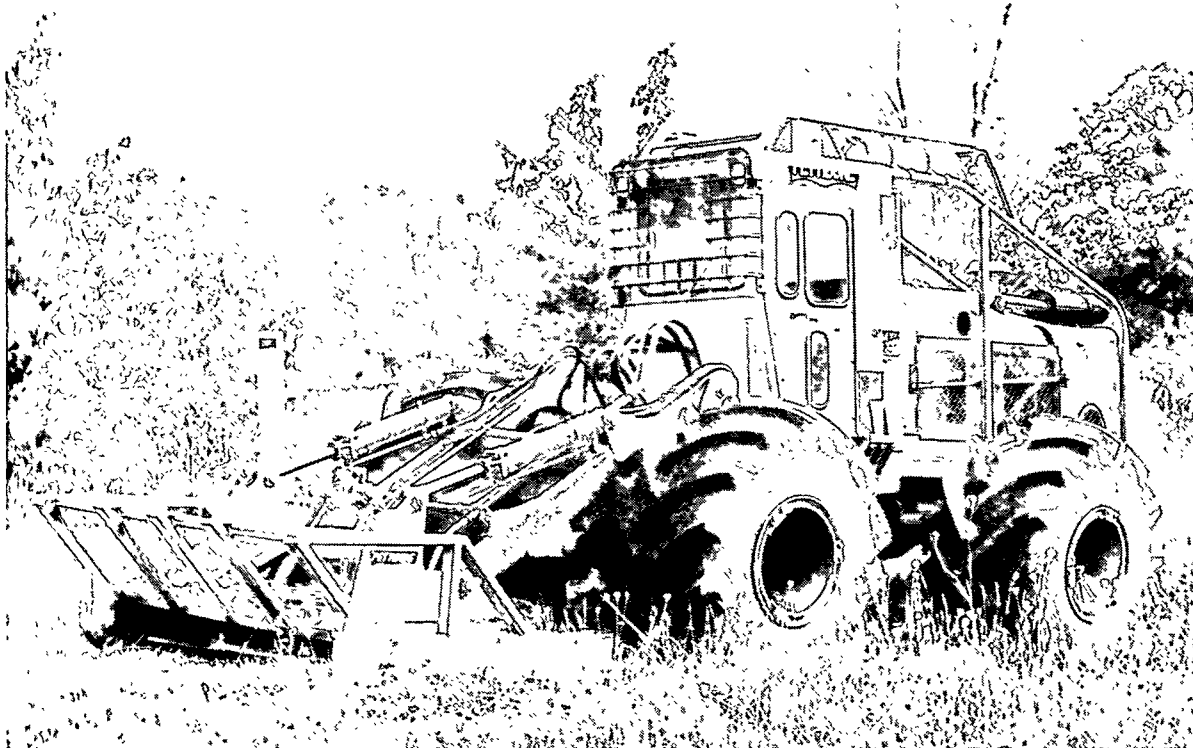


Figure 21. Pettibone Hydro Mower PM-800.

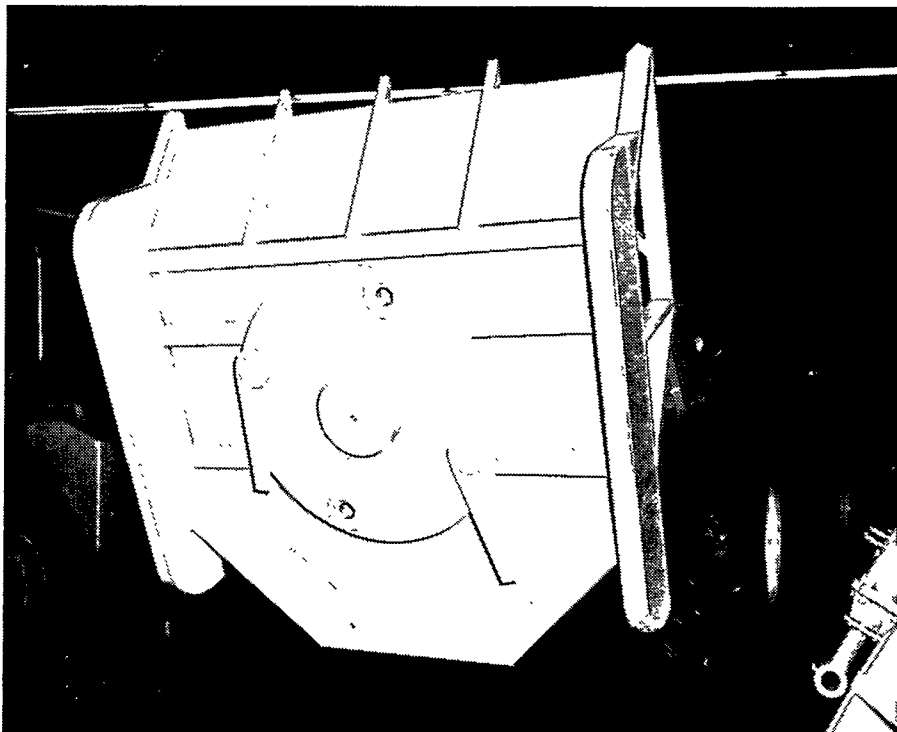


Figure 22. Pettibone Hydro Mower cutter head. Timing 1.38

Rotoclear Manufacturing, Ltd.

Equipment

Designation:A2 Forester Machine
Status:Special order
Cost:\$325,000

Manufacturer

Name:Rotoclear Mfg. Ltd.
Address:Bay No. 4, 4451 58th Avenue, S.E.
Calgary, Alberta, CANADA T2C 1Y3
Telephone:(403) 279-7759

Reduction-head Mechanism

Type:Horizontal shaft
Cutters:44 fixed teeth wedge into packets welded on rotor
Timing:N/A
Width of cut (ft-in):10-0 (cuts 3 feet on each end leaving a protective area in the center)
Maximum material size (in):Unlimited (if cut to 5 in above ground)
Working material size (in):5 (standing)
Type of drive:Hydrostatic, self-contained 480-hp diesel engine
Rotational speed (rpm):380

Prime Mover

Type:Pulled by a D-7 or larger size crawler tractor or large wheeled tractor
Diesel engine net power (hp):N/A
Transmission:N/A

Machine Data

Width (ft-in):13-6
Length (ft-in):32
Height (ft-in):9-0
Weight (lb):33,000
Ground pressure (psi):unknown



Figure 23. Rotoclear A2 Forester.

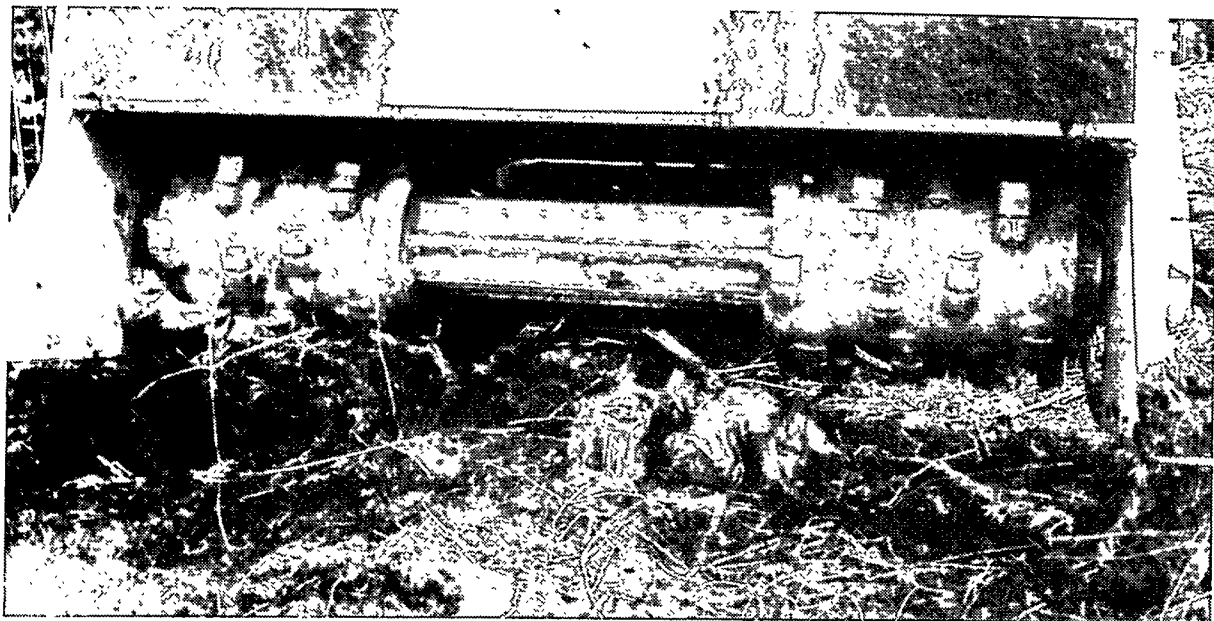


Figure 24. Rotoclear A2 Forester shredder head.

Rotoclear Manufacturing, Ltd.

Equipment

Designation: Rotoclear Machine
Status: Production
Cost: \$155,000

Manufacturer

Name: Rotoclear Mfg., Ltd.
Address: Bay No. 4, 4451 58th Avenue, S.E.
Calgary, Alberta, Canada T2C 1Y3
Telephone: (403) 279-7759

Reduction-head Mechanism

Type: Horizontal shaft
Cutters: 56 fixed teeth wedged into packets welded on rotor
Width of cut (ft-in): 7-6
Maximum material size (in): Unlimited (if cut to 5-in above ground)
Working material size (in): 5 (standing)
Type of drive: Torque converter; self-contained 460 hp diesel engine
Rotational speed (rpm): 360

Prime Mover

Type: Pulled by D-6 size crawler tractor or large wheel tractor
Diesel engine net power (hp): N/A
Transmission: N/A

Machine Data

Width (ft-in): 9-8
Length (ft-in): 22-6
Height (ft-in): 9
Weight (lb): 22,000
Ground pressure (psi): 2.5 at 6-in penetration (when working)



Figure 25. Rotoclear Machine.

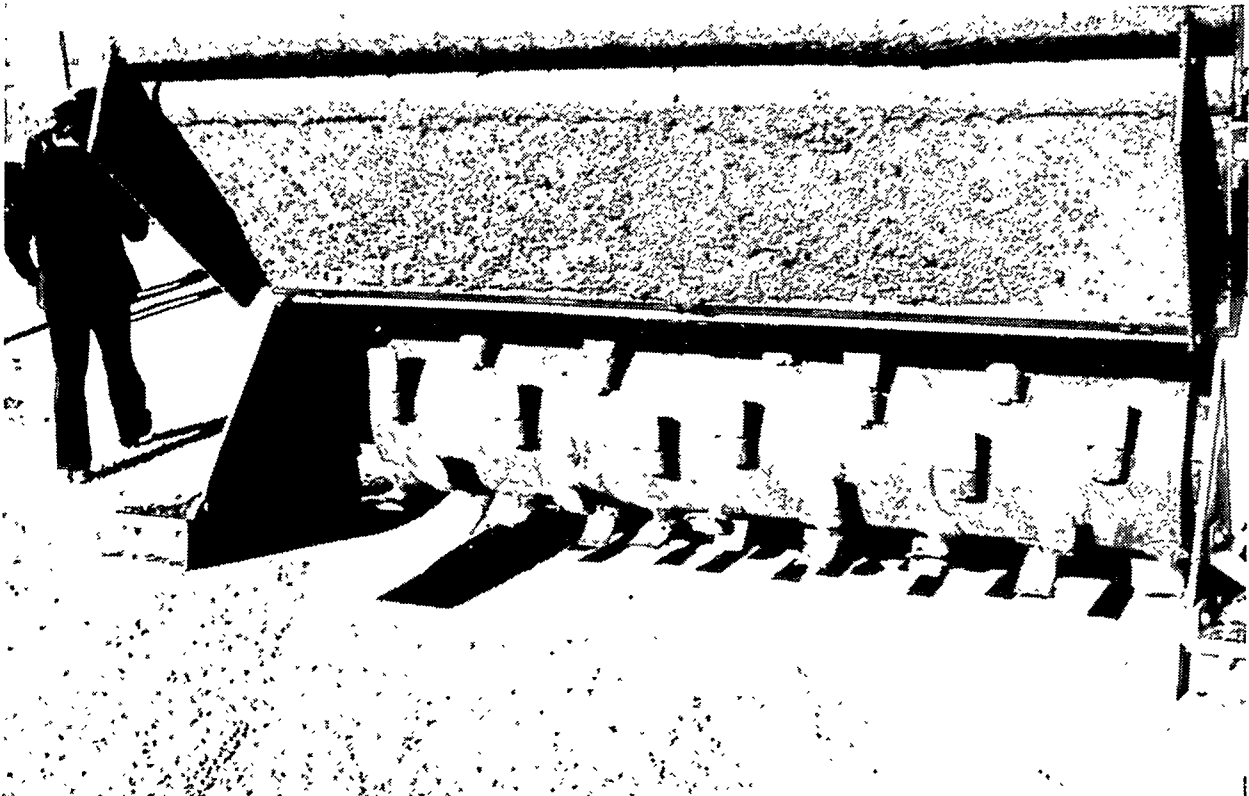


Figure 26. Rotoclear Machine cutter head.

Rousseau Inc.

Equipment

Designation: FO 80
Status: Production
Cost: \$14,150

Manufacturer

Name: Rousseau, Inc.
Address: 2717 W. 5th Street N., Unit B
Summerville, SC 29483
Telephone: (803) 875-1850; FAX (803) 875-1848

Reduction-head Mechanism

Type: Horizontal shaft
Cutters: 38 free-swinging
Timing: 1.60
Width of cut (ft-in): 5-11
Maximum material size (in): 6
Working material size (in): 3
Type of drive: 540 or 1000 pto from tractor
Rotational speed (rpm): 1,710 (at 540 pto);
2,110 (at 1,000 pto)

Prime Mover

Type: This is an attachment for mounting onto 70-90 hp
wheeled tractor with a category II or III three point hitch and equipped with a creeper gear.
Diesel engine net power (hp): N/A
Transmission: N/A

Machine Data

Width (ft-in): 6-3
Length (ft-in): 5-6
Height (ft-in): 5-10
Weight (lb): 2,425
Ground pressure (psi): N/A



Figure 27. Rousseau FO 80.

Rousseau, Inc.

Equipment

Designation:FO 120
Status:Production
Cost:\$18,210

Manufacturer

Name:Rousseau, Inc.
Address:2717 W. 5th Street N., Unit B
Summerville, SC 29483
Telephone:(803) 875-1850; FAX (803) 875-1848

Reduction-head Mechanism

Type:Horizontal shaft
Cutters:28 free-swinging
Timing:1.60
Width of cut (ft-in):5-11
Maximum material size (in):9
Working material size (in):4
Type of drive:1,000 pto from tractor
Rotational speed (rpm):2,110 (at 1,000 pto)

Prime Mover

Type:This is an attachment for mounting onto 90-130 wheeled tractor
with a category II or III three point hitch and equipped with a creeper gear.
Diesel engine net power (hp):N/A
Transmission:N/A

Machine Data

Width (ft-in):6-3
Length (ft-in):6-0
Height (ft-in):6-8
Weight (lb):2,866
Ground pressure (psi):N/A

Rousseau Inc.

Equipment

Designation:FO 220
Status:Production
Cost:\$40,400

Manufacturer

Name:Rousseau, Inc.
Address:2717 W. 5th Street N., Unit B
Summerville, SC 29483
Telephone:(803) 875-1850; FAX (803) 875-1848

Reduction-head Mechanism

Type:Horizontal shaft
Cutters:38 free-swinging
Timing:1.60
Width of cut (ft-in):6-11
Maximum material size (in):10
Working material size (in):4
Type of drive:1,000 pto from tractor
Rotational speed (rpm):2,110 (at 1,000 pto)

Prime Mover

Type:This is an attachment for mounting onto 130 hp or larger wheeled tractor with
a category II or III three point hitch and equipped with a creeper gear.
Diesel engine net power (hp):N/A
Transmission:N/A

Machine Data

Width (ft-in):8-2
Length (ft-in):6-0
Height (ft-in):6-8
Weight (lb):4,409
Ground pressure (psi):N/A

Royer Industries, Inc.

Equipment

Designation: Royer Woodsman 6003-DH
Status: Production
Cost: \$47,000

Manufacturer

Name: Royer Industries, Inc.
Address: P.O. Box 1232, 158 Pringle Street
Kingston, PA 18704
Telephone: (717) 287-9624; FAX (717) 283-0578

Reduction-head Mechanism

Type: Horizontal shaft
Cutters: 38 free-swinging
Timing: 1.64
Width of cut (ft-in): 5-0
Maximum material size (in): 12
Working material size (in): 6
Type of drive: Hydrostatic self-contained 117 hp engine
Rotational speed (rpm): 1,800

Prime Mover

Type: This is an attachment for mounting onto wheeled
or tracked loader or bulldozer; attaches to loader lift arms or dozer C-frame
Diesel engine net power (hp): N/A
Transmission: N/A

Machine Data

Width (ft-in): 6-6
Length (ft-in): 6-0
Height (ft-in): 6-2
Weight (lb): 6,000
Ground pressure (psi): N/A

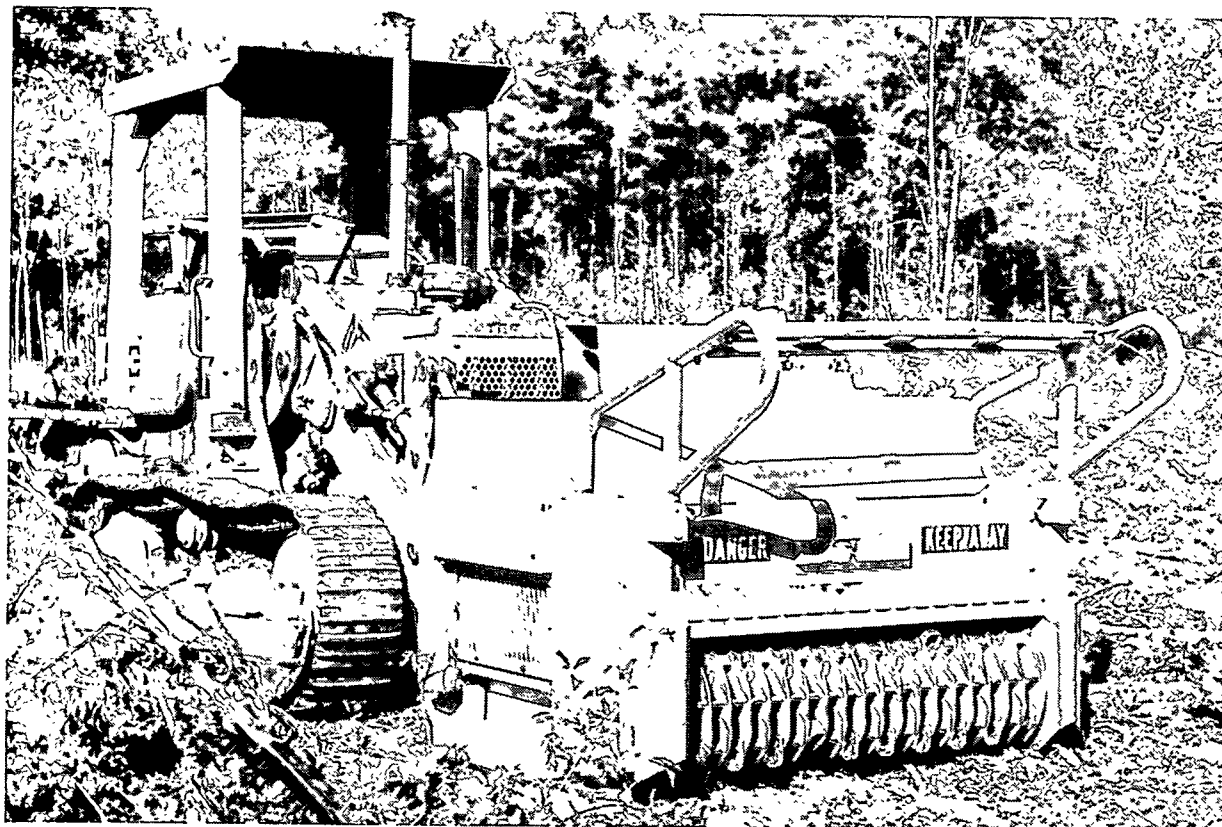


Figure 28. Royer Woodsman 6003-DH.

Royer Industries, Inc.

Equipment

Designation: Royer Woodsman 6003-P
Status: Production
Cost: \$12,500

Manufacturer

Name: Royer Industries, Inc.
Address: P.O. Box 1232, 158 Pringle Street
Kingston, PA 18704
Telephone: (717) 287-9624; FAX (717) 283-0578

Reduction-head Mechanism

Type: Horizontal shaft
Cutters: 38 free-swinging
Timing: 1.64
Width of cut (ft-in): 5-0
Maximum material size (in): 12
Working material size (in): 6
Type of drive: Pto from farm tractor
Rotational speed (rpm): 1,800

Prime Mover

Type: This is an attachment for mounting onto 80-100 hp wheel
tractor with a category II three point hitch
Diesel engine net power (hp): 80-100
Transmission: N/A

Machine Data

Width (ft-in): 6-4
Length (ft-in): 3-6
Height (ft-in): 3-6
Weight (lb): 2,550
Ground pressure (psi): N/A

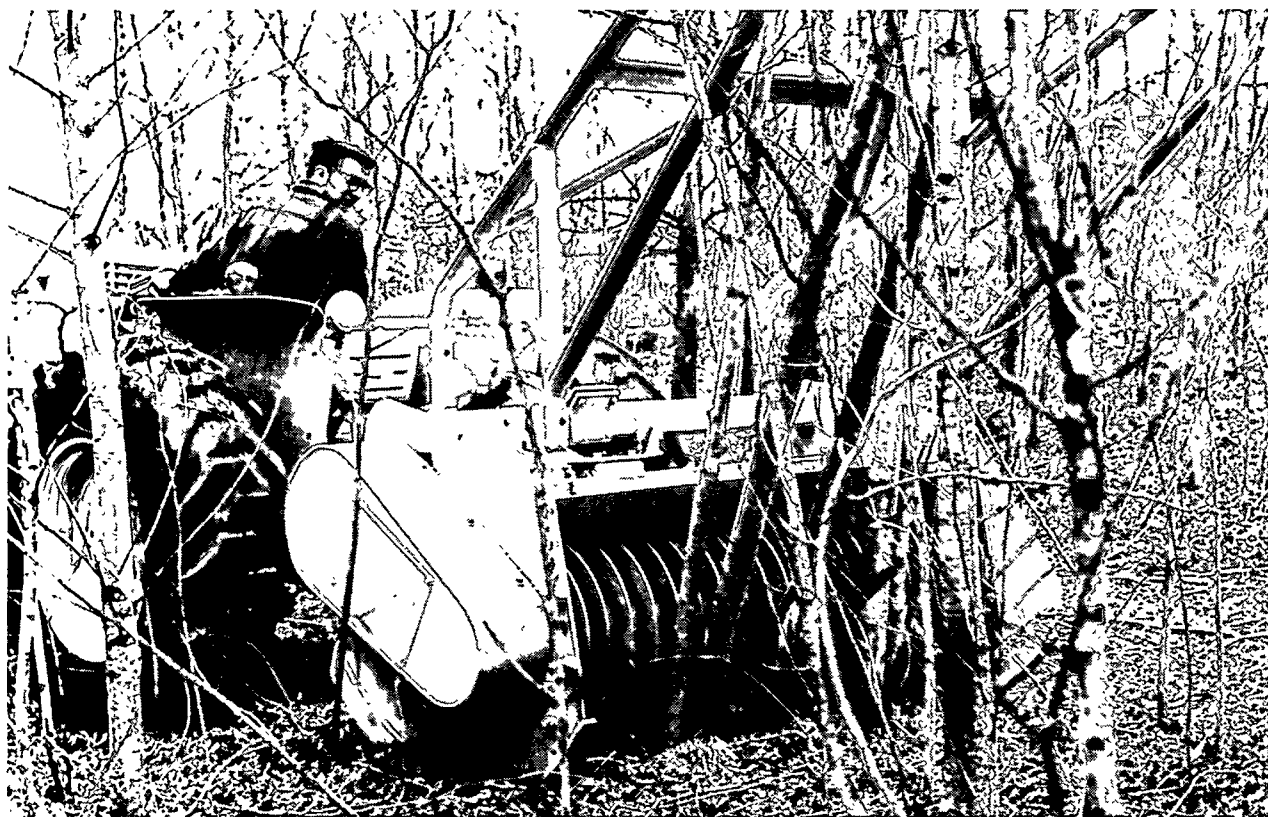


Figure 29. Royer Woodsman 6003-P.

Royer Industries, Inc.

Equipment

Designation: Royer Woodsman 6003-PH
Status: Production
Cost: Furnished upon request

Manufacturer

Name: Royer Industries, Inc.
Address: P.O. Box 1232, 158 Pringle Street
Kingston, PA 18704
Telephone: (717) 287-9624; FAX (717) 283-0578

Reduction-head Mechanism

Type: Horizontal shaft
Cutters: 38 free-swinging
Timing: 1.64
Width of cut (ft-in): 5-0
Maximum material size (in): 12
Working material size (in): 6
Type of drive: Hydrostatic
Rotational speed (rpm): 1,800

Prime Mover

Type: This is an attachment for a prime mover with a hydrostatic
pto, such as the Brown Bear Cub and the Case 475 cable layer.
Diesel engine net power (hp): 70 or above
Transmission: Hydraulic

Machine Data

Width (ft-in): 6-4
Length (ft-in): 3-6
Height (ft-in): 3-6
Weight (lb): 2,550
Ground pressure (psi): N/A



Figure 30. Røyer 6003-PH carried by a Brown Bear Club.

Royer Industries, Inc.

Equipment

Designation:Royer Woodsman 6003-U(for Mercedes-Benz Unimog)

Status:Production

Cost:Contact Royer dealer

Manufacturer

Name:Royer Industries, Inc.

Address:P.O. Box 1232, 158 Pringle Street
Kingston, PA 18704

Telephone:(717) 287-9624; FAX (717) 283-0578

Reduction-head Mechanism

Type:Horizontal shaft

Cutters:38 free-swinging

Timing:1.64

Width of cut (ft-in):5-0

Maximum material size (in):12

Working material size (in):6

Type of drive:PTO from prime mover to belts

Rotational speed (rpm):1,800

Prime Mover

Type:Mercedes-Benz Unimog

Diesel engine net power (hp):94

Transmission:Manual

Machine Data

Width (ft-in):6-7

Length (ft-in):17-0

Height (ft-in):7-7

Weight (lb):12,800

Ground pressure (psi):Not available

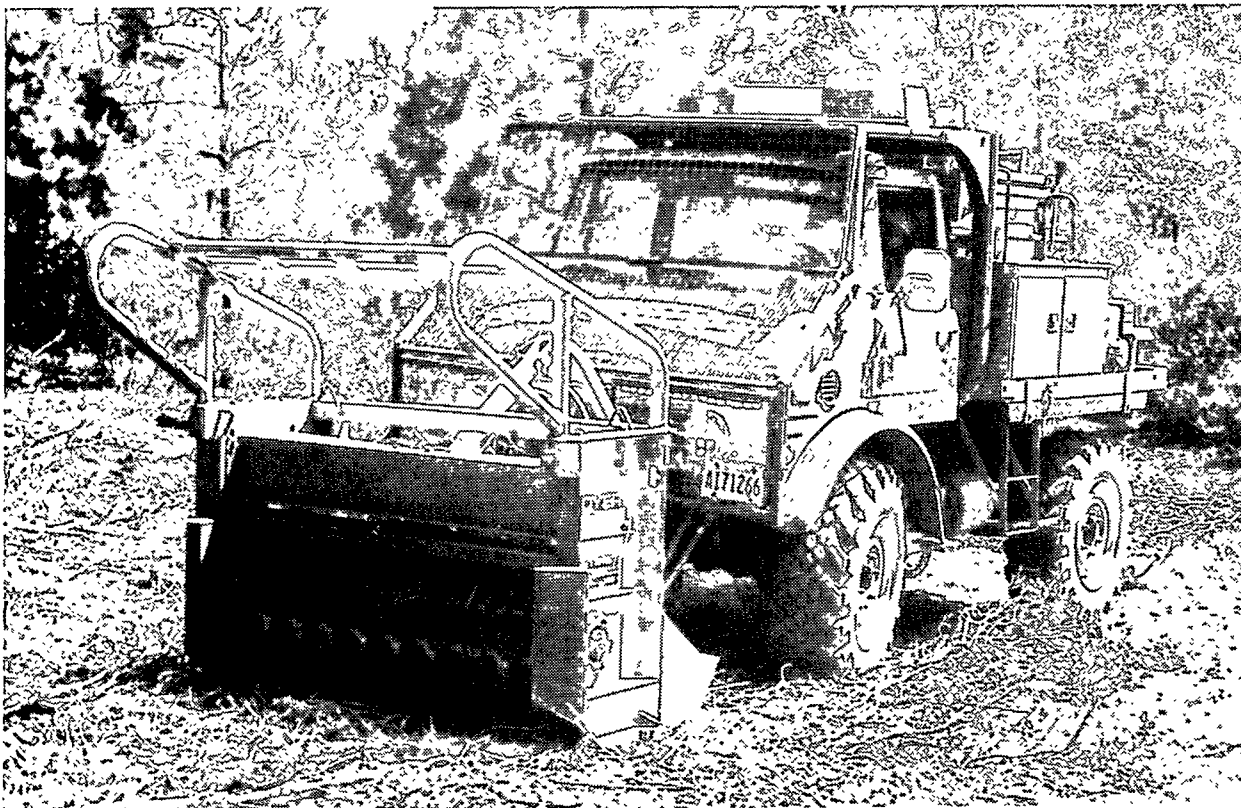


Figure 31. Royer Woodsman 6003-U for Mercedes-Benz Unimog.



Figure 32. Royer Woodsman 6003-U shredder head.

Royer Industries, Inc.

Equipment

Designation: Royer Woodsman 9000W
Status: Production
Cost: \$250,000

Manufacturer

Name: Royer Industries, Inc.
Address: P.O. Box 1232, 158 Pringle Street
Kingston, PA 18704
Telephone: (717) 287-9624; FAX (717) 283-0578

Reduction-head Mechanism

Type: Horizontal shaft
Cutters: 66 free-swinging
Timing: 2.16
Width of cut (ft-in): 7-2
Maximum material size (in): 12
Working material size (in): 6
Type of drive: Hydrostatic
Rotational speed (rpm): 1,800

Prime Mover

Type: Wheeled, modified Caterpillar power module
Diesel engine net power (hp): 400
Transmission: Hydrostatic

Machine Data

Width (ft-in): 8-6
Length (ft-in): 26-7
Height (ft-in): 11-3
Weight (lb): 36,000
Ground pressure (psi): 12.26 (rear)



Figure 33. Royer Woodsman 9000-W.

Shur Shar Manufacturing, Co.

Equipment

Designation: Shar 20
Status: Production
Cost: \$174,800

Manufacturer

Name: Shur Shar Mfg., Co.
Address: 3241 S. Parkway Drive, P.O. Box 2587
Fresno, CA 93745
Telephone: (209) 268-7487

Reduction-head Mechanism

Type: Vertical shaft
Cutters: Fixed (72" diameter head)
Width of cut (ft-in): 14-6
Maximum material size (in): No limit
Working material size (in): 14
Type of drive: Hydrostatic
Rotational speed (rpm): 400

Prime Mover

Type: Articulated, four track, integral, self-propelled, special design
Diesel engine net power (hp): 128
Transmission: Mechanical four speed with variable hydraulic drive

Machine Data

Width (ft-in): 7-9
Length (ft-in): 18-5
Height (ft-in): 9-6
Weight (lb): 18,500
Ground pressure (psi): 3.75

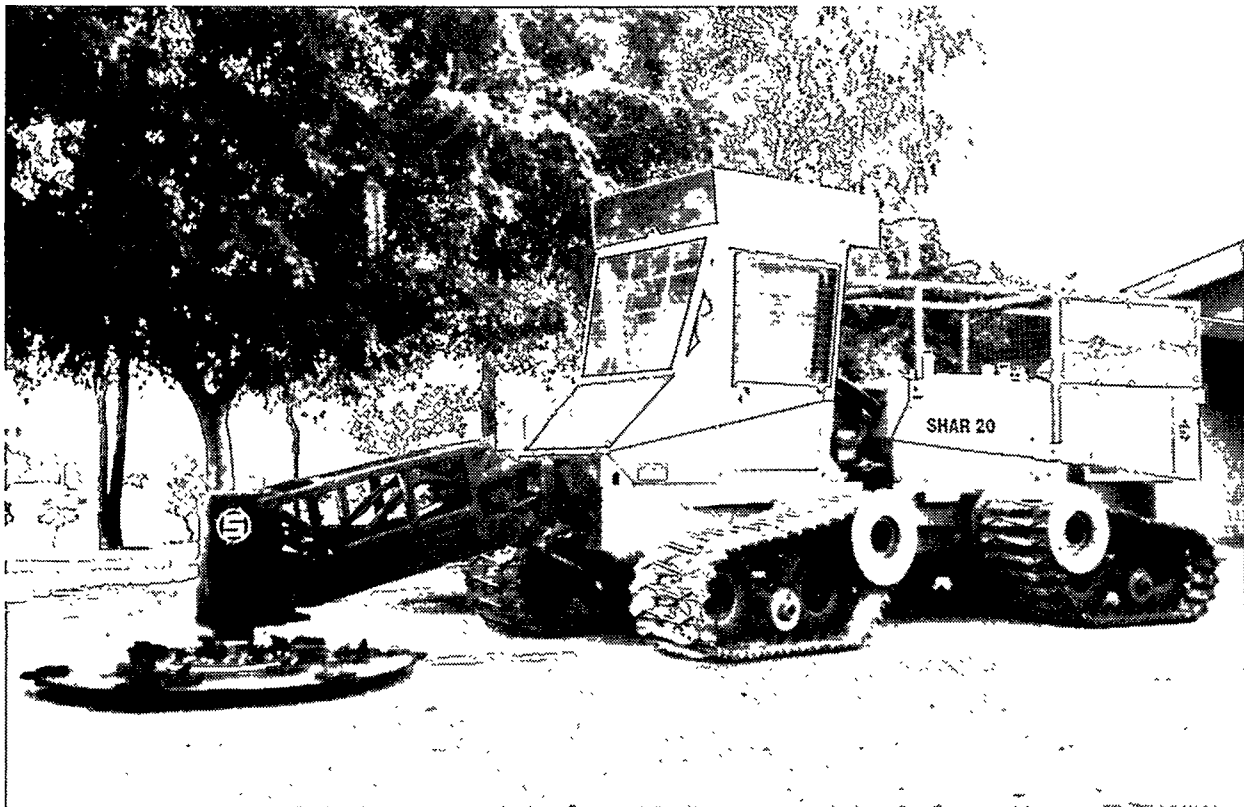


Figure 34. Shur Shar 20.

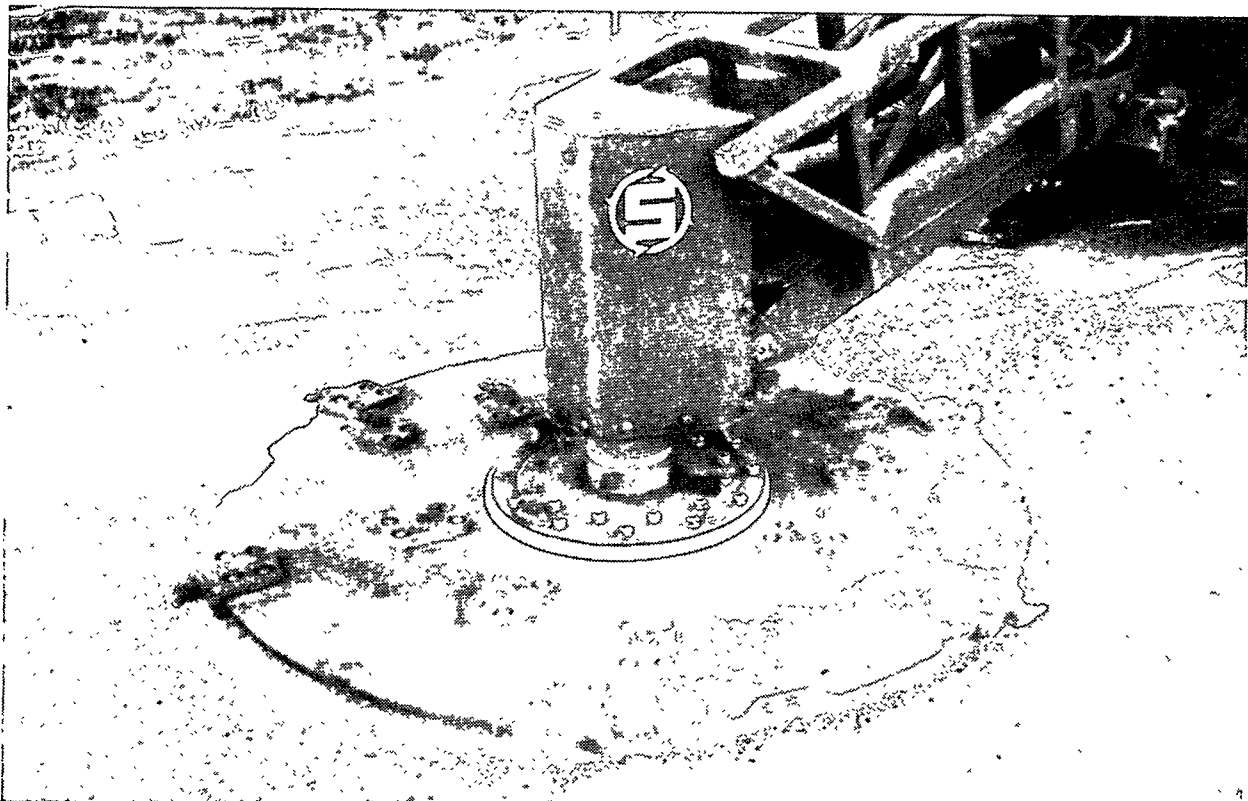


Figure 35. Shur Shar 20 cutter head.

Weldco-Beales

Equipment

Designation: Weldco-Beales ERC 36
Status: Production
Cost: \$8,670 (price of head only)

Manufacturer

Name: Weldco-Beales
Address: 2328 Roosevelt Avenue, P.O. Box 8,
Enumclaw, WA 98022
Telephone: (206) 825-3581

Reduction-head Mechanism

Type: Vertical single spindle
Cutters: Fixed teeth on edge & bottom of cutting disc
Width of cut (ft-in): Arm mounted, depends on swing radius of machine
Maximum material size (in): 8
Working material size (in): 2- 4
Type of drive: Hydraulic
Rotational speed (rpm): 1,600-1,800

Prime Mover

Type: This attachment is for mounting on and being carried
by a 1/3 to 3/4 yard backhoe
Diesel engine net power (hp): 30
Transmission: N/A

Machine Data

Width (ft-in): 3-0 (attachment only)
Length (ft-in): 3-0 (attachment only)
Height (ft-in): 3-0 (attachment only)
Weight (lb): 990 (attachment only)
Ground pressure (psi): N/A

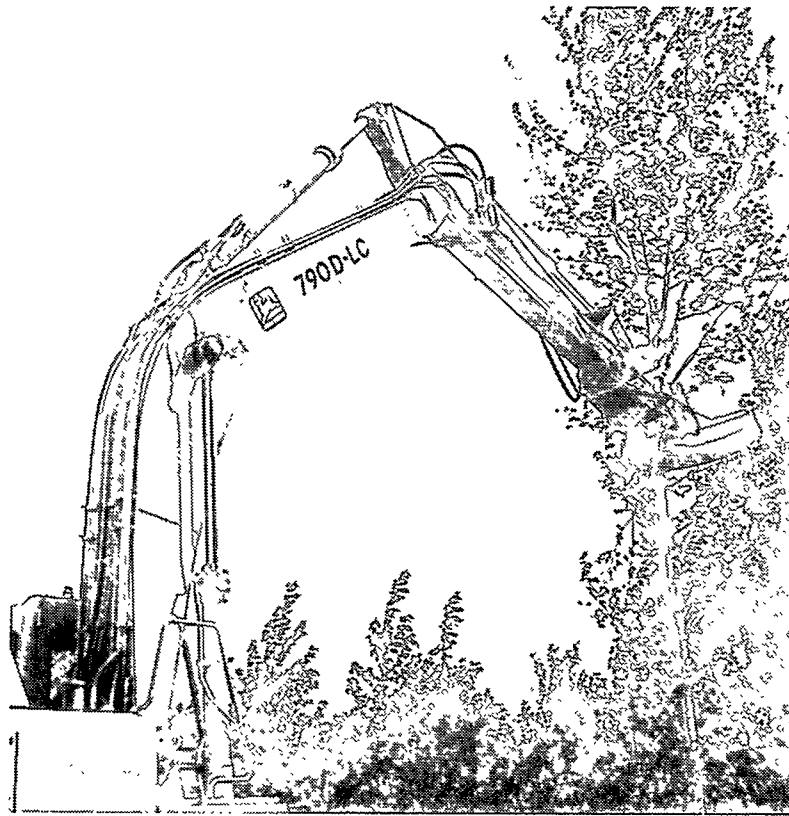


Figure 36. Weldco-Beales ERC 36.

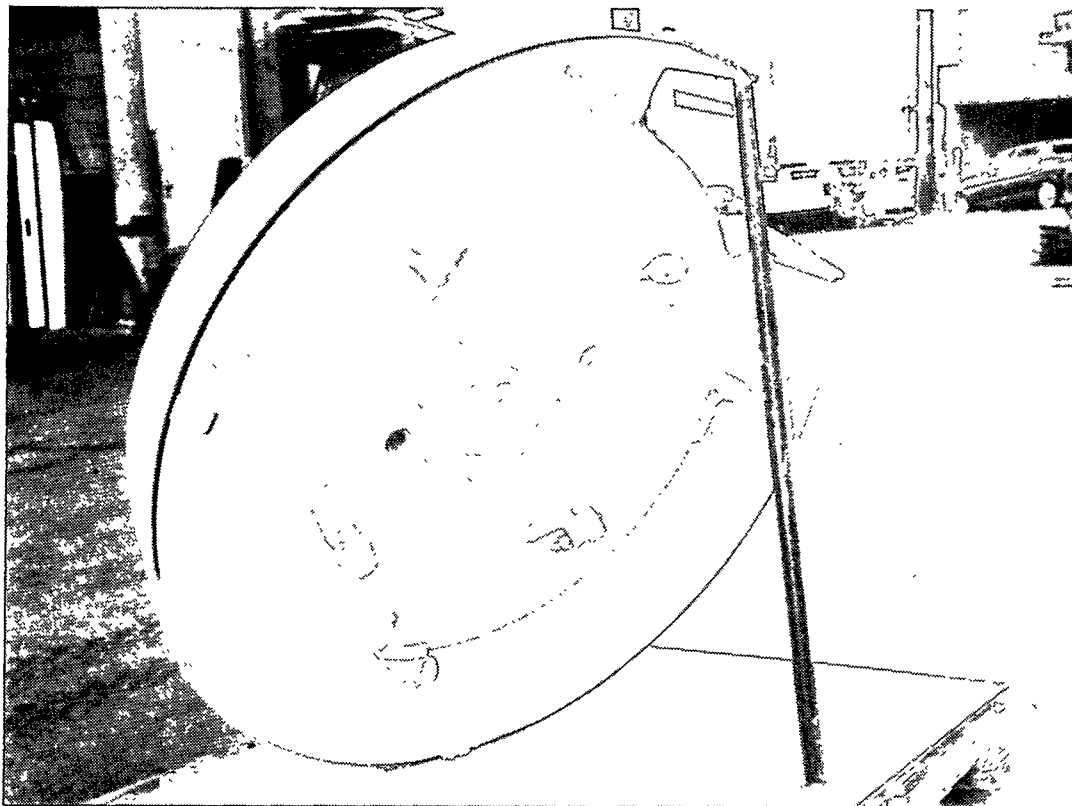


Figure 37. Weldco-Beales ERC 36 cutter head with fixed teeth.

Weldco-Beales

Equipment

Designation: Weldco-Beales ERC 48
Status: Production
Cost: \$11,980 (price of head only)

Manufacturer

Name: Weldco-Beales
Address: 2328 Roosevelt Avenue, P.O. Box 8,
Enumclaw, WA 98022
Telephone: (206) 825-3581

Reduction-head Mechanism

Type: Vertical single spindle
Cutters: Fixed teeth on edge & bottom of cutting disc
Width of cut (ft-in): Arm mounted, depends on swing radius of machine
Maximum material size (in): 10
Working material size (in): 2 -6
Type of drive: Hydraulic
Rotational speed (rpm): 1,400-1,600

Prime Mover

Type: This attachment is for mounting on and being carried
by a 3/4 to 1-1/2 yard excavator
Diesel engine net power (hp): N/A
Transmission: N/A

Machine Data

Width (ft-in): 4-0 (attachment only)
Length (ft-in): 4-0 (attachment only)
Height (ft-in): 3-0 (attachment only)
Weight (lb): 1,290
Ground pressure (psi): N/A

Weldco-Beales

Equipment

Designation: Weldco-Beales ERC 60
Status: Production
Cost: \$13,550 (price of head only)

Manufacturer

Name: Weldco-Beales
Address: 2328 Roosevelt Avenue, P.O. Box 8,
Enumclaw, WA 98022
Telephone: (206) 825-3581

Reduction-head Mechanism

Type: Vertical single spindle
Cutters: Fixed teeth on edge & bottom of cutting disc
Width of cut (ft-in): Arm mounted, depends on swing radius of machine
Maximum material size (in): 12
Working material size (in): 2 -6
Type of drive: Hydraulic
Rotational speed (rpm): 1,200-1,400

Prime Mover

Type: This attachment is for mounting on and being carried
by a 1 to 2 yard excavator
Diesel engine net power (hp): 100-160
Transmission: N/A

Machine Data

Width (ft-in): 5-0 (attachment only)
Length (ft-in): 5-0 (attachment only)
Height (ft-in): 3-0 (attachment only)
Weight (lb): 1,990 (attachment only)
Ground pressure (psi): N/A

Weldco-Beales

Equipment

Designation: Weldco-Beales ERF 36
Status: Production
Cost: \$8,670 (price of head only)

Manufacturer

Name: Weldco-Beales
Address: 2328 Roosevelt Avenue, P.O. Box 8,
Enumclaw, WA 98022
Telephone: (206) 825-3581

Reduction-head Mechanism

Type: Vertical single spindle
Cutters: 3 free-swinging
Timing: 1.29
Width of cut (ft-in): Arm mounted, depends on swing radius of machine
Maximum material size (in): 2
Working material size (in): 1
Type of drive: Hydraulic
Rotational speed (rpm): 1,600-1,800

Prime Mover

Type: This attachment is for mounting on and being carried
by a 1/3 to 3/4 yard backhoe
Diesel engine net power (hp): 30
Transmission: N/A

Machine Data

Width (ft-in): 3-0 (attachment only)
Length (ft-in): 3-0 (attachment only)
Height (ft-in): 3-0 (attachment only)
Weight (lb): 620 (attachment only)
Ground pressure (psi): N/A



Figure 38. Weldco-Beales ERF 36 cutter head with free-swinging cutters.

Weldco-Beales

Equipment

Designation: Weldco-Beales ERF 48
Status: Production
Cost: \$11,980 (price of head only)

Manufacturer

Name: Weldco-Beales
Address: 2328 Roosevelt Avenue, P.O. Box 8,
Enumclaw, WA 98022
Telephone: (206) 825-3581

Reduction-head Mechanism

Type: Vertical single spindle
Cutters: 3 free-swinging
Timing: 1.21
Width of cut (ft-in): Arm mounted, depends on swing radius of machine
Maximum material size (in): 3
Working material size (in): 1
Type of drive: Hydraulic
Rotational speed (rpm): 1,400-1,600

Prime Mover

Type: This attachment is for mounting on and being carried
by a 3/4 to 1-1/2 yard excavator
Diesel engine net power (hp): 60-100
Transmission: N/A

Machine Data

Width (ft-in): 4-0 (attachment only)
Length (ft-in): 4-0 (attachment only)
Height (ft-in): 3-0 (attachment only)
Weight (lb): 1,450 (attachment only)
Ground pressure (psi): N/A

Weldco-Beales

Equipment

Designation: Weldco-Beales ERF 60
Status: Production
Cost:\$13,550 (price of head only)

Manufacturer

Name: Weldco-Beales
Address: 2328 Roosevelt Avenue, P.O. Box 8,
Enumclaw, WA 98022
Telephone: (206) 825-3581

Reduction-head Mechanism

Type: Vertical single spindle
Cutters: 3 free-swinging
Timing: 1.48
Width of cut (ft-in): Arm mounted, depends on swing radius of machine
Maximum material size (in): 4
Working material size (in): 2
Type of drive: Hydraulic
Rotational speed (rpm): 1,200-1,400

Prime Mover

Type: This attachment is for mounting on and being carried
by a 1 to 2 yard backhoe
Diesel engine net power (hp): 100-160
Transmission: N/A

Machine Data

Width (ft-in): 5-0 (attachment only)
Length (ft-in): 5-0 (attachment only)
Height (ft-in): 3-0 (attachment only)
Weight (lb): 1,800 (attachment only)
Ground pressure (psi): N/A

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