

THE STEFFEN SYSTEM APPROACH TO BALING AND HANDLING

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The equipment I am presenting is what we have developed on our own farm in the Willamette Valley of western Oregon. We are presently farming 300 acres, of which there is 120 acres of alfalfa and 60 acres of timothy. We also contract harvest about 150 acres of clover hay and about 500 acres of fescue hay. Our largest job is 2500 tons of wheat straw delivered to the Castle & Cooke mushroom farm. We bale and handle about 5000 tons total each year.

Our equipment development began in 1967 when we built the first bale package handler. This machine was built from an old truck frame with a 1959 Pontiac car body and engine. The loader lifted 10 two-wire bales 14 layers high. We pulled wagons behind the baler and loaded them by hand and then used the loader to place them in the barn.

Loading the wagon by hand was the next job we tried to mechanize. We first tried the harrow bed wagon to stack the bales roadside and then used the loader to transfer to the truck to haul to the barn. This ran our cost of handling much higher though because we had not eliminated any labor. The man loading the wagons merely moved to operating the harrow bed and the bales all had to be rehandled for the ten mile trip to the barn. The added fixed cost of the harrow bed increased our handling cost greatly.

In 1969 I sold the harrow bed and constructed a bale accumulator. This pulled behind the baler and automatically arranged 10 bales into an 8 foot square. The loader then directly loaded the truck from these accumulator packages. We found we could load 304 bales in about 40 minutes. This reduced our operating cost greatly.

Since that time we have custom built many accumulators and loaders. In 1974 we built our first diesel-powered loader tractor. It is powered by a 6V-53 with an Allison automatic transmission. Over 20,000 tons have been hauled with this loader. It can pull a 32-foot drop deck semi with a 16 foot pup trailer, hauling 384 three-wire bales per load.

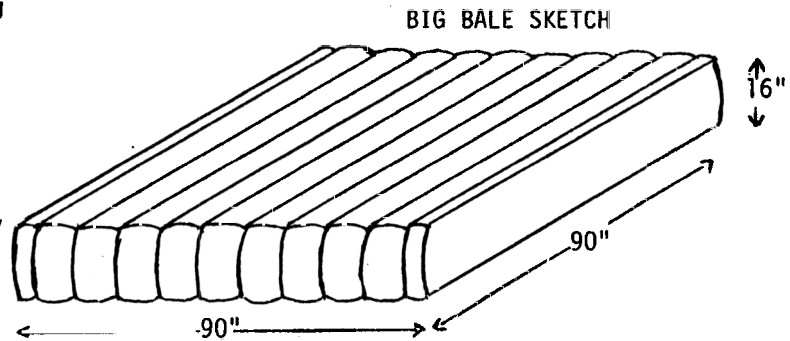
Last year we built 13 tractor mount and five "Grasshopper" loaders for Olin Corporation of South Dakota. The tractor mount loads the same 8-foot square bale package of 10 two-tie bales or 8 three-tie. It stacks 18 1/2 feet high and is mounted on a 60-100 HP tractor. This machine can be attached in only a few minutes. The "Grasshopper" is self-propelled and features a heated cab that is insulated and soundproof. The power unit can be slid out in 15 minutes for in-shop service. This year Olin Corporation purchased four more "Grasshopper" loaders with Perkins diesel engines. These loaders are being used for handling flax straw for paper making. They have also equipped one for round bale handling.

Don Ast of Hemet, California hired us to build a special low profile "Grasshopper" for stacking inside of containers. This works quite well even with the double compressed bale. We have also built him a double compressor for three-wire bales.

Last spring we built a diesel powered "Grasshopper" loader that can pull trailers. This has two sets of driving controls so that on the highway it is a cab over tractor with the loader mounted on the rear. This loader has a 6V-53T with an Allison 643 automatic transmission. The rear suspension is carried on air bags. Much attention has been given to cutting down air drag and increasing fuel mileage. The fifth wheel is hydraulically lifted to make trailer hookup fast. The trailer can be connected and moved around the field without leaving the driver's seat. We have hauled about 3000 tons with this loader truck this season. Several loads were delivered 250 miles.

Back in 1977 I began development of a 10-wire Big Baler. This makes a bale approximately the same dimensions as a package of 8 three-wire bales measuring 90 inches x 90 inches x 16 inches weighing up to 1200 pounds. The 10 wires are spaced 9 inches apart. All tying parts are standard Freeman wire knotters including the needles. The material is gathered from two or three windrows with wheel rakes mounted on front and picked up with a Freeman pickup modified to 84 inches wide. The pickup teeth have been replaced with a rubber tooth as used on newer hay rakes for greater reliability. The tooth-mounting bars run on sealed bearings in the pickup drum. The material then passes under

two rubber paddled equipped feed rolls to move the crop into the feed fingers that place the material up into the bottom of the bale chamber. This feed opening measures 84 inches x 7 inches. The material has been precompressed by the feed rolls as it is delivered to the chamber. The hydraulic-operated plunger awaits a sensing signal determining the material has fully filled the chamber before compressing. This produces a nicely shaped bale with little damage to the crop. The plunger operates at up to 35 cycles per minute. The bale density is controlled by tension rails 8 feet long using two 4 inch diameter hydraulic cylinders. The bale is extruded onto an automatic lowering chute which lets the bale to the ground gently to prevent bending and disturbance of the bale.



The baler is powered by a Perkins 6-354 turbo charged engine with 120 HP. All drives are hydrostatic. The machine weighs 23,000 pounds with 80 gallon fuel capacity and storage for 20 boxes of wire. We can bale 40 bales an hour and bale up to 12 hours without refueling or adding wire. Each standard 6500 foot box of wire yields 35 Big Bales or 20 tons of hay. This compares to about 13 tons per roll on a three-wire baler.

The bales can be loaded two at a time with the newer "Grasshopper" loaders. This cuts loading time to half of the time it takes to load packaged three-wire bales. Thirty-two Big Bales are loaded in less than 20 minutes.

Thus you can see this system greatly improved our field efficiency and lowered our cost per ton. One of the problems still to be worked out is finding adequate markets for this bale size. Our main market has been wheat straw to the mushroom farm. This has reduced their labor and storage headaches. One dairyman used some grass bales using a long set of forks on a manure loader to move them around. We need to develop a feed wagon to unload into feed bunks. Another dairyman drops Big Bales into a tub grinder as wires can be removed before lifting bale into tub with our bale loader.

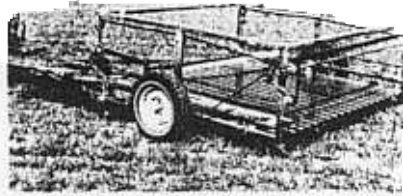
We are currently building a saw that will split the large bale into five segments, each with two wires remaining. These bales could be compressed to 46 inches in length, thus making a double compressed bale measuring 16 inches x 18 inches x 46 inches long. Big Bales can also be field baled at shorter than 8 feet. These bales, measuring 16 inches x 90 inches x 46 inches, would weigh 600 pounds each and could be handled nicely by bucket loaders. These would still haul and stack without any loss in efficiency.

We are considering artificial drying of hay in the Big Bales and then recompressing to a 46-inch length. This then could be either sold in this size or sawed into five bales for retail trade.

I would like to say that anyone wishing to take a closer look at these machines can stop at our farm east of Salem. I will be glad to show them to you. We are usually baling from July to the end of September. Also, if you have any ideas or suggestions on marketing Big Bales, I would appreciate talking to you.



BALE ACCUMULATOR



The Steffen Systems bale accumulator is pulled behind a standard baler to create packages of 10 two-tie or 8 three-tie bales.



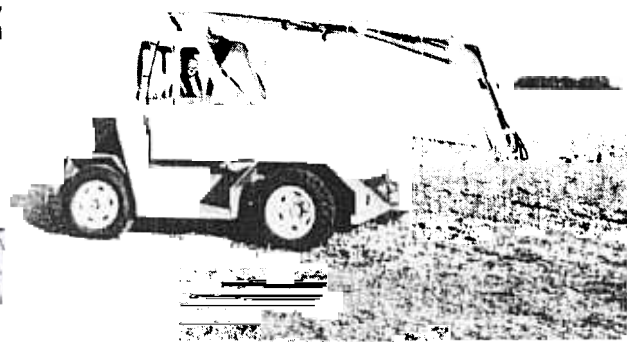
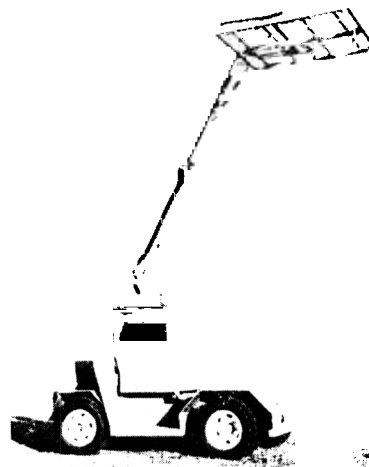
**TRACTOR-LOADER WITH
FIFTH WHEEL TRAILER**

Designed for highway use the tractor-loader enables easy delivery at your destination while providing comfortable long-haul transportation.

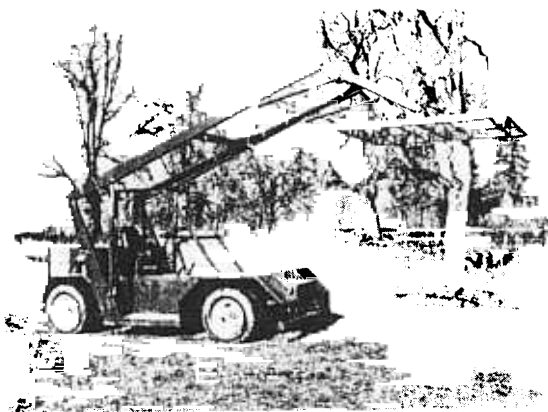
BIG BALER



The Steffen System Big Baler produces single bales measuring 90" by 90" and weighing 1,200 lb. for hay, and 650 lb. for straw. Each bale is wrapped with 10 wires.



MODEL 200 "GRASSHOPPER"



MODEL 300 "LOW PROFILE"

The low profile grasshopper was designed for operations where overhead or side clearance is a problem. With the ability to stack the bales on edge, it is currently used to load cargo containers for overseas shipment.

Even with its reduced size it can still load or unload trucks stacked to 13' 6".

The tractor mounted loader is for farm operations that wish to set the most utility from their investment in tractors. Designed to mount on small and mid-sized tractors. They are currently used on the MF 265 and Ford 7700, and can be adapted to most tractors with hydraulic systems in this size range.

The quick mount features make it easy for one person to connect or disconnect the loader in a few minutes.