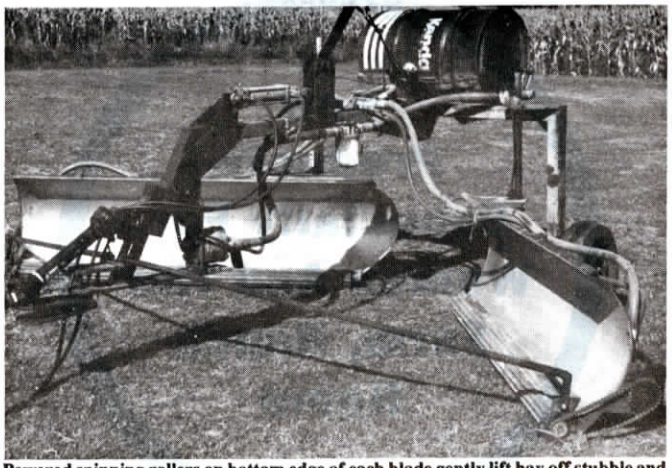


Powered spinning rollers on bottom edge of each blade gently lift hay off stubble and "plow" it into windrows.

SPINNING ROLLERS LIFT HAY OFF STUBBLE AND ONTO V-SHAPED STEEL BLADES

'Snowplow' Hay Windrower

By Bill Gergen, Associate Editor

Hay rakes are a common sight in Pennsylvania but no other rake looks anything like the one owned by Mark Pugliese. It uses a pair of curved steel blades equipped with powered spinning rollers on the bottom edge of each blade to gently lift hay off the stubble and "plow" it into windrows.

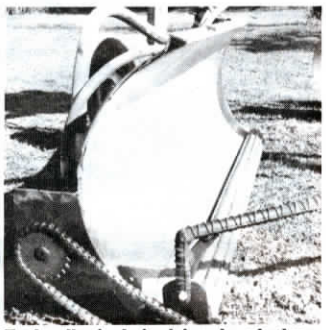
"It minimizes leaf loss, boosting the nutritional value of harvested alfalfa," says Pugliese, who built the prototype windrower last summer.

The 12-ft. wide machine can be used to windrow swathed hay or to combine two windrows into one and can also be used as a hay inverter. It consists of two 2-ft. high, 4 1/2-ft. long stainless steel blades set 3 ft. apart and mounted at a 45 degree angle to the swath or windrow. The bottom of each blade is equipped with a spinning, 3 1/2-in. dia. fluted-steel roller powered by a pto-driven hydraulic pump. The rollers pick up the hay which then slides backward along the blades.

"My friends say it looks like I'm operating a high-speed snowplow because the rollers almost disappear from view in the hay stubble," says Pugliese, an ex-dairy farmer who is now devoting his time to working on the implement. "I came up with the idea after looking for a way to get more output from my forage harvester. I wanted to build a machine that could put up to 40 ft. of swathed hay into a single windrow. My original design included augers for carrying hay across the blades. But I found that when the blades were set at 45 degree angles, hay slid across them without need for an auger. That's when I realized that gentle handling might be my invention's biggest benefit."

According to Pugliese, the problem with conventional hay rakes is that they tear off nutrient-rich leaves and allow some of the leaves to escape between the tines. "The spinning rollers on my hay windrower are less aggressive than the tines on a rake. The rollers just brush the stubble without letting any hay escape under the blades. The hay moves across the closed body of the blades so there's almost no loss of leaves. Studies show that conventional rakes lose 7% of the leaves on average and even more when the hay is dry. I'm certain that my windrower cuts leaf losses in half.

"Another advantage is that I can operate my windrower at faster speeds without knocking off leaves. The faster you go with conventional rakes, the more leaves you knock off. Most rake manufacturers recommend a top speed of 5 mph, but I can go up to 7 mph without any problems. In fact, the faster the speed the smoother the hay flows across the blades. Discharged hay falls upside down allowing the windrower to also be used as an inverter."



Each roller is chain-driven by a hydraulic motor mounted behind blade. Steel rods bolted to tongue keep blades rigid.

Pugliese says his biggest concern at first was hay wrapping around the rollers. However, he hasn't had any problems. He made the rollers by welding 1/4-in. sq. steel bars spaced 1 in. apart all the way around a 3 1/2-in. dia. steel pipe. He bolted an adjustable 1/4 in. thick, 2-in. high steel plate along the bottom edge of the blades that allows him to adjust the distance between roller and blade. He normally sets the rollers about 1/16 in. from the plate.

"My biggest concern now is how to keep the rollers at the proper height," says Pugliese. "The rollers should just buff the hay stubble. If they're too close to the ground they scalp the stubble in rough areas, and if they're too high they miss some hay. Steel skid shoes are mounted under each blade just behind the roller on the leading edge of the blade. I wish they were adjustable so that I could lower the rollers in close-cut hay. Scalping hasn't been a problem on level fields. However, it is a problem on rough or hilly fields."

Each roller is chain-driven by a hydraulic motor mounted behind the blade. The motors are powered by a 50 gpm hydraulic pump (salvaged from a truck hoist). "The hydraulic pump has more power than I need so I have to run the tractor at half throttle to hold the rollers down to 1,600 rpm's. If the rollers run faster they throw the hay too far," notes Pugliese.

He used the steel frame from an old U-Haul trailer to build the windrower's frame, also using the trailers' spindles, hubs, wheel rims, and tires. A local mill rolled the two sheets of stainless steel used for the blades. A 1/4-in. thick, 1-ft. wide steel plate is strapped horizontally onto the rear of the blade for reinforcement. A vertical steel plate welded onto the side of the blade supports a shaft and sprocket connected to the hydraulic motor. Another steel plate, welded onto the bottom of the blade just above the roller, supports a second sprocket that drives a 1 1/8-in. dia. steel shaft that runs inside the roller's 1/2-in. wall pipe. Four spacers keep the shaft exactly centered inside the pipe. Pillow block bearings mounted on the end of the shaft keep hay from tangling up. A pair of 7/8-in. dia. steel rods are bolted to the steel plate above the roller and also to the tongue to keep the blades rigid.

Pugliese's tractor didn't have enough hydraulic capacity to operate the hydraulic pump. To solve the problem he converted the tractor's 540 rpm pto to run at 1,000 rpm's, then mounted a 36-tooth sprocket on a pto shaft and a 12-tooth sprocket on the pump to slow it down. A 55-gal. oil drum mounted on top of the frame serves as an oil reservoir.

The blades are hydraulically raised and lowered by a cylinder that's attached to a steel bar. The bar is hooked to a pair of cables that are attached to a mounting plate on top of the blades and are guided by a system of pulleys. When the hydraulic cylinder is activated, each blade slides up and down on a 2-in. dia. vertical steel shaft. To fold the windrower for transport, Pugliese raises the blades, unbolts the support arms, and manually swings the blades forward. Transport width is 7 1/2 ft.

Pugliese spent $6,500 to build the windrower.

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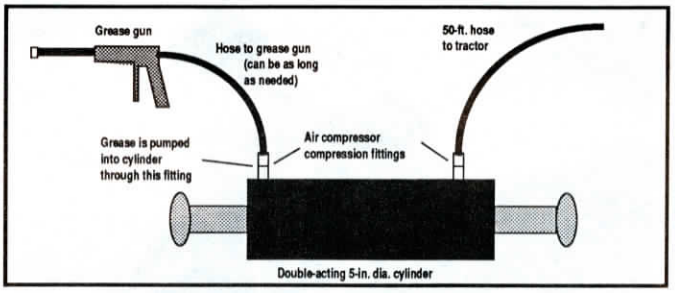

3,000 LBS. PRESSURE MAKES GREASING EFFORTLESS

Grease Gun Made From Hydraulic Cylinder

This home-built, 3,000 psi grease gun is so simple you'll wonder why you didn't think of it.

Lawrence Grabher, Hemingford, Neb., converted a double-acting, 5-in. dia. hydraulic cylinder into a state-of-the-art high-pressure grease gun that makes greasing quick and easy even on older equipment with lots of greasable joints.

"Most newer equipment has sealed bearings but if you've got some older machinery you can spend a lot of time greasing," says Grabher, who particularly likes his powered grease gun for greasing his disc seeder, which has a grease fitting on every disc opener, and on his 60-ft. rod weeder which is "loaded" with U-joints and other greasable fittings. "Using this grease gun I can grease up either piece of equipment in no time."

Grabher started with a 5-in. dia., 8-in. stroke double-acting hydraulic cylinder. He removed the hydraulic hose from in front of the piston, replacing it with quick couplers (he used conventional air compressor quick-tach compression fittings) that let him quickly interchange a grease filling hose and grease gun hose. To fill the cylinder with grease, he attaches the grease filling hose and simply pumps the cylinder full of grease, which forces the cylinder backward. To grease equipment, he hooks up a grease gun trigger handle and connects the hydraulic fitting at the other end of the cylinder to a hose leading to the tractor. When the tractor's hydraulic lever is activated, it applies constant pressure to the piston, which compresses the grease at about 3,000 psi.

"When you pull the trigger on the grease gun, it greases the joint almost instantaneously," says Grabher, who put 50-ft. of hose between the cylinder and the tractor so he can carry it around as needed when greasing big equipment.

When greasing the discs on his seeder, Grabher puts a 4-ft. pipe extension on the trigger handle so he can grease joints without bending over. He just walks along behind the equipment, effortlessly filling each joint with grease. In fact, he mounts the home-built grease gun on a truck that he uses as a drill fill, powering the gun off the truck's dump hoist.

Grabher made no modification to the cylinder used and, as far as he knows, the grease does no damage to internal components. "It's a simple idea that lets you use existing equipment you've got around the farm. Anyone could do it. Because it makes it so much easier to grease, it helps take better care of equipment."

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