

# 'Why I Believe in Flail Mowers'

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**C**OMMERCIAL TURF is big business today. Maintenance is technical and expensive. Professionals in the business may find themselves charged with the greenbelt area of a shopping center, or with the vast sodded areas of an airport. These plus golf courses, factory lawns, city median strips, parks, highway and utility rights-of-way, athletic fields, and a host of other turfgrass areas have led to development of a \$5 billion industry.

Commercial turfgrass areas today range from the very small to the vast, smooth or rough, clean and trashy, level or steeply banked. Vegetation may range from fine lawn type grasses regularly cut and closely cropped to tough field grass growing thick, high and intermittently cut, to weeds and brush, or even revenue producing seed or hay crops.

Moisture conditions may range from dry to "liquid wet!"

A mower must be capable of meeting these conditions. Further, and most important, it must do so with complete safety. Commercial turf areas may involve many people and autos. A misguided object, thrown out by a mower, can result in extremely serious bodily injury or expensive property damage.

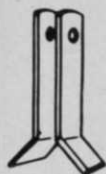
To meet these conditions, the commercial mower must have many qualities. Some, such as width of swath, maneuverability and steep slope stability relate to individual model design and have no bearing as to type. The reel, the rotary and the flail all are available in sizes ranging from small compact highly maneuverable units to wide swath gangs.

Other mowing performance factors such as cutting effectiveness on all types of growths (fine lawn grass, tough field grass, weeds and brush, short or high) on all types of terrain (smooth or rough, clean or trashy, wet or dry); mowing speed; simplicity of operation and safety are directly related to mower type.

The cutter bar, the reel and the rotary have been around so long most are quite familiar with their capabilities and limitations. I am not so sure there is the same degree of understanding about the flail, and in as much as this is "The Case for the Flail," I will direct my comments mostly thereto.

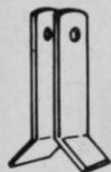
Flail has come to mean a type of mower consisting basically of a horizontal shaft designed to rotate at moderately high speeds and attached thereto a number of free swinging knives, cutters, blades,

## Flail Mower Blades Available



### GENERAL PURPOSE

**C5 (3/4 x 5" pin mounted)** Standard. Recommended for general purpose mowing of grass and weeds, and mulching leaves. Used in clean areas relatively free of rocks and trash.



### TOUGH CUTTING—SCALPING—OVER SEEDING

**H386 (1 1/4 x 5" Hardened-pin mounted)** For extremely tough cutting conditions and for renovating (scalping or over seeding). The greater weight of this knife provides more cutting authority and the extra width increases the useful life almost three times over that of the C5 knife listed above.



### THATCH THINNING

**H387 (1 1/4 x 5" Hardened-pin mounted-straight knife)** Used singly with spacer washers rather than in pairs like the other MOTT knives. For Thatch Thinning. Set cutting height to near ground level or slightly below.



### ROCKS & TRASH

**H293 (1 1/4 x 3" Hardened-Ring mounted)** For Heavy Duty mowing operations in rocky, trashy areas. The ring mounting of the knives provides flexibility to allow the knife to move in all directions, sideways as well as fore and aft, thus minimizing the possibility of a knife bending or breaking.

beaters, chains or the like—referred to in themselves as flails. These rotate in a vertical plane about the horizontal shaft, centrifugal force holding them straight out during operation.

Just as there are variations within the families of "reel," "rotary" and "cutter bar" mowers, so there are within the family of "flail" mowers. Dependability or structural integrity is a matter of design detail and will vary depending upon the manufacturer and model offered.

Versatility of performance, cutting ability, and power requirements also will vary depending upon the style or type of the individual cutters or "flails" used. Generally speaking, the sharpened knife type flail, mounted to cut with an edge-wise slicing action, cut more efficiently, take less power, are lighter and therefore operate with a greater degree of safety than other type flails. Even so, all flail type mowers provide far greater operational safety than do rotary type mowers. The reason is a simple matter of physics. Both types cut with an impact action rather than with a shearing action such as the reel and cutter bar types use. Indeed, the flail mower is sometimes referred to as a "vertical rotary."

The impact force imparted by the cutting blade upon contact with an

object, whether it be the vegetation to be cut, or a rock, is dependent upon the mass (weight) of the blade and the square of the impact velocity. Thus a rotary blade weighing 10 pounds, moving with a tip speed of 150 mph has over 400 times the impact force of a flail blade weighing 1 1/2 ounces traveling with a tip speed of 75 mph.

*The point is that the light weight 1 1/2 ounce flail blade traveling 75 mph, especially the thin sharpened knife type blade, does impart enough impact force to cut the heaviest of grass and weeds and even light brush up to about one inch in diameter, but does not deliver excessive forces that can hurl a struck object with the speed of a bullet.*

Another factor that adds to the

safety aspect of the flail mower is its vertical mode of operation. A horizontally acting rotary tends to move cuttings and struck objects out horizontally in all directions and, to be rendered usable with some degree of safety must be heavily guarded with solid sheet metal or flexible chain shields which extend down to the ground on all sides. However, a discharge chute of some sort is needed to provide means for the ejection of cuttings, so complete guarding is well nigh impossible.

On the other hand, the flail, operating vertically, has no tendency to move cuttings or struck objects sideways, an excellent feature when moving along roadways as nothing is ejected onto the roadway. Most flails

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Heavy duty self-propelled units can be ganged.

**Flail Mowers**

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rotate so as to cut down on the front and back along the bottom of the cut. Height is usually controlled by a full span roller, riding on the ground close behind the cutter. Any object that does happen to be moved by impact of the flail knife would normally be stopped immediately by the roller. The curved cutter housing and rear shields effectively deflect anything discharged rearward high enough to clear the roller, directing it downward towards the ground. The flail mower cutter housings are also designed so that anything that might possibly be picked up and carried over the cutter to be discharged forward is deflected at an

angle of approximately 45 degrees downward and returned almost immediately to the ground.

*Thus the low impact force action of the light weight free swinging flails, their vertical mode of operation, the guard action of the roller, and the deflecting features of the cutter housing all combine to make the flail mower by far the safest of all impact action mowers.*

The basic design conformation of the flail mower, as outlined above contains features that provide for natural cutting superiority. Thin sharp knives cut cleaner and use less power. The vertical flail knife is highly adaptable to cutting either

fine lawn grass or tough field grass as well as weeds and light brush. The cylindrical shape of the flail cutter with knives extended results in cutting occurring on a line rather than over a large area as with a rotary. With the roller set in close behind this line of cut, control of the height of cut is very accurate. The cutter can follow the ground contour closely with very little problem of scalping. Performance is therefore very good even on rough or uneven ground. Height of cut is controlled by adjusting the roller. There is no adjustment needed or possible on the knives. Their position on the shaft is fixed.

Because there is no need to completely encase the cutter to provide operational safety, the flail cutter housing is open on both the front and the rear. Grass enters over the full width of the cutter without being flattened. The knives cut the grass in an upright position.

The capacity of a mower depends upon the volume of vegetation it can process through its cutter mechanism in a given time. The flail mower, with its open full span intake and discharge areas can handle higher volumes of cuttings than other type mowers.

This same "open" feature of the flail mower also provides top performance in wet—even "liquid wet"—conditions.

One of the basic claims upon which the Mott flail mower patents were based was the discovery of its self cleaning capabilities. The self cleaning aspects, coupled with the open "pass through" features of the flail mower cutter housing allow wet grass to be cut, shredded and discharged without problem. This wet cutting ability is very important. Often after rain or heavy dew the grass remains wet for long periods and there just isn't time to wait for everything to dry up.

Mowing speed also is important. Again, because of the high volume capabilities of the flail mower, mowing speeds of 10 mph over smooth terrain are not uncommon. One Mott model, is equipped with torsion bar spring suspension, shock absorbers and forward rotation of the cutter shaft. This unit was designed specifically to be pulled in gangs for wide swath high speed mowing of wide open field areas.

*While each of the various specific types of mowers are indeed best suited for certain mowing jobs, the flail mower is without a doubt the most versatile, capable all around mower than can be had for many mowing jobs.*



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