

Evaluation Report

160



Stanley Sunflower Harvesting Attachment

A Co-operative Program Between



STANLEY SUNFLOWER HARVESTING ATTACHMENT

MANUFACTURER AND DISTRIBUTOR:

Intersteel Industries, Ltd.
 (formerly Stanley Manufacturing, Ltd.)
 Box 1451
 Morden, Manitoba
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RETAIL PRICE:

\$1,015.00 (May, 1980, f.o.b. Morden, Manitoba, 3.8 m width with 305 mm row spacing).

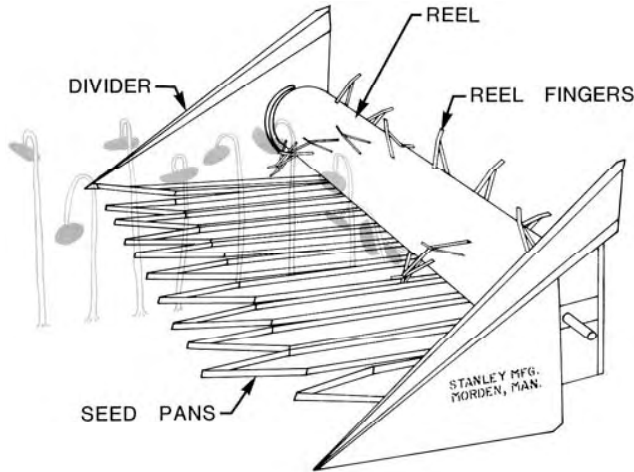


FIGURE 1. Stanley Sunflower Harvesting Attachment.

SUMMARY AND CONCLUSIONS

Overall functional performance of the Stanley sunflower harvesting attachment was very good. Performance was reduced somewhat by the excess length of stalk cut off with each head.

Crop flow through the Stanley was smooth, as long as the reel speed was properly synchronized with ground speed. If reel speed was too slow, occasional cutterbar plugging occurred, while if reel speed was too high, loss of some whole heads occurred. Capacity of the Stanley could be increased by using a variable speed reel drive, to permit adjusting reel speed to suit crop conditions.

Crop losses were acceptable in both dry and tough crops. The seed pans, which covered 78% of the ground area in front of the cutterbar, collected most of the shattered seeds in dry crop conditions.

Although the 305 mm (12 in) seed pan spacing permitted on-row cutting for this row spacing, there was no need to follow rows; this spacing was suitable for continuously seeded crops and for cutting row crops at an angle or across headlands.

Installation was easy, although no set-up instructions were provided. Total installation time for two men was about one day. No operator's manual was available. Daily lubrication took about one minute.

No serious mechanical problems occurred during the testing.

RECOMMENDATIONS

It is recommended that the manufacturer consider:

1. Supplying a shield to protect the reel drive mechanism from the standing sunflower crop.
2. Providing an operator's manual complete with installation, operation and safety instructions.
3. Modifications to permit leaving longer stubble, thereby reducing the length of stalk to be processed by the combine.
4. Providing a more secure means of attaching the crop dividers to the reel arms, to prevent the dividers from vibrating in rough field conditions.

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Senior Engineer -- J. C. Thauberger

Project Engineer -- Gregory R. Pool

THE MANUFACTURER STATES

With regard to recommendation number:

1. We are investigating the possibility of supplying instructions for on-farm manufacture of shields for specific combines.
2. We are planning the production of an operator's manual, which will include all these items.
3. It is difficult to design a machine to effectively pick up downed heads and cut the stalks short at the same time.
4. The principal consideration is to keep field losses to a minimum.
5. We recommend that the dividers be bolted securely to the reel arms. This will effectively eliminate divider vibration.

Note: This report has been prepared using SI units of measurement. A conversion table is given in APPENDIX III.

GENERAL DESCRIPTION

The Stanley Sunflower Harvesting Attachment (FIGURE 1) is designed to mount on straight-cut combine headers. It consists of seed pans, which attach to the combine cutterbar, dividers and a drum reel with two spiral rows of metal fingers. The reel is powered by the combine reel drive.

The seed pans are spaced to correspond with sunflower row spacing. The stalks pass between the seed pans to the cutterbar, where heads are severed from the stalks. The drum reel pushes down tall plants and delivers cut heads to the combine header. The seed pans, which extend ahead of the reel, collect shattered seed that may dislodge during cutting, and hold the heads up until they are cut off the stalks.

The attachment tested was 3.8 m (12.5 ft) wide between divider points, with eleven row openings spaced at 305 mm (12 in) and 240 mm (9.5 in) seed pan width.

Attachments with various header and seed pan widths are available to suit existing combines and cultural practices. Detailed specifications are given in APPENDIX I.

SCOPE OF TEST

The Stanley was mounted on an International 914 pull-type combine, with a 3.8 m (12.5 ft) header. It was operated in the conditions shown in TABLE 1 for 23 hours while harvesting about 36 ha (90 ac) of sunflowers, sown at 760 mm (30 in) row spacing. It was evaluated for ease of installation, quality of work, ease of operation and adjustments, and operator safety.

TABLE 1. Operating Conditions

Crop Type	Soil Conditions	Hours	Field Area	
			ha	ac
Open Pollinated	Loamy Sand	9	16	40
Hybrid	Clay Loam	3.5	6	15
Hybrid	Clay	10.5	14	35
Total		23	36	90

RESULTS AND DISCUSSION

EASE OF INSTALLATION

Installation Time: It took about 15 man hours to attach the Stanley to the combine header, using tools normally found in most farm shops. No installation instructions were provided, making installation more difficult.

Reel: The drum reel was mounted on the reel arms of the combine header. Combine reel bearing brackets were needed to mount the Stanley reel (FIGURE 2).

In addition, reel shaft locking collars had to be obtained from a hardware supplier, to prevent lateral movement of the drum reel during operation. Reel drive sprockets were obtained from the combine dealer.

Seed Pans: The seed pans were supplied in sub-assemblies of three, attached to a flat bar. Bolt holes in the flat bar corresponded to knife guard bolts on the combine header. The pans were easy to install, however the guard bolts, supplied with the Stanley, were too short. The left seed pan, which was shorter than the others to eliminate possible tractor tire interference on turns, was part of the

left divider assembly.

The seed pans were also supported from underneath by angle iron braces (FIGURE 3), to provide rigidity and to permit vertical adjustment. One end of each brace was bolted to a slotted bracket at the front of each seed pan, while the other end was fastened to a long support bracket which bolted to the combine header frame. The braces were easy to install by one person, but two men were needed to install the support bracket.

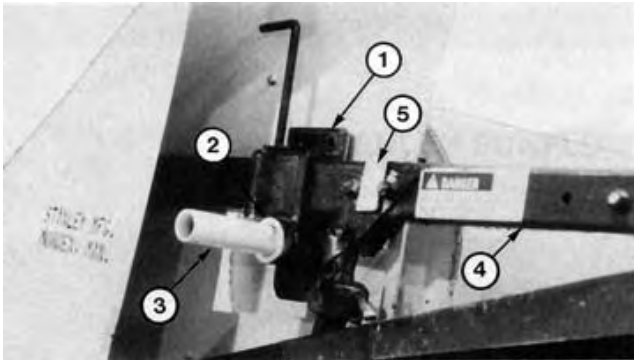


FIGURE 2. Reel Mount: (1) Reel Bearing Bracket, (2) Locking Collar, (3) Reel Shaft, (4) Reel Arm, (5) Divider Mounting Bracket.

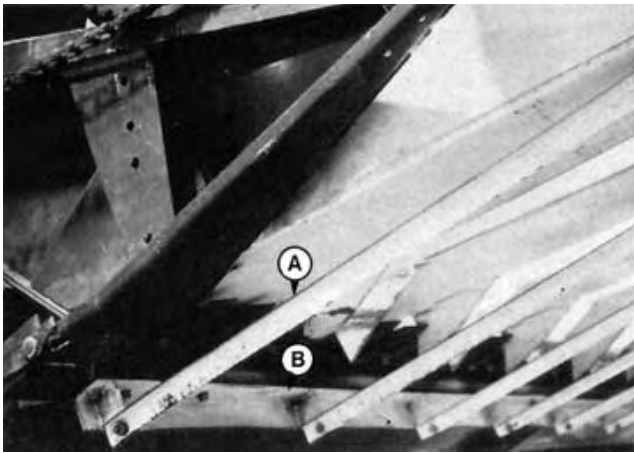


FIGURE 3. Seed Pan Support: (A) Brace, (B) Support Bracket.

Dividers: The dividers were easy to install. They attached to the cutterbar with bolts and were secured to the combine reel arms with small angle brackets (FIGURE 2). These small brackets did not provide adequate rigidity or security for the dividers. It is recommended that a more secure means of attaching the dividers to the reel arms be provided, to prevent them from vibrating excessively in rough field conditions.

QUALITY OF WORK

Feeding: The flow of crop into the combine was smooth as long as reel speed was properly synchronized with ground speed. It was important to maintain a reel index* between 0.9 and 1.1. At high ground speeds, with the reel index less than 0.9, the reel could not effectively clear the crop from the cutterbar, resulting in occasional plugging. At slower ground speeds, with the reel index greater than 1.1, the reel was too aggressive, causing loss of some whole sunflower heads over the back of the combine header.

When operating the Stanley in tall weed conditions, such as in ragweed, occasional wrapping on the reel occurred. The sharp metal fingers would hook onto the weeds and wrap them around the reel. As ragweed usually occurred only in small patches, this was not a significant problem.

The two drive sprockets, supplied with the combine header, gave reel speeds of 36 or 47 rpm. This gave acceptable ground speed ranges of 5.6 to 6.9 km/h (3.5 to 4.3 mph), or 7.3 to 9 km/h (4.5 to 5.6 mph) within the suitable range of reel indices. This provided an adequate speed range for most crop conditions. Capacity of the Stanley could be increased by using a variable speed reel drive to

permit adjusting reel speed to suit crop conditions.

Stubble Length: For most uniform feeding, the reel had to be operated with about 270 mm (10.6 in) clearance between the reel drum and the cutterbar. The 230 mm (9 in) reel finger length did not permit running the drum any closer to the cutterbar. This resulted in an excessive length of stalk, often as long as 500 mm (20 in), being cut off with each sunflower head and fed into the combine. To maximize combine capacity, stubble should be as long as possible, with only the sunflower heads fed into the combine. It is recommended that the manufacturer consider modifications, which will enable leaving longer stubble, thereby reducing the length of stock processed with each head.

Shatter Loss: The seed pans were very effective in reducing seed loss, especially in dry crops. Individual pans were 240 mm (9.5 in) wide, with a 65 mm (2.6 in) row space between pans. The seed pans covered 78% of the ground area in front of the reel and cutterbar, and collected most of the shattered seed. The amount of shatter loss is very dependent upon moisture content. Shatter loss is negligible in tough crops, but can be high in very dry crops. Maintaining proper ground speed was very important in reducing shatter loss in dry crops.

Dividers: The crop dividers performed very well. Their size and shape ensured that very few sunflower plants were pushed over in dividing the crop.

EASE OF OPERATION AND ADJUSTMENT

Row Spacing: All tests were conducted in sunflowers seeded at a 760 mm (30 in) row spacing. Although the 305 mm (12 in) seed pan spacing on the Stanley permitted on-row cutting for this row spacing, there was no need to follow rows. This seed pan spacing was also suitable for continuously seeded crops or for cutting row crops at an angle or across headlands. When not following rows, the seed pan points occasionally knocked down some large sunflower plants. Turning: To facilitate right turns with a pull-type combine, the left divider and left seed pan were 330 mm (13 in) shorter than the other pans. This eliminated interference with the right tractor tire on sharp right turns.

Seed Pans: The seed pan angle was easy to adjust with the slotted brackets at the front of the support braces (FIGURE 3). The pans did not require any additional adjustments during the test. It was important to have the seed pans sloping toward the combine header to permit collected seeds to be conveyed into the combine. Total time required for one man to adjust all pans was approximately ten minutes. Seed pan vibration was desirable, to convey collected seeds back into the combine. Operation on rough fields caused much vibration of the seed pans, however no failures occurred. Cutting ability and feeding characteristics were not affected by field roughness.

Reel Drive: The reel drive chain, on the right side of the header, was exposed to the standing sunflower crop. As a result, plants often caught in the drive, causing the chain to jump off the drive sprockets. A reel drive shield (FIGURE 4) had to be installed by PAMI, which eliminated the problem. It is recommended that the manufacturer supply a suitable shield as part of the divider assembly.

Unhooking: The complete combine header assembly, with the Stanley attachment in place, could be unhooked from the combine and placed on the ground without damage. Occasionally, the divider mounting brackets came off the reel arms when the header was set down.

Lubrication: Two pressure grease fittings on the reel support bearings required daily lubrication. No other lubrication was required on the Stanley.

OPERATOR SAFETY

The Stanley was safe to operate provided normal safety procedures were followed. No safety decals were supplied.

OPERATOR'S MANUAL

No operator's manual was available for the Stanley. It is recommended that a suitable operator's manual be provided, complete with installation, operating and safety instructions.

DURABILITY RESULTS

The Stanley sunflower harvesting attachment was operated in the field for 23 hours while harvesting about 36 ha (90 ac) of

*Reel Index is defined as the ratio of reel tip speed to forward travel speed.

sunflowers. The intent of the test was functional evaluation and no extended durability evaluation was conducted. No mechanical problems occurred during testing, however severe vibration of both the right and left dividers, throughout the test, indicated that the divider mounting brackets were not adequate. It is recommended that the manufacturer consider modifying the divider mounting assembly to increase rigidity and to reduce vibration during operation.

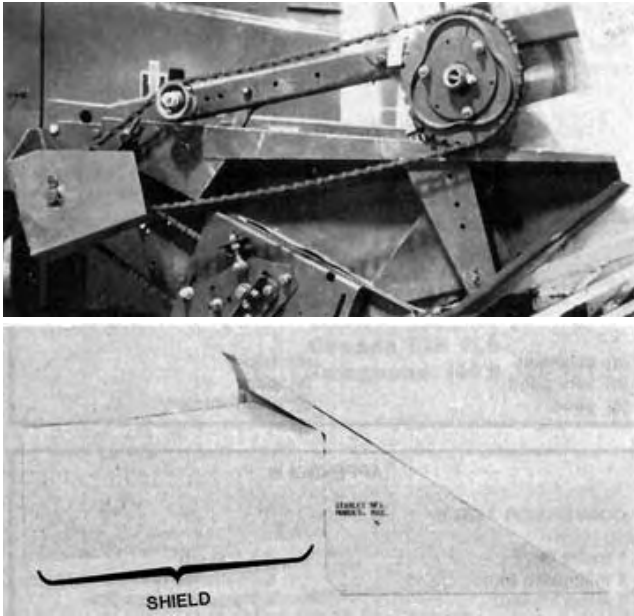


FIGURE 4. Exposed Reel Drive (top) and PAMI Reel Drive Shield (bottom).

**APPENDIX I
SPECIFICATIONS**

Make:	Stanley
Model:	11 row, 305 mm spacing
Serial Number:	N/A
Overall Dimensions:	
--length	2100 mm
--width	4100 mm
-- height	1350 mm
Total Weight:	270 kg
Feeding System:	
-- type	seed pans and spiked drum reel
-- attachment	to straight-cut combine header
Seed Pans:	
-- width	240 mm
-- length	nine, 1740 mm; one, 1400 mm
-- depth	40 mm
Reel:	
-- length	3550 mm
-- diameter	
- drum only	460 mm
- w/fingers	920 mm
-- speed	36 or 47 rpm
-- no. of fingers/revolution/row	2
-- drive	chain drive from combine header

**APPENDIX II
MACHINE RATINGS**

The following rating scale is used in PAMI Evaluation Reports:

- | | |
|---------------|--------------------|
| (a) excellent | (d) fair |
| (b) very good | (e) poor |
| (c) good | (f) unsatisfactory |

**APPENDIX III
CONVERSION TABLE**

1 metre (m)	= 3.3 feet (ft)
1 millimetre (mm)	= 0.04 inches (in)
1 kilogram (kg)	= 2.2 pounds mass (lb)
1 kilometre/hour (km/h)	= 0.6 mile/hour (mph)



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