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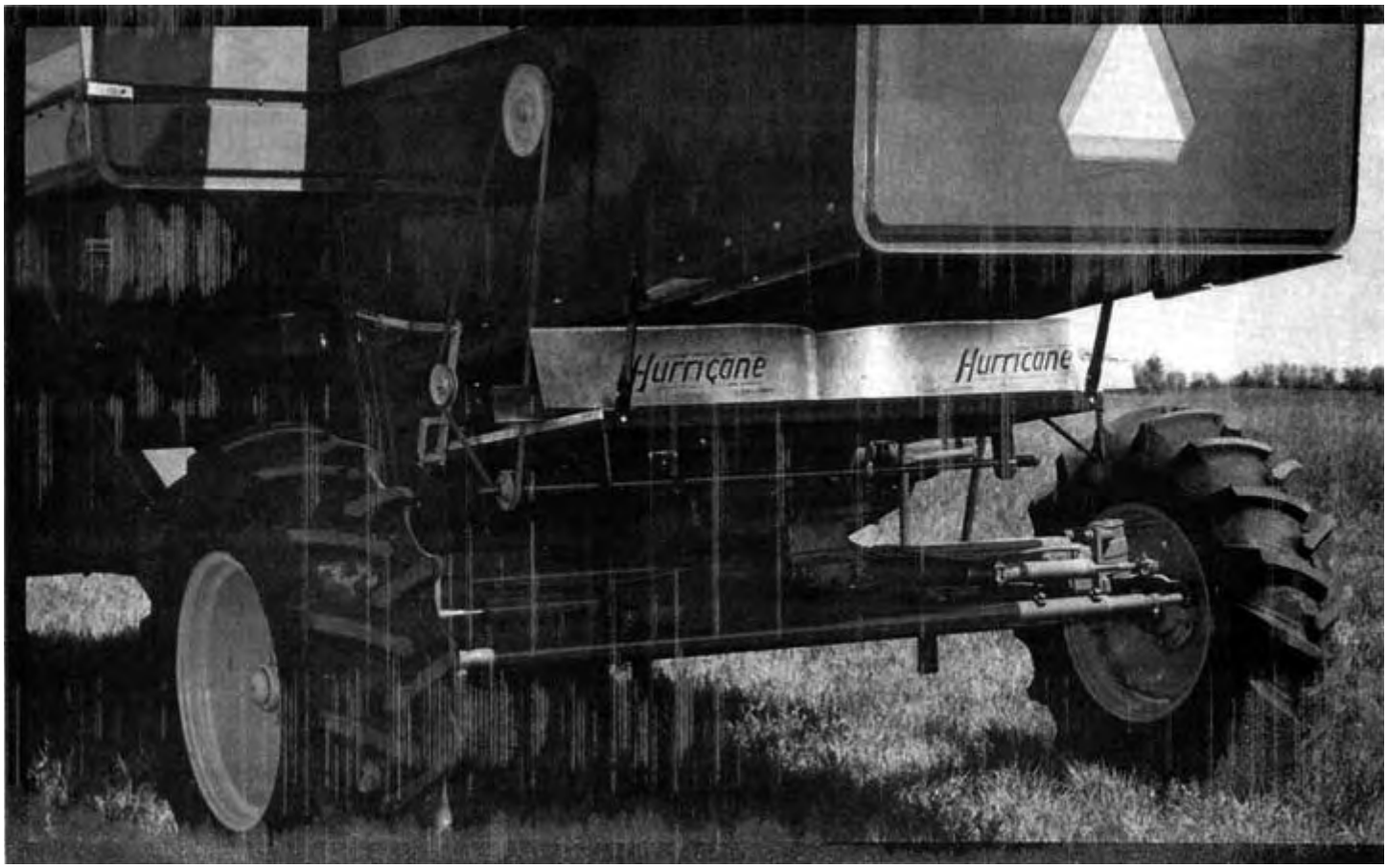

Hurricane Chaff Spreading Attachment

A Co-operative Program Between
ALBERTA FARM MACHINERY RESEARCH CENTRE
PAMI
PRAIRIE AGRICULTURAL MACHINERY INSTITUTE

HURRICANE CHAFF SPREADING ATTACHMENT

MANUFACTURER AND DISTRIBUTOR:

Clarke Manufacturing Ltd.
P.O. Box 68
Rosetown, Saskatchewan
S0L 2V0

RETAIL PRICE:

$975.00 (May, 1985, f.o.b. Humboldt, Saskatchewan. Suitable for mounting on a John Deere 7720 combine).

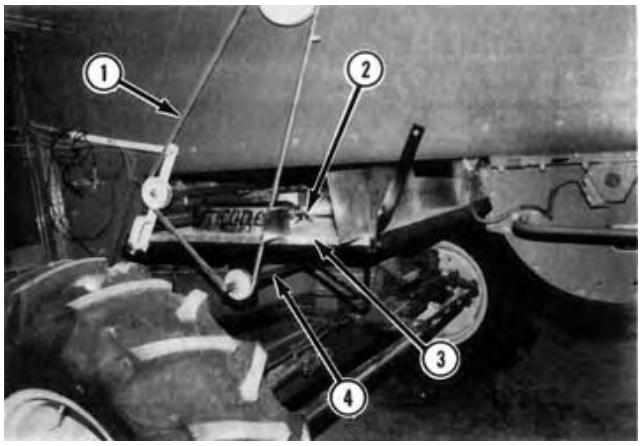

FIGURE 1. Hurricane: (1) Drive Belt, (2) Spreading Blades, (3) Discharge Ports, (4) Drive Shaft.

SUMMARY AND CONCLUSIONS

Quality of Work: Originally, most of the chaff was blown over the rear of the Hurricane, directly behind the combine. The spread was improved when modifications were made to direct the chaff into the spreader. In dry average conditions these modifications increased the spread width to 28 ft (8.5 m). The uniformity of spread was poor without the modifications. The uniformity was very good after modifications were made to direct the chaff into the spreader and to regulate the amount of chaff spread to the rear of the combine.

Capacity: The Hurricane had sufficient capacity to spread all of the chaff from the John Deere 7720 combine while harvesting at a maximum acceptable feedrate in all crops.

Ease of Installation: Ease of installation was good. The Hurricane was easily installed by two men in 3 hours. The installation instructions were very brief and not well illustrated. The belt tightener interfered with the spreader body when installed on the slack side of the belt. No provisions were made for mounting the combine's grain loss monitor sensors.

Ease of Operation and Adjustment: No adjustments were provided to alter the chaff spread pattern.

Ease of adjusting the combine's cleaning shoe was unsatisfactory with the Hurricane installed, the spreader body blocked access to the combine's shoe, making shoe adjustments difficult and inconvenient.

Only periodic inspections were required for proper operation as no greasing was needed. Ease of cleaning was good. Chaff on the combine's axle support was inconvenient to remove.

Power Requirements: Power required to operate the Hurricane was 0.5 hp (0.4 kW).

Operator Safety: All spreading devices for combines are potentially dangerous. No shields or safety instructions were provided.

Operator's Manual: No operator's manual was supplied.

Mechanical History: No mechanical problems occurred during testing.

RECOMMENDATIONS

It is recommended that the manufacturer consider:

1. Modifications to direct more chaff into the spreader and to regulate the amount of chaff spread to the rear.
2. Providing locations for the combine's grain loss monitor sensors.
3. Modifications to prevent the belt tightener from interfering with the spreader.
4. Modifications to allow access to the combine shoe for easier chaffer and sieve adjustment.
5. Shielding the drive sheaves.
6. Supplying an operator's manual.

Senior Engineer: G.E. Frehlich

Project Technologist: A.R. Boyden

THE MANUFACTURER STATES THAT

With regard to recommendation number:

1. The suggested modification to regulate amount of chaff spread to the rear of the combine has been standard equipment for some time on models for other combines. This modification, along with a short shaker pan to direct the chaff into the spreader, will be included on the model for the John Deere Titan II combine.
2. This was not a problem in 1984 and earlier John Deere Titan combines. The model for the new Titan It combines will have openings in the shaker pan to allow the monitors to remain in place.
3. We will include a double pulley belt tightener on this model to prevent the belt from rubbing on the spreader.
4. This is a particularly difficult problem on the John Deere Titan It combine, Adding the shaker pan will improve access to the shoe considerably.
5. This is being considered. However, chaff collects around the drives when shields are used and could be a fire hazard. The use of warning labels is a probable compromise. There is no substitute for being careful and using common sense around machinery.
6. We are presently printing a new operator's manual, which includes more detail and drawings.

MANUFACTURER'S ADDITIONAL COMMENTS

PAMI had conducted these tests with a new John Deere 7720 Titan II that has only recently been marketed. Therefore, we were unable to properly research and develop the spreader for use on this combine before PAMI did its tests.

GENERAL DESCRIPTION

The Hurricane chaff spreading attachment mounts at the rear of a combine to spread the chaff from the cleaning shoe (see APPENDIX I for applicable combines).

Chaff from the shoe enters the Hurricane and is accelerated by two sets of horizontally rotating blades. The chaff exits the spreader through the two discharge ports (see FIGURE 1).

The rotating blades are driven through a 90 degree gear drive from a common horizontal shaft that is belt driven from the combine's rear straw walker shaft.

Detailed specifications for the Hurricane are given in APPENDIX I.

SCOPE OF TEST

The Hurricane was mounted on a John Deere 7720 combine. It was operated in the conditions shown in TABLE 1 for 34 hours while harvesting 320 ac (129.4 ha). It was evaluated for quality of work, capacity, ease of installation, ease of operation and adjustment, power requirements, operator safety, and suitability of the operator's manual.

RESULTS AND DISCUSSION

QUALITY OF WORK

Spreading Width: With the Hurricane mounted directly behind the combine's cleaning shoe, most of the chaff was blown over the rear of the Hurricane, directly behind the combine. The spread was improved when a rear deflector shield and shaker pan were added to direct chaff to the spreader. These additions increased the spread width to 28 ft (8.5 m) in dry average conditions and to 32 ft (9.8 m) in heavy damp chaff.

TABLE 1. Operating Conditions

Crop	Hours	Field Area	
		ac	ha
Barley	3	30	12.1
Rye	24	200	80.9
Wheat	7	90	36.4
Total	34	320	129.4

The spread pattern of the Hurricane, like other spreaders, were greatly affected by crosswinds.

Spreading Uniformity: The uniformity of chaff spreading was poor when the Hurricane was mounted directly behind the cleaning shoe since most of the chaff was blown over the rear of the spreader. The uniformity was very good after the shaker pan and rear deflector were added to direct the chaff to the Hurricane. However, it was important that the rear deflector be adjustable to regulate the amount of chaff spread to the rear of the combine.

A typical spread pattern obtained with the shaker pan and deflector shield is shown in FIGURE 2. The coefficient of variation (CV)* was 25 percent and was well within the acceptable limit. The uniformity of the spread pattern may differ considerably with field conditions and machine adjustments.

It is recommended that the manufacturer consider modifications to direct more of the chaff into the spreader, and to regulate the amount of chaff spread to the rear of the combine.

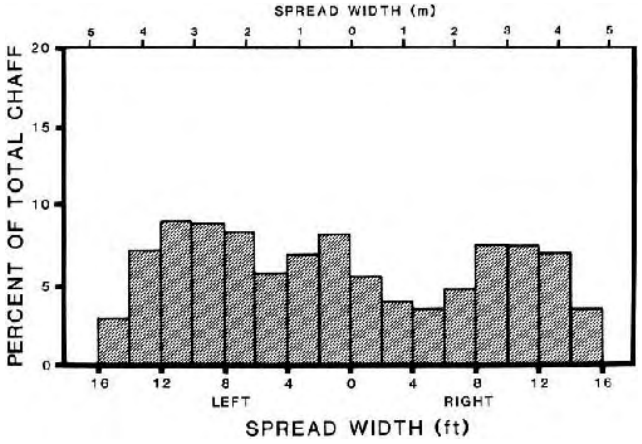

FIGURE 2. Typical Chaff Spread Pattern Uniformity After Modifications.

CAPACITY

The Hurricane had sufficient capacity to spread all of the chaff from the John Deere 7720 combine while harvesting at a maximum acceptable feedrate in all crops.

EASE OF INSTALLATION

Ease of installation was good. The Hurricane was easily installed on the John Deere 7720 combine by two men in 3 hours. The supplied mounting hardware was adequate and only four holes had to be drilled in the combine body. The installation instructions were very brief and not well illustrated. The combine's grain loss monitor sensors were not used, as no provisions were made for remounting them. It is recommended that the manufacturer provide locations for the combine's grain loss monitor sensors.

The supplied belt tightener interfered with the spreader body if it was installed on the slack side of the belt. It was replaced with a double pulley belt tightener to prevent this interference (FIGURE 3). It is recommended that the manufacturer consider modifications to prevent the belt from interfering with the spreader.

The centre steady bearing for the horizontal drive shaft was not used since the clearance between the shaft and the combine's axle support was minimal.

EASE OF OPERATION AND ADJUSTMENT

Adjustments: No adjustments were provided to alter the chaff spread pattern. **Combine Adjustment:** Ease of adjusting the combine's cleaning shoe was unsatisfactory with the Hurricane installed (FIGURE 4). The spreader body blocked access to the combine's shoe for viewing. The chaffer and sieve were difficult and inconvenient to adjust with the Hurricane in place. It is recommended that the manufacturer modify the Hurricane to allow access to the combine shoe.

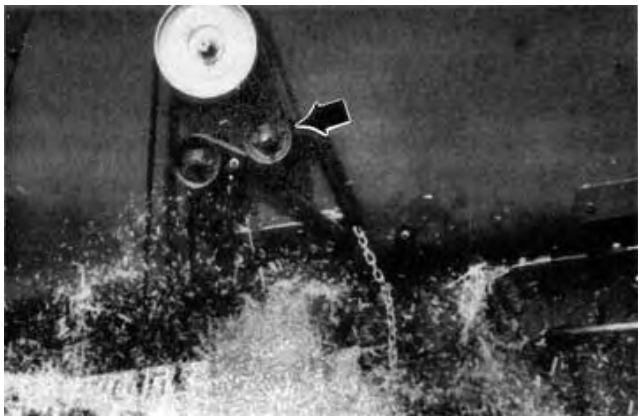

FIGURE 3. Replacement Belt Tightener.

FIGURE 4. Access to Shoe Adjustments.

Servicing: No lubrication was required. Only periodic inspections are required for loose bolts or worn parts.

Cleaning: Ease of cleaning was good. Chaff that collected under the spreader on the combine's axle support was inconvenient to remove.

POWER REQUIREMENTS

Power required to operate the Hurricane in typical conditions was 0.5 hp (0.4 kW).

SAFETY

All spreading devices for combines are potentially dangerous to operate. Extreme care is required in working near them to prevent possible injury from flying stones or other objects.

The Hurricane was safe to operate if proper safety procedures were followed. No shields were provided for protection from the drive components. It is recommended that the manufacturer supply shields for the drive sheaves. No safety instructions were provided.

OPERATOR'S MANUAL

An operator's manual was not available for the Hurricane. It is recommended that the manufacturer consider supplying an operator's manual.

The brief assembly instructions were not well illustrated. A complete parts listing was included.

MECHANICAL HISTORY

The intent of the test was evaluation of functional performance. An extended durability test was not conducted. No mechanical problems occurred during the 34 hours of testing.

**The coefficient of variation (CV) is the standard deviation of the material in each successive 24 in (508 mm) section across the spread pattern expressed as a percent of the average amount of material in a section. The lower the CV, the more uniform is the spread pattern*

APPENDIX I
SPECIFICATIONS

MAKE:	Hurricane Chaff Spreading Attachment
MANUFACTURER:	Clarke Manufacturing Ltd. P.O. Box 68 Rosetown, Saskatchewan S0L 2V0
DIMENSIONS:	
-- spreader body	
-maximum height	16.5 in (419 mm)
-maximum width	75 in (1905 mm)
-maximum length	36 in (914 mm)
-- impeller diameter 3	2 in (813 mm)
-- impeller height	2.5 in (64 mm)
TYPE:	spreader body mounts directly behind the combine's shoe; twin impellers propel chaff out opposite ports
DRIVE SYSTEM:	
-- type	belt driven from rear straw walker shaft
-- impeller speed	380 rpm

COMBINES AVAILABLE FOR:

-- Co-Op Implements	9600
-- International Harvester	914, 1440, 1460, 1482
-- John Deere	106, 6601, 7701, 7721, 7700, 7720, 8820
-- Massey Ferguson	510, 550, 751,851,852
-- White	8600, 8650, 8700, 8800, 8900, 9700, 9720
-- Allis-Chalmers	L, N
-- New Holland	TR75, TR85

APPENDIX II
MACHINE RATINGS

The following rating scale is used in Machinery Institute Evaluation Reports:

excellent	very good
good	fair
poor	unsatisfactory

SUMMARY CHART
HURRICANE CHAFF SPREADING ATTACHMENT

RETAIL PRICE	$975.00 (May, 1985, f.o.b. Humboldt, Saskatchewan. Suitable for mounting on a John Deere 7720 combine).
QUALITY OF WORK	
Width of Spread	Most of the chaff fell directly behind combine before modifications; 28 ft (8.5 m) chaff spread after modifications
Uniformity	**Poor** before modifications; very good after modifications
CAPACITY	Sufficient for maximum acceptable feedrates
EASE OF INSTALLATION	**Good;** was installed by two men in 3 hours; no provisions for combine grain loss sensors
EASE OF OPERATION AND ADJUSTMENT	
Spreader Adjustment	No adjustments provided
Combine Adjustment	**Unsatisfactory;** the spreader body blocked access to the shoe
Servicing	No lubrication required
Cleaning	**Good**
POWER REQUIREMENTS	0.5 hp (0.4 kW); minimal
SAFETY	No shields or safety information were provided
OPERATOR'S MANUAL	Not available
MECHANICAL HISTORY	No failures occurred during the test

ALBERTA FARM MACHINERY RESEARCH CENTRE

3000 College Drive South
Lethbridge, Alberta, Canada T1K 1L6
Telephone: (403) 329-1212
FAX: (403) 329-5562
http://www.agric.gov.ab.ca/navigation/engineering/afmrc/index.html

Prairie Agricultural Machinery Institute
Head Office: P.O. Box 1900, Humboldt, Saskatchewan, Canada S0K 2A0
Telephone: (306) 682-2555

Test Stations:
P.O. Box 1060
Portage la Prairie, Manitoba, Canada R1N 3C5
Telephone: (204) 239-5445
Fax: (204) 239-7124

P.O. Box 1150
Humboldt, Saskatchewan, Canada S0K 2A0
Telephone: (306) 682-5033
Fax: (306) 682-5080