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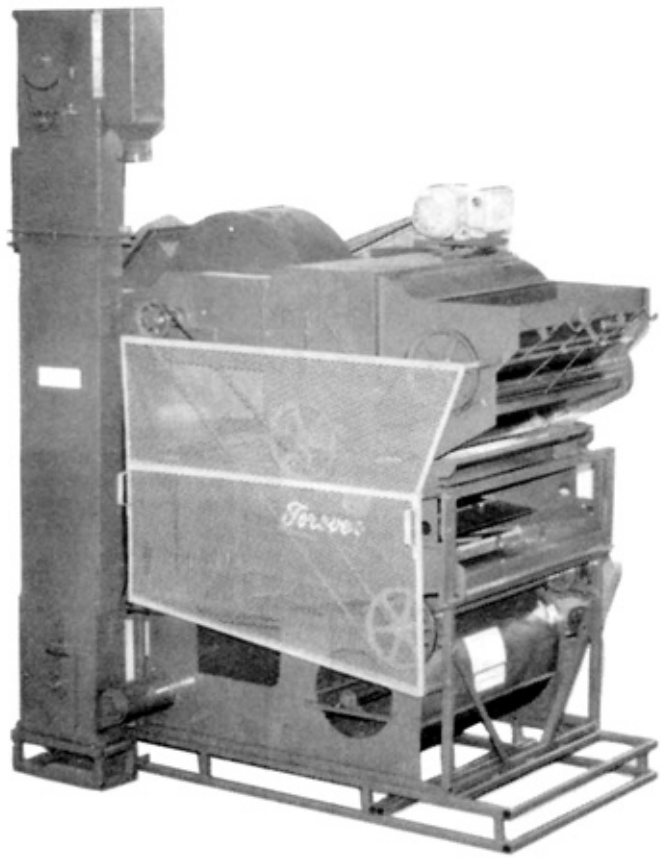

Forever 42 Dustless Grain and Grass Seed Cleaner

A Co-operative Program Between

ALBERTA FARM MACHINERY RESEARCH CENTRE

PAMI
PRAIRIE AGRICULTURAL MACHINERY INSTITUTE

FOREVER 42 DUSTLESS GRAIN AND GRASS SEED CLEANER

MANUFACTURER AND DISTRIBUTOR:
Forever Industries Ltd.
2-1673 Dugald Rd.
Winnipeg, Man.
R2J 0H3

RETAIL PRICE: $8,242.00 (Feb. 1987, f.o.b. Portage la Prairie, Manitoba) 42 Dustless with 10 small and 2 large screens.

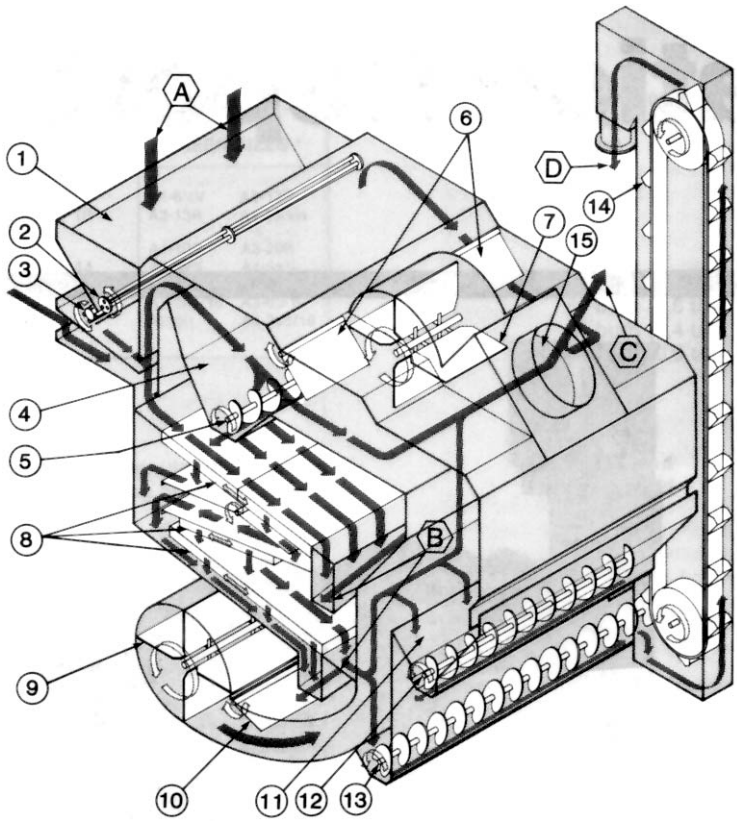

FIGURE 1. Forever 42 Dustless Grain and Grass Seed Cleaner, (A) Uncleaned Grain, (B) Screenings, (C) Dust and Chaff, (O) Clean Grain, (1) Hopper, (2) Agitator, (3) Feed Roller, (4) Suction Settling Chamber, (5) Suction Auger, (6) Suction Air Valve, (7) Suction Fan, (8) Screens, (9) Blower Fan, (10) Blower Fan Control, (11) Blower Settling Chamber, (12) Blower Auger, (13), Clean Grain Auger, (14) Bucket Elevator, (15) Dust Outlet.

SUMMARY

Quality of Work: The Forever 42 Dustless Grain and Grass Seed Cleaner was effective in removing most contaminants from spring wheat, oats and canola, Canada No. 2 grade was easily obtainable with acceptable losses in screenings, Canada No. 1 status could be obtained if problems such as barley in wheat, wild oats and wheat in oats, and ball mustard in canola were not present.

Rate of Work: Capacity of the cleaner varies depending upon the crop, contaminants and grade desired. A Canada No, 2 grade was achieved with incoming feed rates of 60 bu/h (1.6 t/h) in wheat, 95 bu/h (1.4 t/h) in oats, and 40 bu/h (0.9 t/h) in canola.

Ease of Operation and Adjustment: Adjustment of the two fans was very fast and simple. The four screens took one person about 5 minutes to replace.

Power Requirements: One 5.0 hp (3.7 kW) electric motor was used to drive the cleaner and had adequate power.

Operator's Manual: The operator's instructions consisted of one page of parts description and suggested screens for various crops. Much more information on operation, adjustment, service and safety was required.

Operator Safety: The Forever cleaner was safe to operate if normal precautions were observed and the optional belt and pulley shields were properly installed.

Mechanical History: No durability problems occurred during testing.

RECOMMENDATIONS:

It is recommended that the manufacturer consider:

1. Modifying the cleaner so that there is less grain spillage and leakage.
2. Providing calibraion decals for more convenient adjustment of the air volume controls.
3. Providing an operator's manual containing information on operation, adjustment, safety, lubrication, maintenance and warranty.
4. Providing shields as standard equipment and safety decals to alert the operator of potentially hazardous areas.

Station Manager: G. M. Omichinski

Project Engineer: D.J. May

THE MANUFACTURER STATES THAT

With regard to the recommendation: (1-4)

1. We have redesigned the seal and installed an air deflecting plate to eliminate leakage just ahead of the blower fan. The sides of the shaker shoe have also been redesigned to eliminate losses due to kernel bounce.
2. Calibrated decals for air settings will be on all new models.
3. A new operating manual, containing all pertinent information is being written.
4. Shields and safety decals will be standard equipment on all models.

GENERAL DESCRIPTION

The Forever Grain and Grass Seed Cleaner is a solidly constructed, small capacity grain cleaner which incorporates aspiration and screening to separate grain and remove foreign particles. Grain is separated by weight, width and length. These functions are performed by a suction fan, a blower fan and four reciprocatlng screens.

Contaminated grain fed into the hopper is evened out across the machine width by the agitator (FIGURE 1). Feed rollers create a "shower" of grain down onto the screens. The suction fan pulls dust, chaff and light particles out of the shower of grain and allows them to settle into the suction auger for removal. Four screens mounted to an eccentric shaker have varying sizes and shapes of holes to remove both large coarse particles and small fine particles including weed seeds and other crops. From the final screen the grain drops down into the clean grain auger where it is taken out of the cleaner. As the grain is dropping into the auger a blower fan blows air th rough the cascade of grain for final grading of the grain by weight and for removal of dust. Most particles removed by the blast of air settle into another auger for removal from the cleaner. The very light particles such as dust are removed by both fans and are carried out through an air duct for collection, if desired.

An optional bucket elevator was supplied with the test machine to elevate the clean grain from the clean grain auger up into a wagon or truck.

Detailed specifications are given in APPENDIX I.

SCOPE OF TEST

The Forever seed cleaner was operated for approximately 50 hours while cleaning wheat, oats and canola. Certified seed was mixed with known quantities of screenings, chaff, wild oats and small weed seeds? The mixture was cleaned by the test machine. The machine was evaluated for quality of work, rate of work, ease of operation and adjustment, power requirements, suitability of the operator's manual and operator safety.

RESULTS AND DISCUSSION

QUALITY OF WORK

Before the cleaning operation begins, the operator should determine the quality of the uncleaned sample, the grade standard to be met, the acceptable level of screenings and the time available for cleaning the grain. A small amount of desired grain is expected to be lost with the screenings in each cleaning operation. The Forever 42 Dustless cleaner does not include all possible cleaning operations and is not designed to remove all types of contaminants from every type of grain.

Suction Fan: The suction fan was used to draw chaff, hulls and light particles off the contaminated grain. Although the fan could easily lift good kernels of wheat from the sample, careful adjustment kept good grain losses to a minimum. The performance of the suction fan was very good.

Screens: With wheat and oats, selected screens adequately removed small weed seeds from the Columbus wheat and the Fidler oats. After trying several sizes of screens, the problem of removing barley from the wheat and wheat from the oats could not be solved. Increased aspiration (with an increase of grain loss to screenings) partially solved the problem of barley in wheat, but did not remove wheat in oats since wheat is heavier. The test machine also had difficulty removing ball mustard from canola.

Losses occurred in several places on the machine especially along the sides of the screens. Seed tended to bounce over the edges of the screen frames. Also, a significant amount of grain leaked out the bottom of the cleaner into the space just ahead of the blower fan (FIGURE 2). It is recommended that the manufacturer consider modifying the cleaner so that there is less grain spillage and leakage.

Hard rubber balls were provided within the screen frames to prevent material from collecting in the screen holes. The ability of the rubber balls to keep the screens free of material was very good (FIGURE 3).

Blower Fan: The blower fan was used for final grading of the grain by weight as it came off the screens. This fan could also lift off large good kernels of grain from the sample, so careful adjustment was necessary to keep good grain loss to a minimum. The performance of the blower fan was very good.

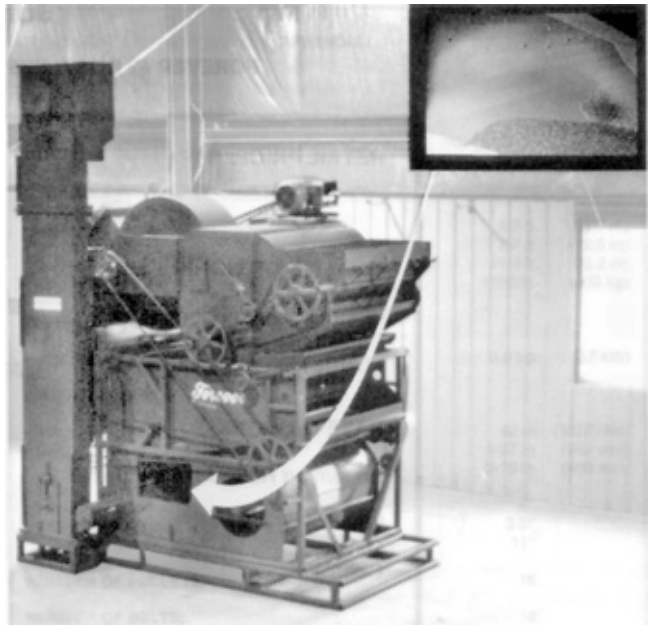

FIGURE 2. Grain Leakage Area (Close-up of area shown in inset).

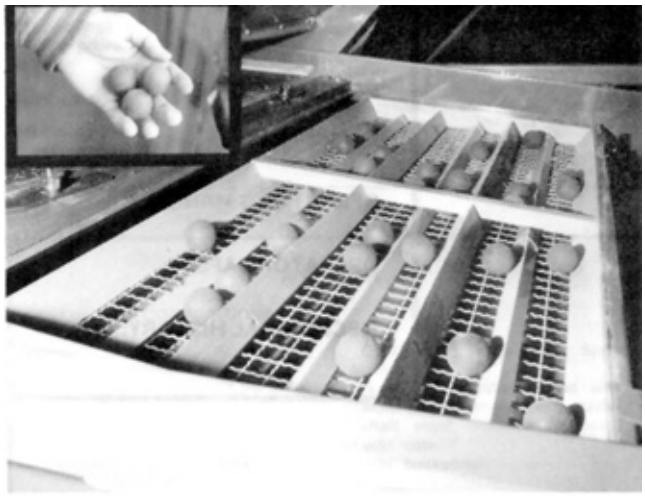

FIGURE 3. Screen Frame (Hard Rubber Balls Shown in Inset).

General Performance: Canada No. 2 was produced from all three test samples of spring wheat, oats and canola. Certified No. 1 or No. 2 seed could have been produced if certain elements indicated below were not present or if other machines were used in conjuntion with the test machine.

The seed regulations are very strict about the amount of ergot and noxious weed seeds in cereal grains. The Forever cleaner removed enough of these impurities to achieve Certified No. 1 status for the wheat sample.

However, the cleaner had difficulty in removing enough barley from the wheat to grade higher than Canada No. 2.

A large percentage of bosom oats (one oat inside another) were left in the oat sample. These seeds could have been knocked apart with another cleaning machine (e.g. Buffer). Wild oats in oats is considered to be an inseparable operation. The Forever cleaner reduced the amount of wild oats in oats but not to seed standards. Also, the cleaner would not remove plump wheat kernels from the oat sample.

The test sample of canola contained a large amount of ball mustard and some wild mustard, both of which are very difficult to remove. A large amount of ball mustard, small wheat kernels and broken wheat remaining in the sample kept the grade down to Canada No. 2

[1]*See Appendix II for detailed composition of test material.*

RATE OF WORK

The capacity of the machine was dependent upon various factors. These included the type of crop cleaned, contaminants in the sample, the grade desired and the screen configuration selected.

TABLE 1 shows typical rates for wheat, oats and canola that achieved Canada No. 2 results with the samples of grain cleaned. Cleaner bin samples could be processed at higher rates. Quality was adversely affected at feed rates above those indicated.

TABLE 1. Cleaning Rates

CROP	INCOMING RATES bu/h t/h	OUTGOING RATES bu/h l/h	SCREENINGS %	SCREEN SIZES
Wheat	60 1.6	48 1.3	18	A1-6½V A3-13R A2-13R A4-5-3/4x3/4
Oats	95 1.4	51 0.7	44	A1-10R A3-20R A2-9x3/4 A4-5x3/4
Canola	40 0.9	27 0.6	28	A1-3x5/16 A3-6½ R A2-6R A4-3x5/16

* R - Round Screen V - Buckwheat Screen

EASE OF OPERATION AND ADJUSTMENT

It was important to wait approximately five minutes after making an adjustment before determining if the setting change achieved the desired result.

The motor was equipped with an adjustable pulley. This allowed the suction fan speed, and eccentric shaker speed to be varied during testing, but not independently of one another. A set of cone pulleys from the eccentric shaker to the blower fan made it possible to control the blower fan speed independently from the rest of the machine. Only infrequent adjustment in speed settings was necessary.

The air volume controls for the two fans were easy to reach and simple to adjust but had no calibration scale along the side of the threaded adjustment crank. It is recommended that the manufacturer consider providing calibration decals for more convenient adjustment of the air volume controls.

The screens were held in place on the eccentric shaker with thumbscrews and were easy to change. One person could easily change the four screens in five minutes.

Two steps were required to clean the machine between crops. The screens had to be removed and completely brushed clean and the three cross augers had to be vacuumed out. Neither of the steps was difficult, but it was awkward reaching the aspiration augers with a vacuum hose.

POWER REQUIREMENTS

The 5.0 hp (3.7 kW) motor installed on the cleaner had sufficient power to operate the machine in all grains encountered.

OPERATOR'S MANUAL

The only instruction supplied by the manufacturer was a one page description of the various parts of the machine and a table of suggested screens for different grains to be cleaned. It is recommended that the manufacturer consider providing an operator's manual containing information on operation, adjustment, safety, lubrication, maintenance and warranty.

OPERATOR SAFETY

The Forever Grain and Grass Seed Cleaner was supplied with optional belt and pulley shields. The machine was safe to operate if these shields were kept in place and normal safety precautions were observed. Aisc, no safety decals were provided on the test machine. It is recommended that the manufacturer consider providing shields as standard equipment and safety decals to alert the operator of potentially hazardous areas.

MECHANICAL HISTORY

The Forever 42 Dustless was operated for approximately 50 hours. No mechanical problems arose during the test. The intent of this evaluation was an appraisal of functional performance, and an extended durability evaluation was not conducted.

APPENDIX I

SPECIFICATIONS:

MAKE: FOREVER

MODEL: 42 Dustless Grain and Grass Seed Cleaner

OVERALL DIMENSIONS: (with bucket elevator)

- width	5.7 ft	(1.7 m)
- length	7.7 ft	(2.3 m)
- height	10.6 ft	(3.2 m)
- weight	1990 lb	(903 kg)

DRIVE:

- one electric motor	5.0 hp	(3.7 kW)

GRADER SCREENS:

- width	42 in	(1070 mm)
- length	1-37 in	(940 mm)
	3-19 in	(480 mm)
- slope		
- top two screens	8°	
- middle screen	3.5°	
- bottom screen	11°	

NUMBER OF PULLEYS: 16

NUMBER OF BELTS:

NUMBER OF CHAINS:

NUMBER OF DISCHARGE CHUTES:

- screenings	4 gathered into 1
- clean grain	1
- dust	1

OPTIONAL EQUIPMENT:

- bucket elevator
- various screens

APPENDIX II

TEST SAMPLE COMPOSITIONS:

Wheat:	82.5%	- Certified No. 1 Columbus Spring wheat
	15.0%	- Screenings (cracked wheat, small weed seeds, whole grain, barley, chaff, ergot, unthreshed heads)
	2.0%	- wild oats
	0.5%	- wild buckwheat
Oats:	70.0%	- Certified No. 2 Fidler Oats
	30.0%	- Screenings (chaff, light oats, whole oats, bosom oats, wheat, small weed seeds)
Canola:	80.0%	- Certified No. 2 Regent Canola
	20.0%	- Screenings (hulls, bail mustard, whole canola, wheat, small weed seeds, straw, pods).

APPENDIX III

MACHINE RATINGS

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

Excellent	Fair
Very Good	Poor
Good	Unsatisfactory

SUMMARY CHART

FOREVER 42 DUSTLESS GRAIN AND GRASS SEED CLEANER

RETAIL PRICE:	$ 8,242.00 (Nov. 1986, f.o.b. Portage la Prairie, Man.)
QUALITY OF WORK:	
- Light Material Removal	**Very Good**
- Small Material Removal	**Good**
- Large Material Removal	**Good**
RATE OF WORK:	
(Incoming Rates for Canada No. 2)	
Wheat	60 bu/h (1.6 t/h)
Oats	95 bu/h (1.4 t/h)
Canola	40 bu/h (0.9 t/h)
EASE OF OPERATION:	
Settings	**Very Good**
Screen Changes	**Very Good**
Cleanout	**Good**
POWER REQUIREMENTS:	
Electric Motor	5.0 hp (3.7 kW)
OPERATOR'S MANUAL:	**Poor;** insufficient instruction
OPERATOR SAFETY:	**Good;** with optional shields
MECHANICAL HISTORY:	No mechanical problems during the test.

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