(54) Title: GRAIN STORAGE AND TRANSPORTATION CONTAINER

(57) Abstract

A container (C) for storing and transporting grains having rigid side (11, 12) and end walls (16) defining a generally rectangular or square cross-sectional shape, wherein the bottom corner is truncated to form a generally flat supporting base (10) which is formed by a pair of hopper doors (10a) which provide the base panel when closed, but can be opened to discharge the contents from the container having a covered filler opening (13) in the top, the container being provided with perforated drying tubes (18) extending therewithin and a wheeled transport unit (T) for receiving the container thereon and tilting the container into position where one of the hopper sides (11) forms the bottom during transportation and permitting the container to be readily moved from one location to another.
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GRAIN STORAGE AND TRANSPORTATION CONTAINER

BACKGROUND OF THE INVENTION

In the past, grains have had to be initially loaded into trucks in the field and delivered to large storage bins on the farm site for storage until marketing. This requires initial handling in the loading of the truck, a second handling in unloading the truck, a third handling in loading the bins; a fourth handling for unloading the bins and loading the grain back in the trucks, and a fifth handling at the country elevator site at the time the grain is sold by the farmer. The present invention permits the grain to be loaded once in the field, into the storage box and the storage box then transported to a suitable storage location on the farm site where the grain is stored until it is taken to market in the same storage box, thus eliminating most of the handling steps and thus, obviously reduces damage to the grain. Suitable means for drying the grain while confined within the box may be provided such as the perforated hollow tubes extending thereacross through which hot drying air can be injected through the grain without removing the grain from the box.

SUMMARY OF THE INVENTION

The invention consists in a generally cube shaped box having one corner thereof truncated to form sloping hopper sides and a box bottom, the bottom having normally closed hopper doors which form the supporting bottom for the box when closed, but which can be opened to discharge the contents of the box for dumping, the box being particularly easily loaded onto a pivoted sloping frame which matches the slope of one of the hopper side panels to permit the frame to be positioned thereunder with means for releasably connecting the box to the mounting frame and elevating the box thereon into transporting position for transporting the same from one location to another, said box being provided with a plurality of perforated air discharge tubes extending thereacross for introducing a flow of drying air.
through the grain confined within the container to dry the
grain without removing it from the container and maintain
optimum moisture content therein during storage in the con-
tainer.

DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective view of the container
embodying this invention with a wheeled trailer unit about
to be connected thereto for transporting the same;

Fig. 2 is a side elevational view of the trailer
connected to the storage unit with the hopper doors shown
in open, dumping position;

Fig. 3 is a side elevational view of the container
mounted on the trailer in transporting position; and

Fig. 4 is a front elevational view taken substan-
tially along the line 4-4 of Fig. 3 with portions broken
away.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

As shown in the accompanying drawings, this inven-
tion provides a grain container unit C which is in the form
of a cube having one edge thereof truncated to form a bottom
10. Sides 11 slope upwardly from the bottom at approximately
45° and the upper side walls 12 are rigidly connected to the
upper ends of the sloping sides 11 and form upwardly con-
verging top panels which are slightly truncated at the upper
ends thereof to form an opening 13 through which grain can
25 be introduced into the container. A cover 14 is hinged to
the top of one of the sides 12. End panels 16 are provided
to complete the generally cube-shaped enclosure.

A plurality of perforated air discharge cross
30 tubes 18 are rigidly mounted in the ends 16 and extend
across the container between said ends 16 to provide rigid
cross bracing within the container unit. The ends of the
tubes are normally closed but a least one end is provided
with a removable cap 18a which permits a hot air supply tube
(not shown) to be connected to deliver hot drying air through
the grain being storaged in the unit C, thus providing a
combination storage container and grain drier.
The truncated bottom of the container unit C is provided with a discharge opening which is normally closed by a pair of hopper doors 10a to which toothed arcuate segments 10b are fixed at the respective ends of the doors. The segments are mounted for movement within the container adjacent to the respective ends 16 and mesh with toothed pinion gears 10c to which crank 10d can be connected for turning the same to open and close the doors 10a. A cross shaft 10e connects opposed pinions 10c. The doors may be overlapped along the center line of the opening to provide a seal when closed.

A suitable container pick up and transporting vehicle is provided such as the trailer T illustrated, which has a pick up and carriage frame F pivotally mounted at the rear end thereof with the pivot points located substantially over the axle of the trailer T. The trailer T is provided with a rigid frame assembly 25 which has a hitch 25a at the forward end thereof. An axle 26 is mounted at the rear end of the frame 25 and has wheels 27 journaled on the ends thereof. A pair of pivot pins 30 connect an intermediate portion of the frame F to the rear portion of the frame 25 above the axis of the axle 26 and in substantial alignment therewith. The pivoted frame F has suitable channel members or rails 31 along the sides thereof to form a container-receiving channel and bed therebetween. Suitable slides 35 are slidably mounted on the rails 31 and are provided for suitable releasable connection with the container unit C as by a pair of removable connector pins 36 inserted through holes 35a formed in the forward ends of slides 35 and in brackets 37 fixed to container C. A pair of hydraulic cylinders 40 connect the frame unit F to the slides 35 as shown and provide the power for moving the slides forward and back on the rails 31. A second pair of cylinders 41 are connected between an intermediate portion of the trailer frame 25 and the forward end of the pick up and carriage frame F to raise and lower the front end of said frame F to facilitate picking up, transporting, and dumping the container unit C.
As best shown in Fig. 1, the storage container unit C may be placed outside in any convenient location for storage on the farm site until the proper time for transportation to the market place. When the grain is initially loaded into the container through the top opening 13, it may be attached to a farm tractor with the hydraulic system of the tractor connected with the hydraulic cylinders 40 and 41 for controlled actuation thereof. The grain may be introduced into the container in the field where it is being harvested and when filled, the next container is merely moved into filling position adjacent to the harvesting machine (not shown). As previously stated, hot drying air may be introduced into the grain mass confined within the container unit C so that the grain may be dried and kept at the optimum moisture content after harvesting and during storage. When the box is to be transported to another location, the trailer unit T is backed into pick up position with the pick up and carriage frame tilted upwardly to engage the sloping side 11 with the attachment pins 36 inserted through the holes 35a of slides 35 and the holes in brackets 37. The cylinders 40 are in retracted position for initial pick up and the cylinders 41 are in extended position. When the box has been connected to the slides 35, the cylinders 40 are extended and the cylinders 41 are retracted. This may be done simultaneously or successively. The hydraulic system of the tractor is normally used for actuating the cylinders 40 and 41. When the frame has been lowered into horizontal transporting position as shown in Fig. 3, the box may be then transported to the market place or to any other desired location. At the market place the container may be dumped by tilting the frame F into the position shown in Fig. 2 and the hopper doors 10a swung downwardly into open position as illustrated. This discharges the grain into a conventional elevator hopper (not shown).
It will be apparent that the combined container, drier and transporting unit has been provided which completely eliminates multiple handling of the grain which as is presently required. This not only prevents the expense of the multiple handling, it also eliminates the possibility of damaging the grain.
WHAT IS CLAIMED IS:

1. A storing and transporting container particularly adapted for use with grains and comprising,
   a rigid container unit having rigid wall portions defining a grain storage chamber therewithin and having a generally flat bottom portion with a discharge opening therethrough,
   openable closure elements normally closing the discharge opening,
   certain of said side wall portions sloping downwardly toward the bottom discharge opening to direct the grain to said opening during the discharge operation,
   said container having a filler opening in the upper portion thereof with a removable cover normally closing said filler opening, and
   means for connecting said container unit to a wheeled vehicle for transporting the same from one location to another.

2. The structure set forth in claim 1 and said container having side wall portions rigidly connected with the other walls and means defining spaced apart openings in selected wall portions to permit the introduction of warm drying air into the interior of the container for drying grain being confined therewithin.

3. The structure set forth in claim 2 and hollow perforated tube means mounted in said spaced apart openings and extending across from one side wall to the other in fixed relation to both of said side walls and having sufficient strength to provide structural reinforcement to the container unit.

4. A combination of a storage and transporting grain container and a wheeled transporting vehicle, said container comprising,
   rigid wall portions defining the grain storage chamber therewithin and having a generally flat bottom portion with a discharge opening therethrough,
openable closure elements normally closing
the discharge opening,
certain of said side wall portions having
generally flat, downwardly sloping panels for guiding the
5 grain being discharged down through the discharge opening,
said container having a filler opening in the
upper portion thereof with a removable cover,
the transporting vehicle comprising a rigid
frame structure,
10 wheels journaled on said frame structure for
supporting the same during transportation,
a pick up and carriage frame pivotally mounted
to the rear portion of said wheeled vehicle frame,
means for tilting said pick up and carriage
frame to an angle substantially equal to the angle of slope
of the bottom container panels when the container is rest-
ing on its flat bottom portion to permit the frame to be
inserted under said sloping bottom panel for engagement
therewith,
20 means for anchoring the container to the
pivoted pick up and carriage frame, and
means for tilting the carriage frame with the
container thereon down into horizontal transporting posi-
tion on said wheeled vehicle.
25 5. The combination set forth in claim 4 and means
for moving the container forwardly on said pick up and car-
riage frame after connection therewith.
6. The structure set forth in claim 5 and a pair
of slide elements mounted on the sides of said pick up and
30 carriage frame for removable connection with said container,
and
said means for moving the container forwardly
comprising hydraulic cylinder means connected with said
slide elements.
### INTERNATIONAL SEARCH REPORT

**International Application No:** PCT/US83/01848

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#### II. FIELDS SEARCHED

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Documentation Searched other than Minimum Documentation to the extent that such Documents are Included in the Fields Searched.

#### III. DOCUMENTS CONSIDERED TO BE RELEVANT

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<td>US, A, 3,171,405, (Miller), 02 March 1965.</td>
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#### IV. CERTIFICATION

Date of the Actual Completion of the International Search 1: 14 February 1984

Date of Mailing of this International Search Report 2: 23 FEB 1984

International Searching Authority 1: ISA/US

Signature of Authorized Officer 19: David A. Bucci 3/17/94

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