Development of Threshing Machine in Japan

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Methods of threshing in the oldest threshing devices consisted of the flail, beating table and threshing sticks. In 1600 the Senba thresher was invented and it was used for 300 years up to the Taisho era when the pedal thresher was introduced. (Fig. 1).

This thresher was invented in Japan in 1911 independently from the Western style pedal thresher or treading thresher and was widely used in all countries of the world.

The pedal type machine was improved in the later Taisho period to the power driven type and to the self-feeding thresher or unique Japanese type thresher to which rice crop stalks are fed by themselves (Fig. 2).

The Western style throw-in type thresher was studied in Japan after the war but it was not developed. The study on combines was launched and Western style combines were produced. At the same time (1963), small size combines were developed as they were suitable for the small farm lands in Japan.

The Japanese style combine is a machine which combines the self-feeding thresher with the reaping device (Fig. 3).
Pedal-driven thresher

Crank (A) is connected to the big gear (B) which, in turn, drives the little gear (C) fixed on the cylinder. Thus, your foot revolves the cylinder. The cylinder has a number of bars on which many threshing teeth are set in. As the cylinder revolves, the steel teeth beat off the paddy out of the heads fed on it. The shield beneath and the hood above the cylinder prevent the scattering of the paddy and dust.

Power-driven thresher

In this machine, both the threshing cylinder and the cleaning fan can operate at the same time. Consequently, not only threshing but also cleaning can be done effectively and efficiently. During operation, neither paddy nor dust is scattered by the machine which can separate ripen and unripen paddy from dust. In addition, the machine pours paddy into bags or other containers.

Model shown in Fig. 6 comprises two similar threshing drums arranged front and rear in parallel running at the same circumferential speed. The materials put into the first threshing chamber are mostly threshed there and the stalks remaining inside are automatically conveyed into the second threshing chamber after they are chopped into small pieces by the first cutting blade.

Unthreshed paddy still remaining on the ears are completely removed in the second threshing chamber and the straws after being cut further are automatically exhausted out of the straw and dust outlet. The grains that

![Diagram of Pedal-driven thresher in Japan](image)

![Diagram of Power-driven thresher](image)
have dropped through the separating screens
are then separated by the winnower fan and
divided into the whole paddy and the unripen
paddy. The unripen paddy will be blown out
from the unripen paddy outlet and the whole
paddy is taken out by means of the throwing
elevator. A small amount of unripen paddy
which might be blown out and be mixed
among straw pieces and dust will be also re-
covered in the unripen paddy outlet by the
vibrating sifter and the ripen paddy reversing
system.

"Throw-in" threshing: When the paddy is
picked by the ear or reaped by short stalk to
the length preferably less than one foot, you
can just throw these paddy ears with or with­
out the stalk into the threshing chamber
through the front right-side feed opening, and
the therher automatically threshes, separates
and cleans the paddy, exhausts straw chips
and dust and turns out the finished cleaned
paddy.

Self-feeding power thresher

This machines is used when rice is reaped
about 2 ft. long. It is an epoch-making feat
in view of the fact that while threshing, rice
stalks are sent automatically from left to right
by means of a chain instead of being held by
hands.

1) Rice stalks to be threshed are placed on
the feeding table attached to the left end of
the machine, and must be fed continuously in
small quantities by hands into the feed-in
opening of the feeding chain. As for the
method of feeding, rice-ears must be first taken
into the threshing chamber and then make the
feed chain grip the opposite part of the stalks.
Inserted stalks are sent left to right tightly
gripped between the feeding chain and the
stalk pushing up bar and are guided out by
the straw guide out pipe.

2) Inserted rice stalks are threshed while
being shifted by the feeding chain under the
rotating threshing drum. When threshed
paddy goes past the crimped screen, dust and
other foreign mixtures are separated by
fanning, and only the whole mature paddy is
carried by the first screw conveyor over to the
throwing elevator and discharged outward at
the cleaned paddy outlet.

3) Rice stalks chopped short and still un­
able to pass through the screen are to be sent
to the auxiliary threshing drum, where stalks
with paddy are given the second threshing and
then another screening by the auxiliary screen
and the vibrating sifter. Only dust and straw
are to be discharged outside the machine
through the suction exhauster fan.

4) Dust and paddy having passed through
the screen undergo separation by fanning in­
side the winnower, in which case the dusting
regulator must be operated carefully so as not
to blow the paddy out of the dust discharge
outlet.

Reference

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