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**Expert Group Meeting on Design, Development and
Manufacture of Simple Food Processing and
Preserving Equipment***

Lusaka, Zambia, 9-13 January 1989

TECHNICAL PAPER REPORT**

Prepared by

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* Organized by UNIDO in co-operation with the Government of Zambia and the Village Industry Service

** The views expressed in this paper are those of the author and do not necessarily reflect the views of the Secretariat of UNIDO. Mention of firm names and commercial products does not imply the endorsement of the United Nations Industrial Development (UNIDO). This document has not been edited.

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Introduction

Since the late eighteenth century when European civilization was ushered in the country, Uganda witnessed an increasing progress in the development and manufacture of food processing and preserving equipment. This slow development is generally attributed to numerous setbacks. There has been a natural tendency of the local population to prefer imported products or equipments, especially European imports.

Because of the poor financial status, the lack of proper machinery and tools, and the lack of initiative for properly qualified personnel, the quality of the products has not, in some particular areas, reached comparable standards with those from abroad.

However, with the current trend of events in the country, there is a great governmental emphasis on the development of small-scale industries. There is hope that soon promising achievements will be made by the industrialists concerned in this sector.

Many food processing equipments are made in the country; these range from groundnut shelters, rice threshers, maize or grain hullers, feed mixtures, maize or grain mills, to coffee processing equipments, for example, catadors.

This presentation will only discuss the specified equipments whose drawings have been attached. Only food processing equipments are the sole presentations in this technical paper as they are the most abundant in the country, while very few food preserving equipments have been developed.

- (1) Hammer mill (for maize, millet, cassava, etc.). See appendix 1.1; 1.2; 1.3; 1.4; 1.5.

This hammer mill is designed to suit any type of grain milling. The main body is essentially fabricated from galvanized, heavy-duty, (3 mm thick) mild steel plates with a central rotor hammer fitted on 2" c, self-centering bearings. The average hammer mill can be connected to an electric or diesel motor of 11-15kw (15-20hp). Power transmission is supplied by a 3'B' section vee belt (or more, depending on size) and the recommended speed is 3000rpm. It has an output of 700-150kg/h, depending on the screen size and the moisture content of the grain in question. With a maize grain of 16 per cent moisture content, 1,520kg/h of maize floor can be produced on a 3mm screen while a 1.5mm screen will yield 780kg h.

The hammers are made of low-carbon steel, which is hardened and reversible, giving them four lines. Depending on the capacity of the mill, a different number of swinging hammers are fitted onto the rotor:

for 16hp 16 hammers;
for 26hp 32 hammers;
for 40hp 48 hammers.

Similarly, the efficiency of the fan is improved by additional blades:

for 16hp 2 blades;
for 26hp 4 blades;
for 40hp 6 blades.

Grain is fed by bulk or bag into the feed hopper. Pneumatic feed in the grinding chamber is controlled by a regulating duct. This duct controls smooth feeding simultaneously, allowing the operator to inspect the milling stuff for any impurities which may occur, i.e. stones, nuts and bolts.

(2) Groundnut sheller. See appendix 2.1.

This machine is designed to remove groundnut shells from the nuts themselves. For a long time farmers have removed by hand the nut meat from the shells. To lessen this laborious task, this machine has been designed to increase production.

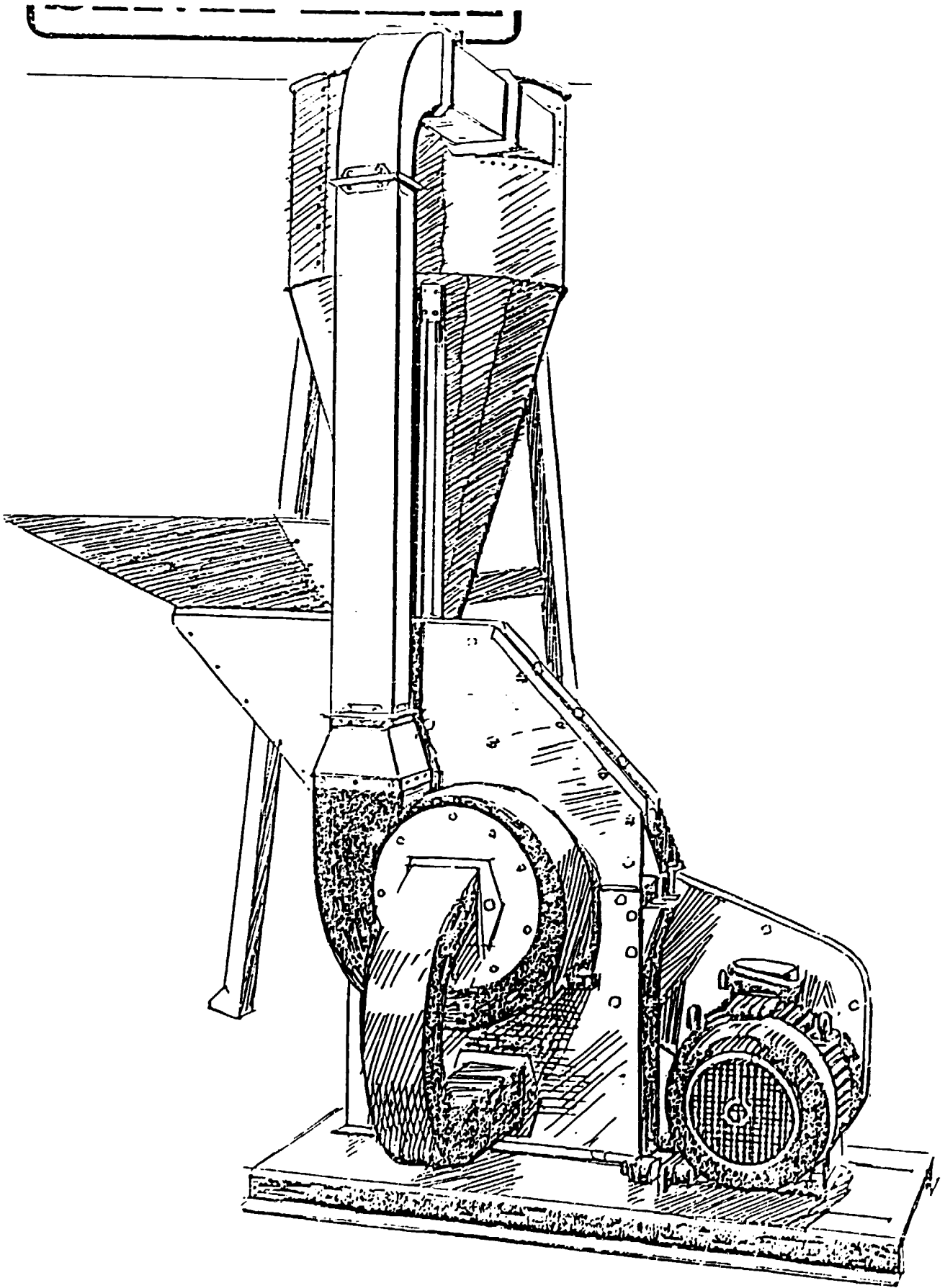
This is basically a manual operation. Dry nut shells are fed into the machine until it is 75 per cent full. With a back-and-forth movement of the handle, the machine crushes the nut shells and, in doing so, the resultant nuts and the shell fragments pass through the perforated grill base of the machine. The resultant mass is collected for easy separation by hand picking.

Construction

The body of the machine consists of a heavy, mild-steel plate 3mm thick, while the bottom is made of mild steel flats of 1.5". The crusher is made of surface-hardened steel rods of 8mm diameter. The clearance between the crusher and bottom grill is 4-6mm.

Output

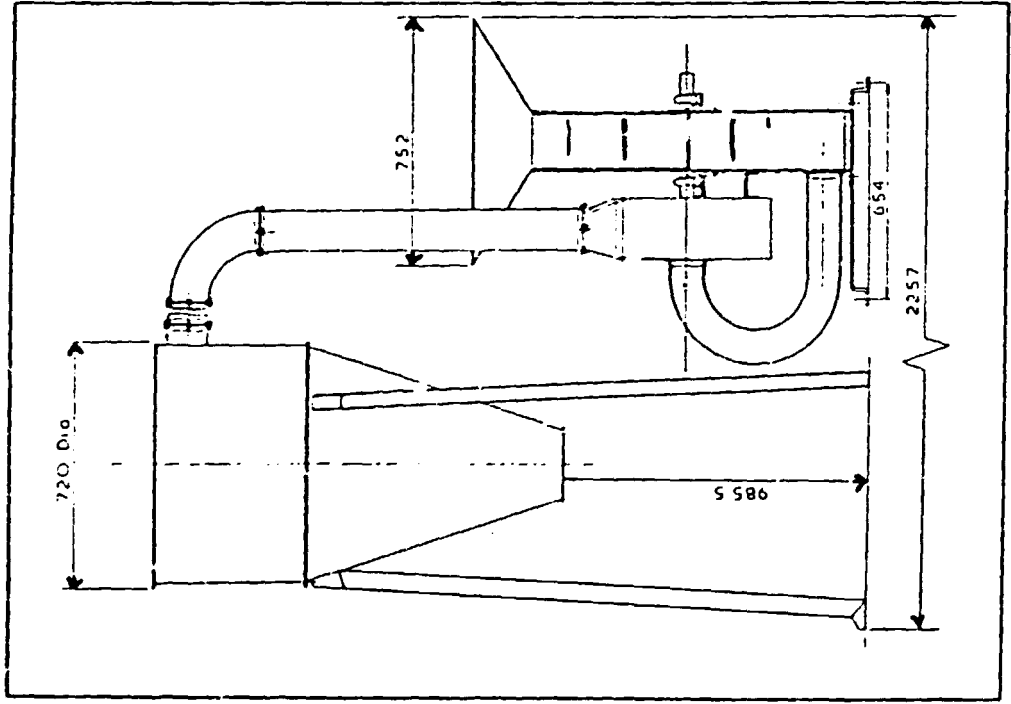
For an eight-hour working shift, one can crush an average of five to six bags of dried groundnut shells.



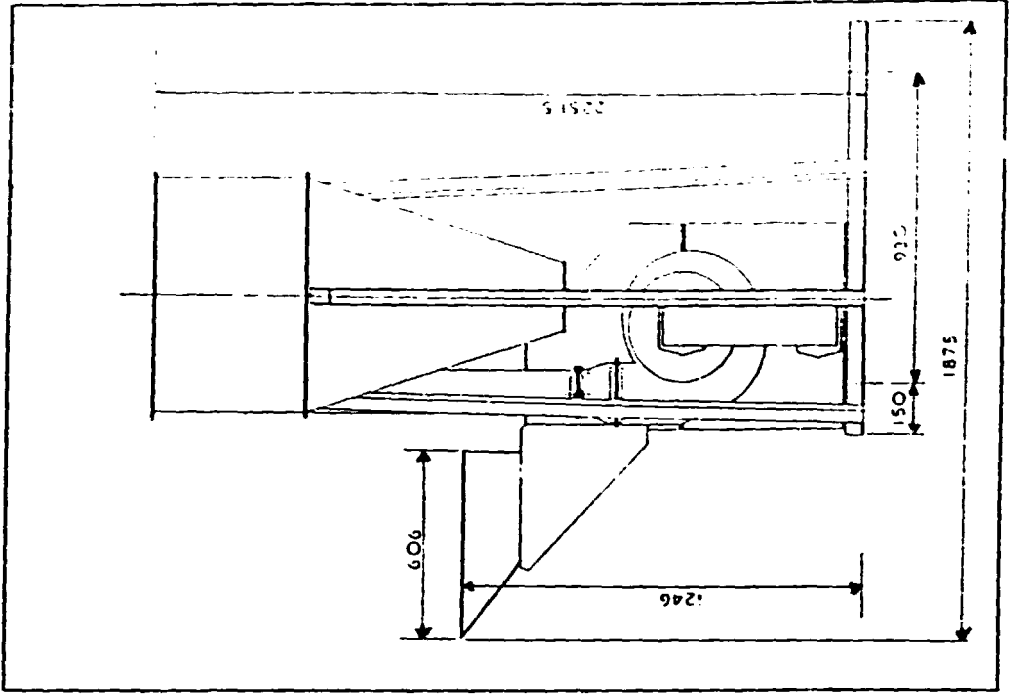
The mill should be firmly bolted to a flat solid base.

APPENDIX 1.2

END ELEVATION

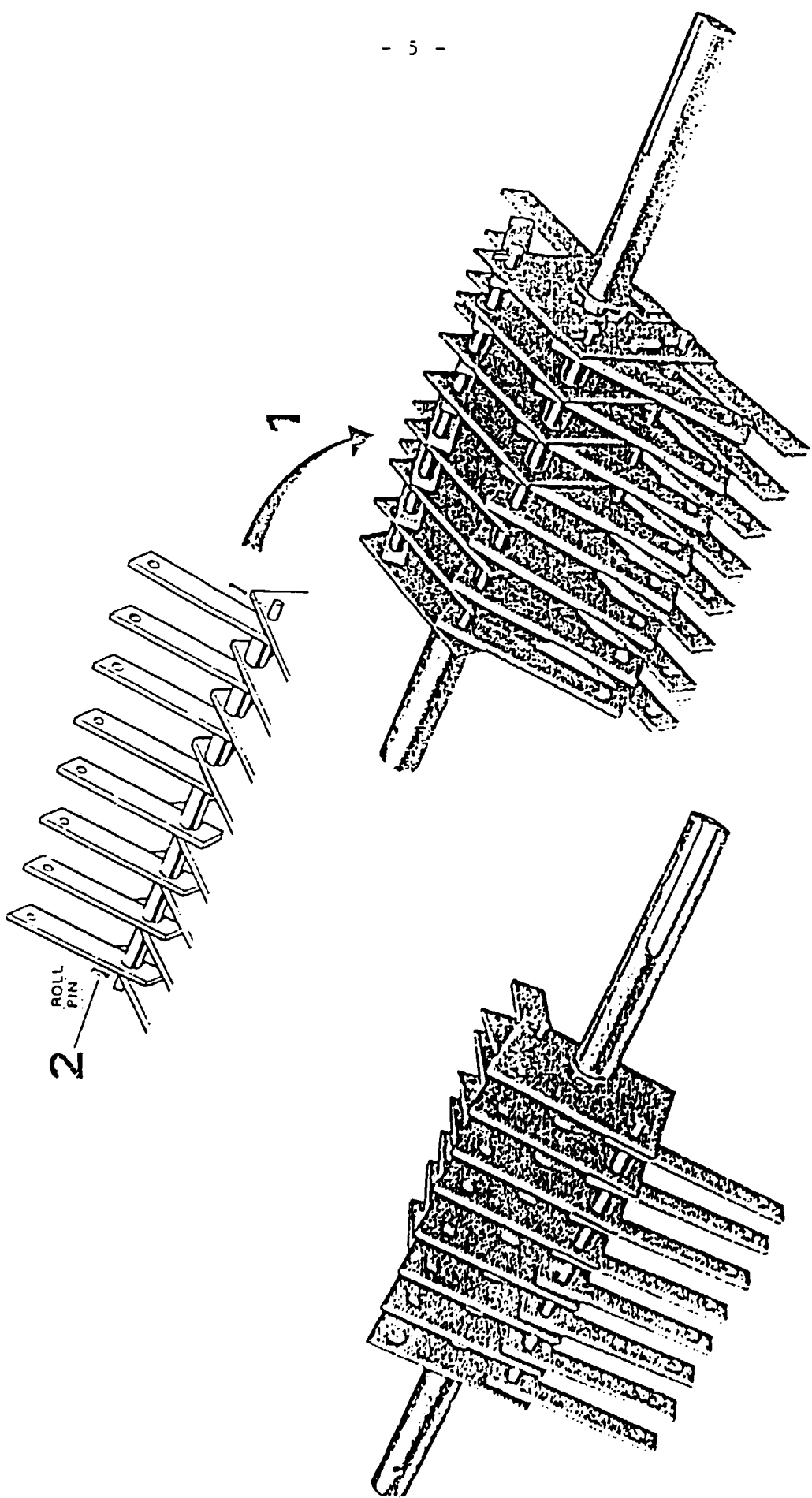


SIDE ELEVATION



Rotor

APPENDIX 1.3



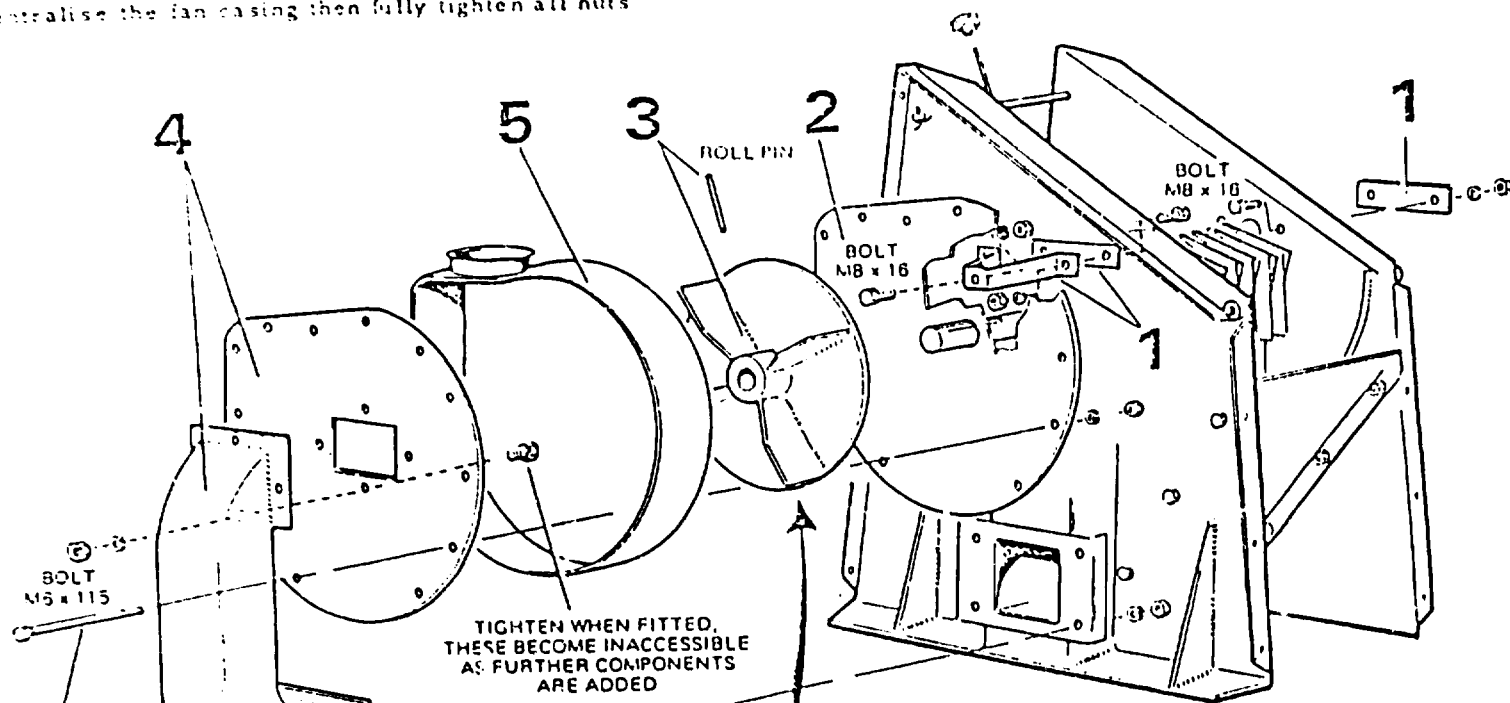
Rotor for 16 h.p. Mill

Rotor for 26 h.p. Mill

Fan

APPENDIX 1.4

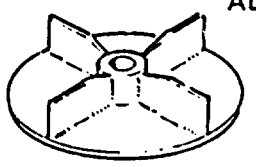
Assemble the fan and fan casing. During assembly the nuts at the end of the long bolts surrounding the fan casing should be left finger tight. After all components are in place, centralise the fan casing then fully tighten all nuts.



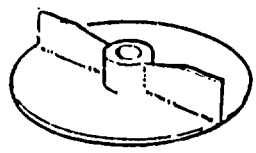
TIGHTEN WHEN FITTED, THESE BECOME INACCESSIBLE AS FURTHER COMPONENTS ARE ADDED

ALTERNATIVES

FAN FOR 2.6 HP MILL

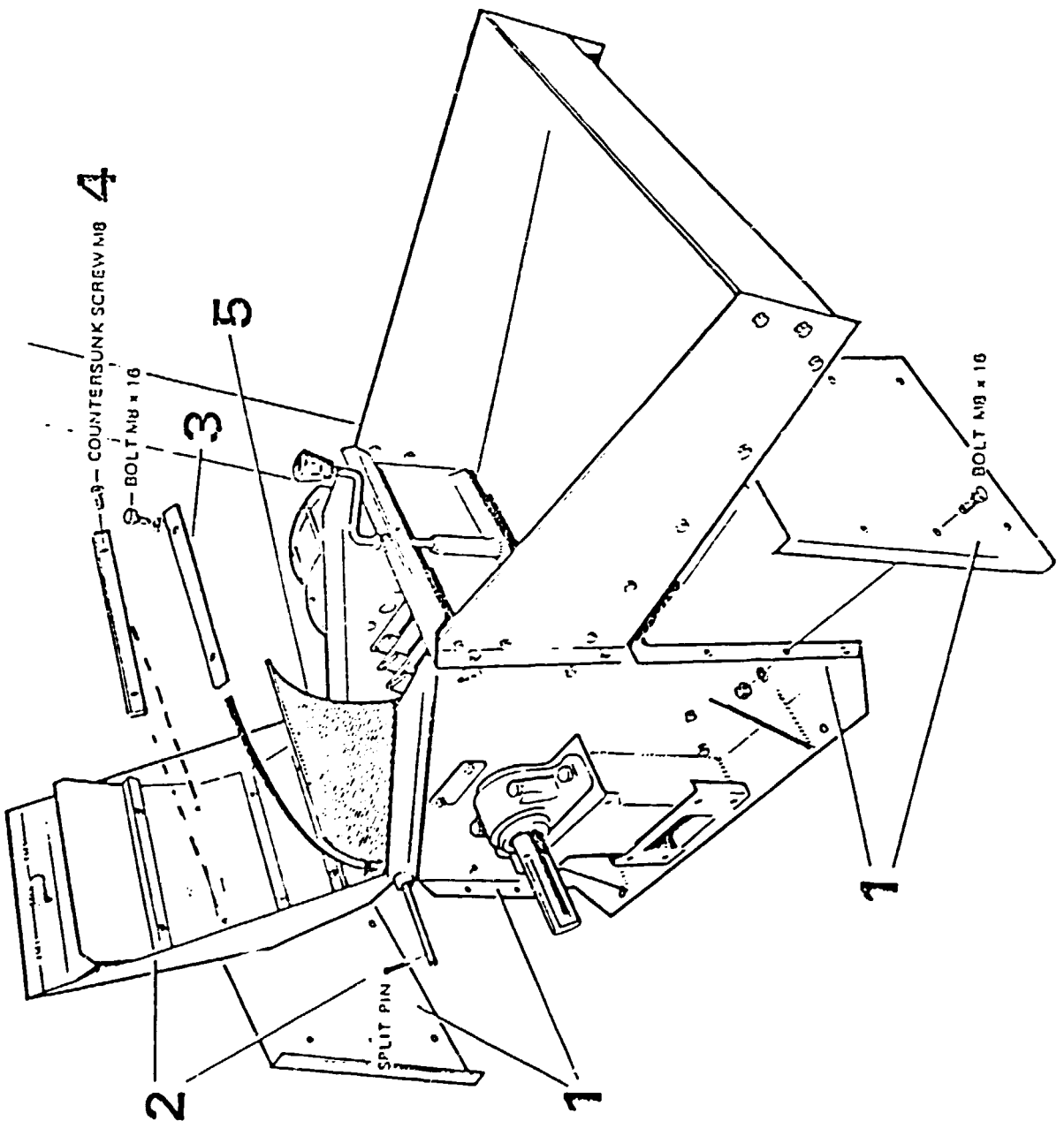


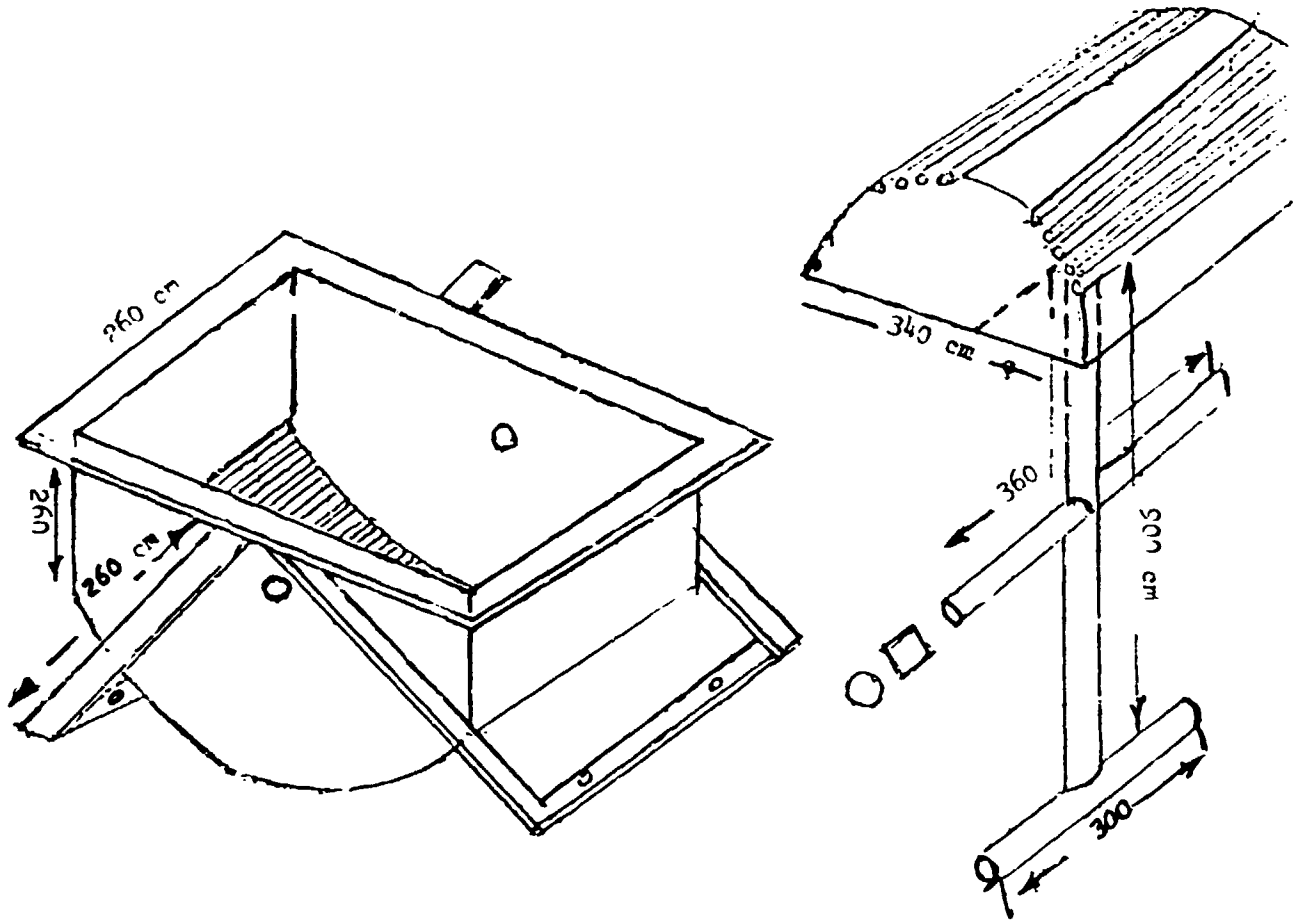
FAN FOR 16 HP MILL



Cover, Panels and Screen

APPENDIX 1.5





APPENDIX 2.1