

इंटरनेट

मानक

Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

“जानने का अधिकार, जीने का अधिकार”

Mazdoor Kisan Shakti Sangathan

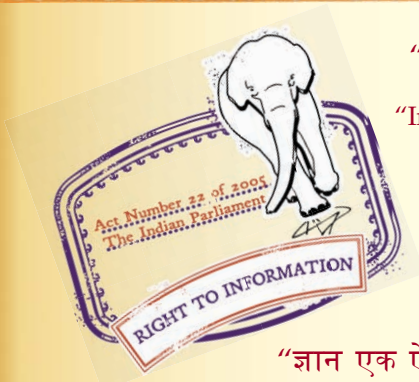
“The Right to Information, The Right to Live”

“पुराने को छोड़ नये के तरफ”

Jawaharlal Nehru

“Step Out From the Old to the New”

IS 15542 (2005): Power-operated chaff cutter - Safety requirements [FAD 20: Agriculture and Food Processing Equipments]



“ज्ञान से एक नये भारत का निर्माण”

Satyanarayan Gangaram Pitroda

“Invent a New India Using Knowledge”



“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

BLANK PAGE



भारतीय मानक

शक्ति चालित कुट्टी मशीन — सुरक्षा संबंधी अपेक्षाएँ

Indian Standard

POWER-OPERATED CHAFF CUTTER — SAFETY
REQUIREMENTS

ICS 65.060.50

© BIS 2005

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Agricultural Produce Processing and Milling Machinery and Surface Covered Cultivation Structures Sectional Committee had been approved by the Food and Agriculture Division Council.

Power-operated chaff cutters are very common in use by farmers for cutting of chaff and fodder. As number of reports of farm workers losing their limbs in power chaff cutters are coming in, the urgency to provide for safety provisions for powered chaff cutters has become more pronounced.

Figures of various components given in this standard are meant for illustration and dimensions of chaff cutters should not be treated as suggestive of any standard design.

In preparation of this standard considerable assistance have been received from Dr Adarsh Kumar of Indian Agriculture Research Institute, New Delhi.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

POWER-OPERATED CHAFF CUTTER — SAFETY REQUIREMENTS

1 SCOPE

This standard specifies safety requirements for power-operated chaff cutter.

2 REFERENCES

The following standards contain provisions, which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

IS No.	Title
210 : 1993	Grey iron castings — Specifications (<i>fourth revision</i>)
1500 : 1983	Method for Brinell hardness test for metallic materials (<i>second revision</i>)
1511 : 1979	Blades for manually-operated chaff cutter (<i>second revision</i>)
1891 (Part 1) : 1994	Conveyor and elevator textile belting — Specification: Part 1 General purpose belting (<i>fourth revision</i>)
2062 : 1999	Steel for general structural purposes — Specification (<i>fifth revision</i>)
2102 (Part 1) : 1993	General tolerances: Part 1 Tolerances for linear and angular dimensions without individual tolerance indications (<i>third revision</i>)
4454 (Part 1) : 2001	Specification for Steel wires for mechanical springs: Part 1 Patented and cold drawn steel wires — Unalloyed (<i>third revision</i>)
7201 (Part 1) : 1987	Methods of sampling for agricultural machinery and equipment: Part 1 Hand tools and hand operated/animal drawn equipment (<i>first revision</i>)
7897 : 1975	Test code for chaff cutter
11459 : 1985	Specification for power-operated chaff cutter

3 TERMINOLOGY

For the purpose of this standard the definitions given in IS 11459 and IS 7897 shall apply.

4 MATERIAL

4.1 The materials for construction of various components of the chaff cutter, other than blade, shall be selected from those given in col 3 of Table 1. The materials may conform to Indian Standards given in col 4 of Table 1. The manufacturer shall declare materials for components not listed. Flywheel-cum-belt pulley cover shall also be made from mild steel (*see* IS 2062) material.

4.2 The material for construction of blade shall be as given in 2.1 and 2.1.1 of IS 1511.

Table 1 Material of Construction
(Clause 4.1)

Sl No.	Parts	Material	Applicable Indian Standard
(1)	(2)	(3)	(4)
i)	Flywheel	Cast iron	IS 210
ii)	Frame	Cast iron	IS 210
		Mild steel	IS 2062
iii)	Cover plate	Cast iron	IS 210
iv)	Shear plate	Cast iron	IS 210
v)	Feed rolls	Cast iron	IS 210
vi)	Feed roll shaft	Mild steel	IS 2062
vii)	Spring	Spring steel	IS 4454 (Part 1)
viii)	Tie rod	Mild steel	IS 2062
ix)	Worm and worm gear	Cast iron	IS 210
x)	Legs	Mild steel	IS 2062
xi)	Leg support	Mild steel	IS 2062
xii)	Shaft and axles	Mild steel	IS 2062
xiii)	Feeding chute	Mild steel	IS 2062
xiv)	Blade cover	Mild steel	IS 2062
		Plastics	—
xv)	Pulley	Cast iron	IS 210
xvi)	Blower	Mild steel	IS 2062
xvii)	Discharge box	Mild steel	IS 2062
xviii)	Belts	Textile belts	IS 1891 (Part 1)

5 HARDNESS

5.1 All cast iron components shall have a hardness of 160 to 220 HB (*see* IS 1500).

5.2 The hardness of the blade shall be as given in 3.1 of IS 1511.

6 GENERAL REQUIREMENTS

6.1 Provision shall be made to change the inclination of the plane of the cutting knives to the plane of rotation of flywheel to avoid feed interference.

6.2 Provision to change the direction of rotation of feed rollers should be made.

6.3 All the three sides of shear plate shall be in one plane.

6.4 Each chaff cutter shall be provided with an operator's manual in Hindi or English or any other vernacular language.

6.5 The chaff cutter shall be run idle (without load) for at least 5 min at the specified rpm to check the following:

- a) Presence of knocking or rattling sound;
- b) Frequent slippage of belts;
- c) Non-smooth running of shafts in respective bearings;
- d) Any unusual wear or slackness in any components; and
- e) Any marked rise in bearing temperature.

7 FEEDING SYSTEMS

7.1 The feeding system in a chaff cutter shall be one of the following types and shall conform to the requirements given in 7.2 and 7.3:

- a) Feeding chute type (*see* Fig. 1), and
- b) Conveyor type (*see* Fig. 2).

7.2 Feeding Chute

A rectangular or trapezoidal trough shall be attached on the rear side of the shear plate. The trough shall be detachable. Provision for changing the angle of placement of trough shall be made. At the rear side of the trough a support shall be made. The total length of

the trough shall be minimum of 900 mm. The chute shall be made of mild steel sheet (*see* IS 2062) having thickness of not less than 1.6 mm. Each chute-fed chaff cutter shall also be provided with the following safety provisions.

7.2.1 Flywheel Locking Pin

Chaff cutter shall be provided with a linch pin with chain to lock the chaff cutter flywheel when it is not required to be operated. This shall be fixed on the flywheel main gear shaft at the end so as to restrict the movement of the system. This is specially needed to lock the movement of the chaff cutter blades in order to avoid injuries due to accidental rotation when chaff cutter is not in use. The linch pin shall be fastened to the body of chaff cutter with the help of the chain (*see* Fig. 3). A bolt shall also be fitted in both the holes (hole of leg and hole of flywheel rim) and tightened with a nut (*see* Fig. 4).

7.2.2 Front Safety Guard

A front safety guard shall be tightly fitted on each knife blade of the chaff cutter. It shall be made of mild steel rod which shall be given a curvature as of chaff cutter blade and have two holes at two ends for fitment in the chaff cutter with the blade mounting bolts (*see* Fig. 5). This device stands a little away from the blades and prevents injuries to the limbs as it pushes the limbs away and acts as a warning signal before the blades hit the limb.

7.2.3 Feeding Chute Cover

The trough on the shear plate side shall be covered up to a length of 450 mm *Min*. The thickness of the chute cover shall not be less than 1.6 mm.

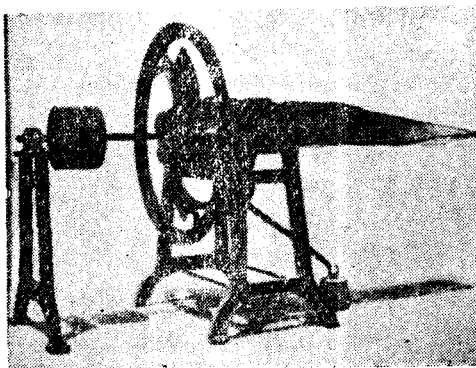


FIG. 1 CHUTE-FED CHAFF-CUTTER

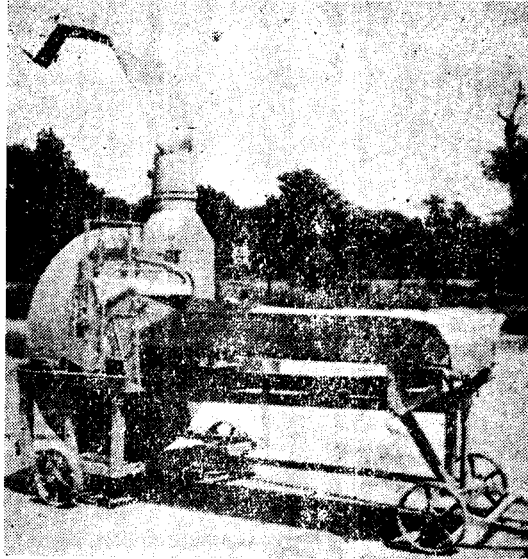


FIG. 2 CONVEYOR-FED CHAFF-CUTTER

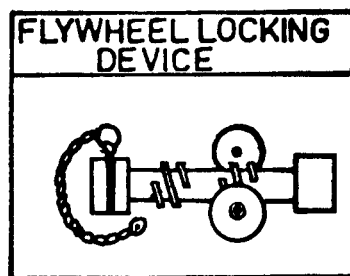


FIG. 3 FLYWHEEL LOCKING DEVICE

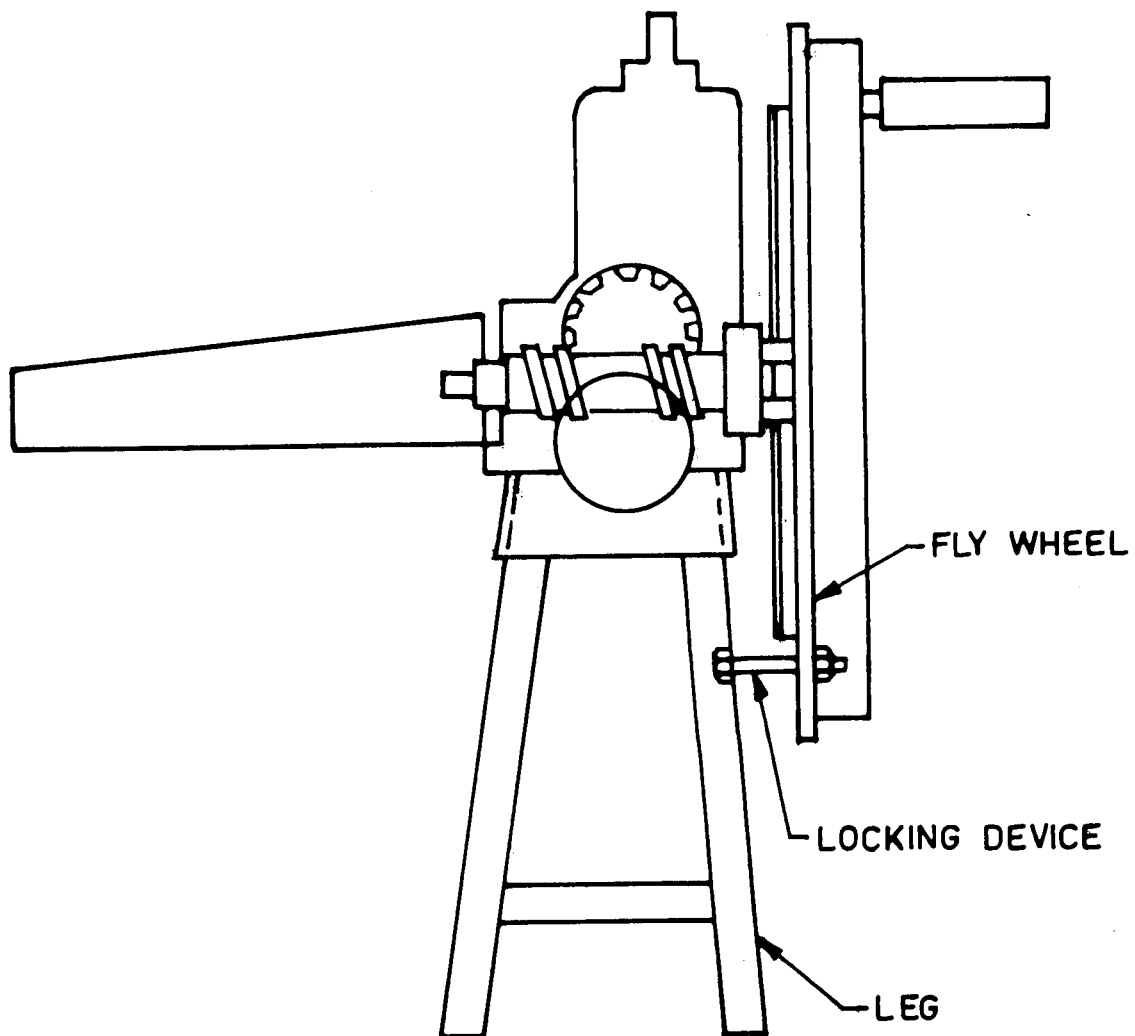


FIG. 4 A TYPICAL LOCKING ARRANGEMENT FOR CHAFF CUTTER

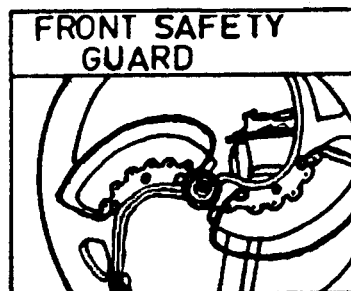


FIG. 5 FRONT SAFETY GUARD

7.2.4 Warning Roller

A warning roller which is a sort of idler roller with spring (see Fig. 6) may be fitted just before the feeding rollers to warn the operator while feeding the fodder crop into the chaff cutter. It may be a conduit GI pipe roller closed at both ends. The upward movement of warning roller shall be controlled by the cam, which lifts the roller when the straw is pushed into the mouth of the chaff cutter. When the chute is empty, the roller shall come down with the help of springs provided for the purpose. The minimum diameter of the roller shall be 40 mm. Warning roller can be used as an alternate to cover chute (see 7.2.3). Centre shaft and cam lever should be made of mild steel (see IS 2062) and pivot axle/adjusting rod should be made of GI pipe.

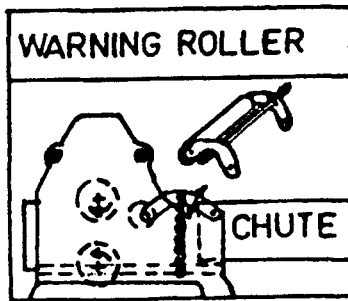
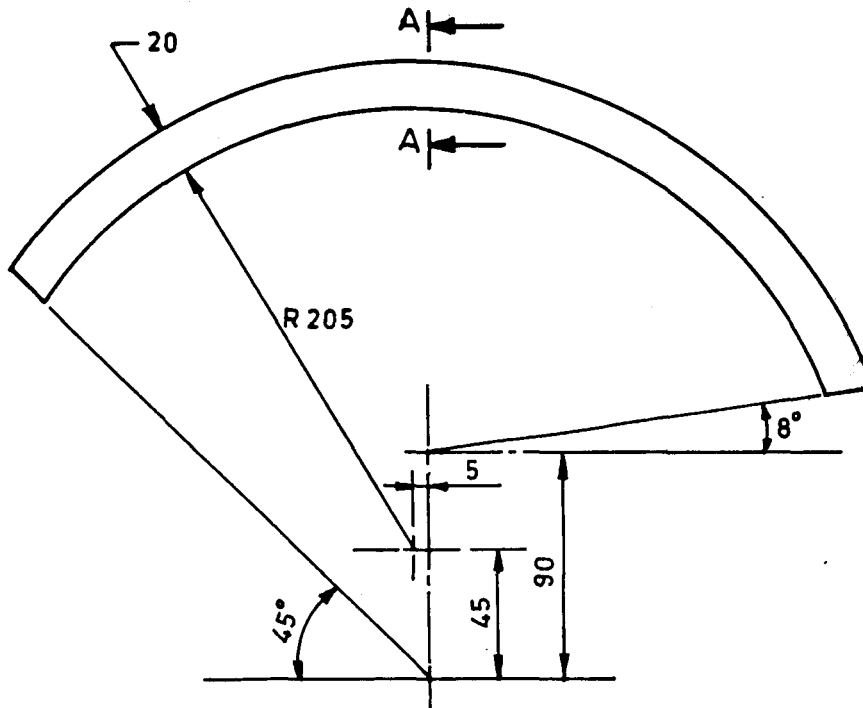


FIG. 6 WARNING ROLLER

7.2.5 Blade Cover

Cutting edge of each blade shall be covered with a



All dimensions in millimetres.

FIG. 7 BLADE COVER

cover. A typical shape and dimension of the blade cover is given in Fig. 7. To hold cover with blade, it shall be welded or riveted.

7.2.6 Height of Feeding Chute

The height of the feeding chute of the chaff cutter should be between 750 mm and 1 100 mm.

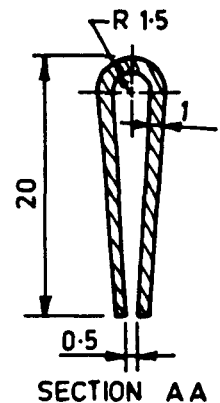
7.3 Conveyor System

Conveyor-fed chaff cutter shall also be provided with the following safety provisions:

- Cover** — The minimum length of conveyor shall be 1 200 mm and it shall be covered up to a minimum length of 450 mm near the feed roll side. The thickness of the cover shall not be less than 1.6 mm.
- Feed reversing mechanism** — It shall conform to the requirements given in Annex A.
- Blower** — If provided, and all other moving parts shall be guarded with mild steel (see IS 2062) sheet of minimum thickness of 1.6 mm.

8 GUARDING OF TRANSMISSION SYSTEM

8.1 Worm and pinion assembly shall be covered from all the sides by a mild steel sheet of minimum 1.6 mm thickness (see Fig. 8). Gear-cum-oil cover can be fitted with the help of two nuts to the body of chaff cutter. On the sides, the plates shall be bent to cover the gears



from sides. At the top, a center hole shall be provided for facilitating the lubrication of gears.

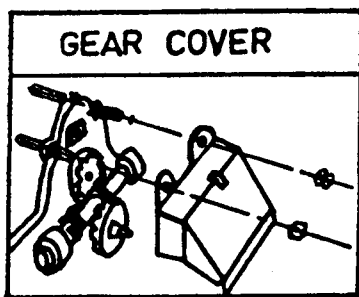


FIG. 8 GEAR COVER

8.2 The bearings shall be completely enclosed and shall have a provision for lubrication.

8.3 Guards shall be provided on all moving parts of the chaff cutter to prevent accident. In case of PTO driven chaff cutters guards shall be provided on the PTO shaft. The guards shall be made of blind sheets of mild steel (*see* IS 2062) having a minimum thickness of 1.6 mm.

8.4 The guards shall be so designed as not to hinder in easy adjustment, servicing and operation of the chaff cutter.

8.5 All guards shall be either permanently attached or firmly secured to prevent their removal without the aid of tools. The servicing and adjustments should be possible without complete removal of the guards.

9 CAUTIONARY NOTICE

9.1 A minimum cautionary notice as follows shall be written in vernacular language legibly on a label preferably fixed on the main body of the chaff cutter:

- a) DO NOT WEAR LOOSE DRESS, BANGLES, WATCH, ETC, WHILE WORKING;
- b) DO NOT SMOKE AND LIGHT FIRE NEAR DRY FODDER BEING CUT;
- c) DO NOT WORK UNDER THE INFLUENCE OF INTOXICANTS LIKE LIQUOR, OPIUM, ETC;
- d) CHILDREN AND AGED PERSONS SHOULD BE DISCOURAGED FROM WORKING;
- e) USE PUSHING DEVICE FOR FEEDING;
- f) PUT THE COVER ON BLADE AND LOCK THE FLYWHEEL AFTER COMPLETING THE WORK;

- g) NEVER BRING HAND NEAR FEED ROLLS AND OPEN BLADE; AND
- h) DO NOT TOUCH BELT WHILE PULLEY IS RUNNING.

9.2 A plate having a 'Danger Signal' shall be rigidly fixed near the blades of the chaff cutter.

9.3 Each chaff cutter shall be provided with an operator's manual (*see* 6.4) in which all safety aspects are also to be highlighted along with the precautions to be taken for safe operation of chaff cutter.

10 WORKMANSHIP AND FINISH

10.1 All the components of the chaff cutter shall be free from cracks.

10.2 The cast iron components shall not be porous. Welding, if done, shall also not be porous.

10.3 All exposed metallic surfaces shall be free from rust and may be painted, if required.

10.4 Sharp corners and protruding fasteners shall be avoided.

11 MARKING

11.1 Each chaff cutter shall be marked with the following particulars:

- a) Manufacturer's name or registered trade-mark;
- b) Code and batch number;
- c) Model number;
- d) Power rating, kW;
- e) Rated input capacity; and
- f) Recommended rpm of fly wheel or cylinder.

11.2 BIS Certification Marking

11.2.1 Each chaff cutter may also be marked with the Standard Mark.

11.2.2 The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act, 1986* and Rules and Regulations made thereunder. The details of conditions under which the licence for the use of Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

12 SAMPLING FOR LOT ACCEPTANCE

Unless otherwise agreed to between the purchaser and the supplier, the criteria for sampling for lot acceptance shall be in accordance with IS 7201 (Part 1).

ANNEX A

[Clause 7.3(b)]

REQUIREMENTS OF CONVEYOR

A-1 CONSTRUCTION

It comprises a feed pressing roller, two corrugated feed rollers and conveyor with power transmission system. For this type of chaff cutters with power ratings of 15 kW or more, a feed reversing mechanism is recommended. It comprises of a gear box, a clutch lever and two joining shafts with universal joints (*see* Fig. 9). In some chaff cutters fast and loose pulleys to cut-off the drive to the upper and lower feed rollers are also used. In the feeding system with feed reversing mechanism, if the hand of an operator gets entrapped, the clutch lever is pressed by his hand or shoulder and the drive to the feed roller is cut-off in the neutral position or the direction of the upper and lower feed rollers is reversed.

A-2 MATERIAL

A-2.1 Conveyor — Canvass or rubber [*see* IS 1891 (Part 1)] or steel slats (*see* IS 2062).

A-2.2 Driving Roller — Cast iron (*see* IS 210).

A-2.3 Pressing Roller — Cast iron (*see* IS 210).

A-2.4 Feed Rollers — Cast iron (*see* IS 210).

A-2.5 Tension Spring — Spring steel [*see* IS 4454 (Part 1)].

A-2.6 Clutch Lever — Mild steel (*see* IS 2062).

A-2.7 Gears — Cast iron (*see* IS 210).

A-2.8 Gear Box — Cast iron (*see* IS 210) or mild steel (*see* IS 2062).

A-2.9 Gear Shaft — Mild steel (*see* IS 2062).

A-2.10 Stand — Mild steel (*see* IS 2062).

A-3 DIMENSIONS

The length of center-to-center distance of conveyor rollers (*see* A in Fig. 9) shall be a minimum of 1 200 mm. Minimum of 450 mm of length of conveyor at feed inlet side shall be covered.

A-4 FEED REVERSING DEVICE

A-4.1 Functioning of Device (*see* Fig. 10)

Pinion 'A' receives the drive from the main shaft of the chaff cutter by means of chain and sprocket. Pinion 'A' meshes with bevel gear 'B' which is mounted on a counter shaft. On the same shaft a spur pinion 'G' is mounted which slides on splines with the help of a

hand lever. When pinion 'G' meshes with the gear 'F' on the lower feed shaft, the lower feed roller revolves in clockwise direction and the upper feed roller in anti-clockwise direction. This is the feed-in position.

A-4.1.1 When pinion 'G' is meshed with gear 'C', the direction of rotation of the upper and lower rollers is reversed. In other words, the upper roller rotates in clockwise and the lower roller in anti-clockwise direction. This is the reversed or feedback position and the material being fed moves out instead of moving into the cutting zone chamber.

A-4.1.2 The third position is when pinion 'G' does not mesh either with gear 'F' or 'C'. This is the neutral position. The lever to slide pinion 'G' can be actuated by hand or foot or shoulder.

A-4.1.3 The details of gears in this system shall be as given in Table 2.

Table 2 Details of Gears in the Feed Reversing Mechanism

Sl No.	Type of Gear/Pinion	Designation	Shaft on Which Mounted
(1)	(2)	(3)	(4)
i)	Bevel gear	A	Splined shaft on main shaft
ii)	Bevel gear	B	Counter shaft
iii)	Spur pinion	C	Counter shaft
iv)	Spur gear	D	Upper feed roller shaft
v)	Spur gear	E	Upper feed roller shaft
vi)	Spur gear	F	Lower feed roller shaft
vii)	Bevel gear	G	Splined shaft on main shaft

A-4.2 Functioning of Device (*see* Fig. 11)

A-4.2.1 If the roller handle is put in backward direction, bevel gear 'A' which is mounted on splined shaft receives the drive from main shaft. The main shaft moving in anti-clockwise direction will rotate bevel gear 'A' also in anti-clockwise direction. Bevel gear 'A' meshes with bevel gear 'B' which is mounted on a counter shaft, having at other end a pinion 'C'. This will rotate bevel gear 'B' counter shaft and pinion 'C' in clockwise direction. Gear 'D' meshes with pinion 'C' and rotates in anti-clockwise direction. Gears 'D' and 'E' are on the same shaft, hence the direction of rotation of 'E' would also be the same. Gears 'E' and 'F' mounted on upper and lower feed roller shafts, respectively, mesh with each other; therefore, the gear 'F' rotates in clockwise direction. The direction of rotation of upper and lower feed rollers would be the same as that of gears 'E' and 'F'. This is the feed-in position.

A-4.2.2 If the roller handle is put in forward direction, bevel gear 'G', which is mounted on splined shaft, receives the drive from main shaft and moves in anti-clockwise direction. Bevel gear 'G' meshes with bevel gear 'B'. The bevel gear 'B', counter shaft and pinion 'C' will rotate in anti-clockwise direction. This will ultimately lead to the rotation of lower feed roller

in anti-clockwise direction. This is the reversed or feedback position and the material being fed moves out instead of moving into the threshing chamber.

A-4.2.3 In case the roller handle is kept in central position, feed-reversing mechanism will not operate. This is the neutral position.

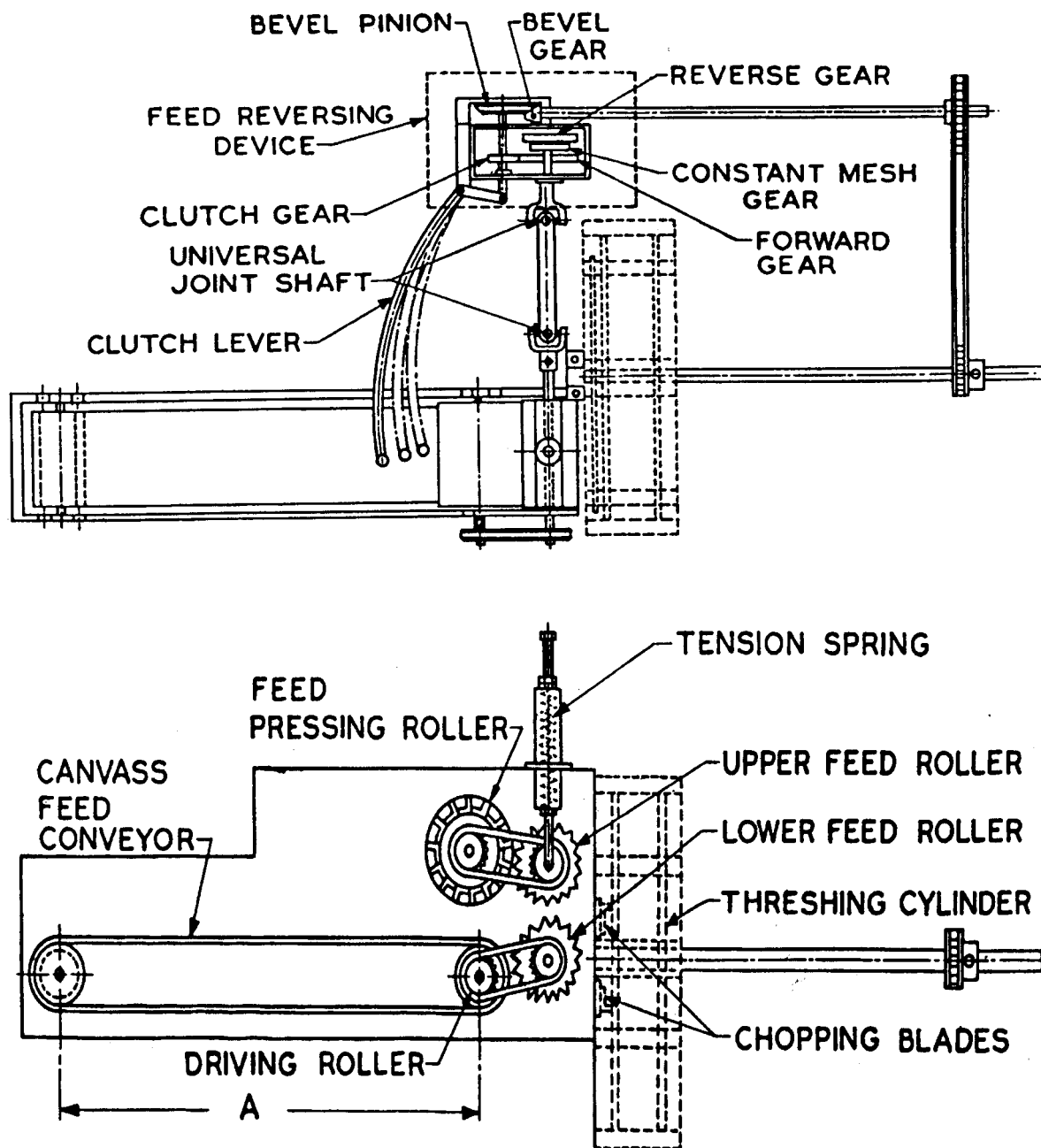


FIG. 9 FEED REVERSING MECHANISM FOR CONVEYOR-FED CHAFF CUTTER

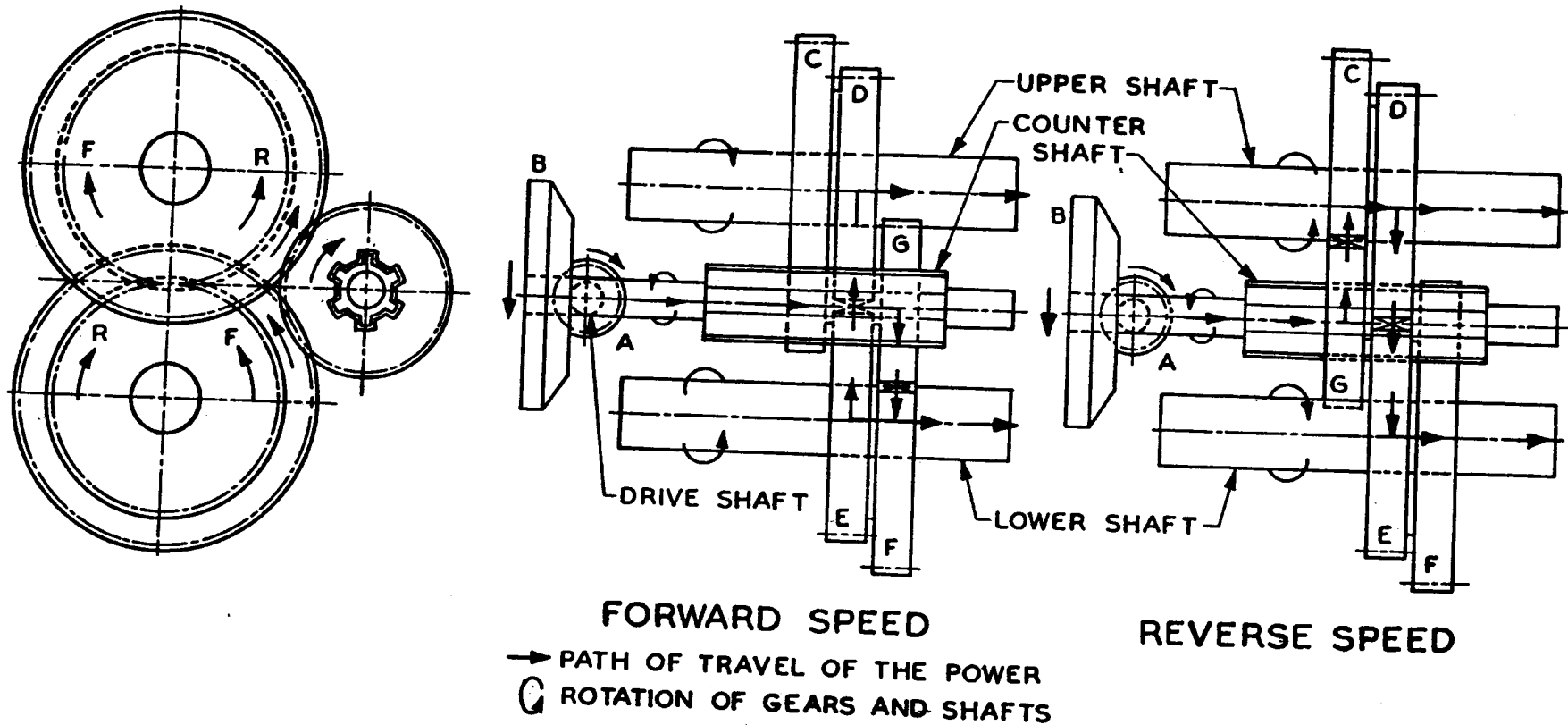


FIG. 10 POWER TRANSMISSION THROUGH FEED-REVERSING SYSTEM FOR CONVEYOR-FED CHAFF CUTTERS

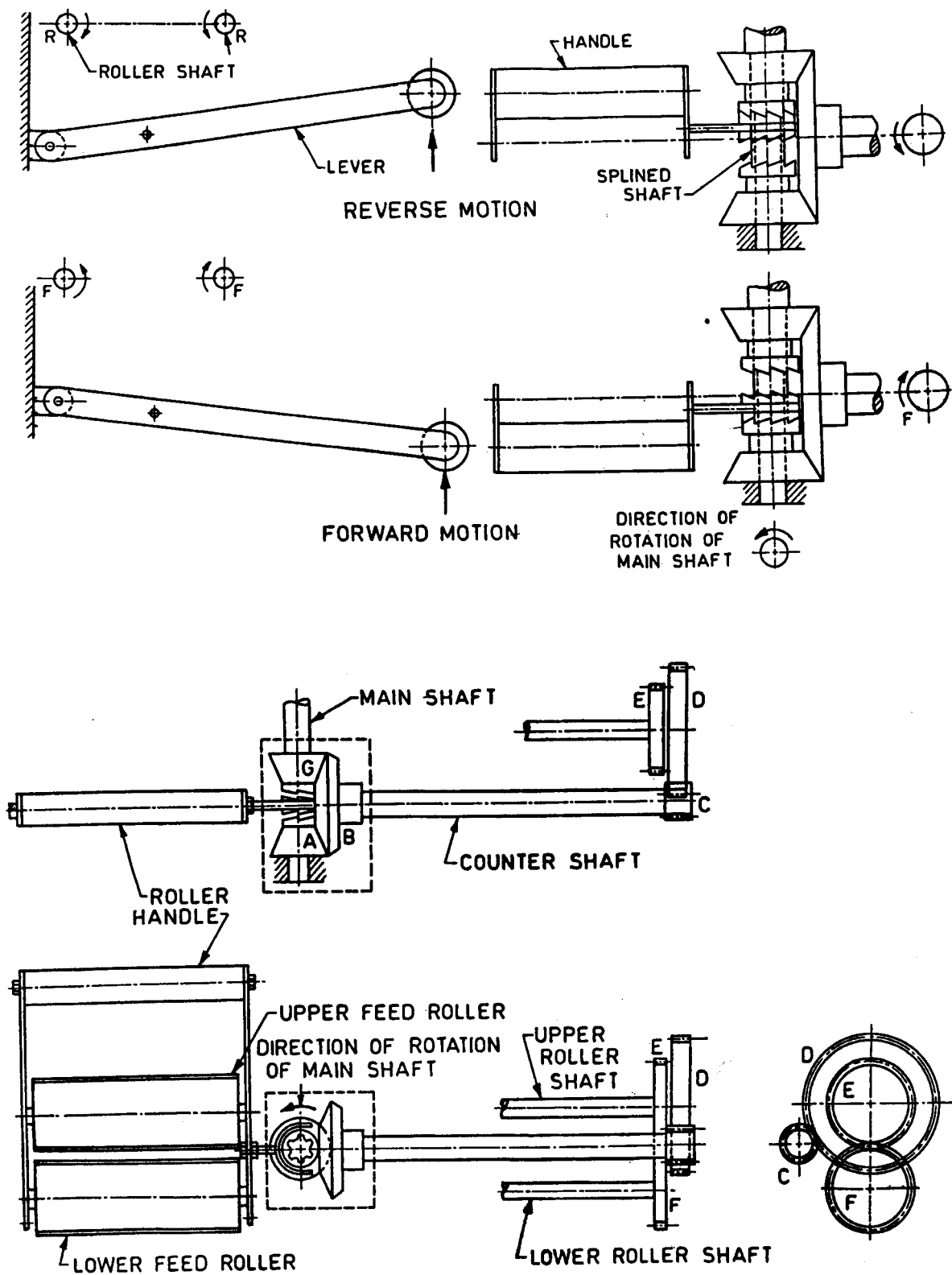


FIG. 11 FUNCTIONING OF FEED-REVERSING MECHANISM FOR CONVEYOR FED CHAFF CUTTER

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act*, 1986 to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Copyright

BIS has the copyright of all its publications. No part of these publications may be reproduced in any form without the prior permission in writing of BIS. This does not preclude the free use, in the course of implementing the standard, of necessary details, such as symbols and sizes, type or grade designations. Enquiries relating to copyright be addressed to the Director (Publications), BIS.

Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Catalogue' and 'Standards: Monthly Additions'.

This Indian Standard has been developed from Doc: No. **FAD 20 (1275)**.

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002

Telephones: 2323 0131, 2323 3375, 2323 9402

website : www.bis.org.in

Regional Offices:

	Telephones
Central : Manak Bhavan, 9 Bahadur Shah Zafar Marg NEW DELHI 110002	{ 2323 7617 2323 3841
Eastern : 1/14 C.I.T. Scheme VII M, V.I.P. Road, Kankurgachi KOLKATA 700054	{ 2337 8499, 2337 8561 2337 8626, 2337 9120
Northern : SCO 335-336, Sector 34-A, CHANDIGARH 160022	{ 260 3843 260 9285
Southern : C.I.T. Campus, IV Cross Road, CHENNAI 600113	{ 2254 1216, 2254 1442 2254 2519, 2254 2315
Western : Manakalaya, E9 MIDC, Marol, Andheri (East) MUMBAI 400093	{ 2832 9295, 2832 7858 2832 7891, 2832 7892
Branches : AHMEDABAD. BANGALORE. BHOPAL. BHUBANESHWAR. COIMBATORE. FARIDABAD. GHAZIABAD. GUWAHATI. HYDERABAD. JAIPUR. KANPUR. LUCKNOW. NAGPUR. NALAGARH. PATNA. PUNE. RAJKOT. THIRUVANANTHAPURAM. VISAKHAPATNAM.	