PORTABLE ELECTRIC SAW

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Design of Portable Electric Saw (Circular)

Diploma Project

Submitted in partial fulfilment of the
requirements for the Postgraduate
Diploma in Industrial Design

by

U.S. Devadiga

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Approval Sheet

Diploma Project entitled
'Portable Electric Saw' (Circular)
by U.S. Devadiga is approved for the
Postgraduate Diploma in Industrial Design

Guide .

Chairman .

Examiners .

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1. Introduction

Wood has always been one of man's most important resources. Directly and indirectly in fact, it has been one of his basic necessities. For example, primitive man used wood to make fires and to make the clubs with which he could protect himself and hunt. His wooden hunting weapon brought meat to his fire and fur clothing for his body. Besides clothing himself with skins, he used them again with wood to make crude shelters. Those shelters that he did not make from wood and skins he made by weaving tree branches together.

But it was not until thousand of years later that he learned to make wooden houses. During these years he used wood for his tool handles and for his first machines, the lever and the wheel. Wood also provided his first means of transportation when he learned to make carts, wagons and ships.

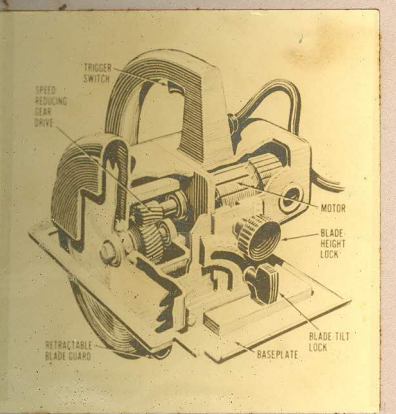
Throughout history, man has perfected ways to bend, carve, smooth, polish, stain and paint wood, as well as to change its size, shape, and appearance to suit his needs and his ideas of beauty. One of the most widely used and oldest known machine to the man in wood working is the circular saw. Circular saws are defined

as machines in which the working tool takes the form of a steel disc equipped with the teeth on its periphery. This disc, usually known as the circular saw blade is mounted on an arbor in the case of bench saws or on a spindle in portable saws, from which it derives a circular motion.

The various types of circular saw are grouped in the following categories :

- Ordinary table saws
- Rip saws, including travelling carriage saws
- Automatic edgers with one or more saw blades
- Cross cut saws
- Fire wood saws
- Portable electric hand saws

The foregoing discussions in this report mainly deal with the portable electric saw which is extensively used for cross cutting and rip sawing of wood.



Electric power hand saws are considered to be tools rather than machines because they are portable and light in weight. They weigh from 6 to 20 pounds so that they are convenient to carry and to operate. The horse power rating of the electric motor varies from 1/6 to 2. The portable saw size is determined by the diameter of the blade it uses. Blades range from

4¼ to 12 inches in diameter. The depth of cut varies from slightly over 1 inch to about 4½ inches. The portable electric saw fitted with proper blades or with abrasive discs can be used to cut many materials. It can slice ceramics, slate, marble, tile, non-ferrous metals, corrugated galvanized sheet and almost any other kind of building material.

In India only one model of portable electric saw is available in the market. This saw is manufactured by Ralliwolf Limited, Bombay. This project has been taken up to redesign the existing portable saw to improve mainly the functional and ergonomical requirements of it.

2. Problem Statement

To redesign the Portable Electric Saw (Circular) with particular emphasis on functional and ergonomical requirements.

3. Information

3.1 Operating adjustments

3.1.1 Changing a blade

- The electric cord from the power source is disconnected.
- The telescopic guard is moved inside the fixed hood until the hole on the blade is seen.
- A tommy bar is inserted into the hole to hold the blade firm.
- With the spanner the set screw is loosened (counter clockwise direction) to remove the blade.
- After cleaning the spindle and applying a thin film of grease; the sharpened blade is fixed on the spindle.

3.1.2 Adjustment for depth of cut

- The wing nut of the depth gauge behind the saw hood is loosened.
- The sole plate is raised or lowered until the blade extends the desired distance below the sole plate.
- The wing nut is tightened.

3.1.3 Adjustments for bevel cut

- The wing nut of the bevel gauge in front of the fixed hood is loosened.

- The body of the saw is swung until the desired angle is obtained.
- The wing nut is tightened.

3.2 Operations

3.2.1 Cross cutting operation

The portable electric saw is designed to be used with the right hand. The left hand holds on saw knob and the right hand guides the saw across or with the work. Cross cutting is the operation performed across the wood grain.

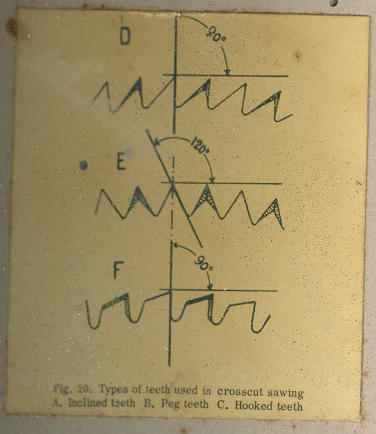


Fig. 20. Types of teeth used in crosscut sawing
A. Inclined teeth B. Peg teeth C. Hooked teeth

- The depth gauge is adjusted so that the blade just saws through the board.
- Markings are made on the board.
- Cord is plugged into an outlet.
- Sole plate is squarely put on the edge of the board. The saw is moved forward until the blade just touches the wood at the marked line for the cut.
- Motor is started with the trigger switch.
- Blade is moved steadily forward through the board.
- The power is cut off with the trigger switch when the cutting is completed.

3.2.2 Ripping operation

Ripping is the operation performed along the grain of the timber. The steps are similar to cross cutting except that the rip guide is set

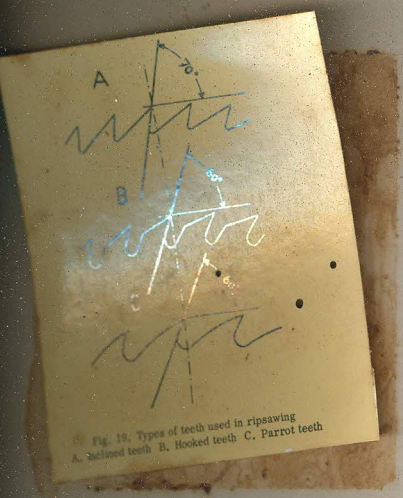


Fig. 19. Types of teeth used in ripsawing
A. Inclined teeth B. Hooked teeth C. Parrot teeth

to the desired width of cut. This guide is particularly useful in making narrow rip cuts. In order to make cuts of more width, a wooden guide strip which is clamped to the board far enough back from the line to serve a fence to guide the base plate.

3.2.3 Pocket and bevel cutting operations

Portable electric saw can be used to cut pockets, miter, bevel and compound cuts. The procedure for handling this tool is like that for cross cutting and ripping.

For bevel cutting the blade is set for desired angle by the bevel gauge. Depth of cut is also adjusted so that the blade just cuts through the piece. And cutting is done in the similar way as it is described for cross cutting and ripping operations.

3.3 Accidents

Accidents in circular saws are due to the following :

. The material characteristics of the wood. Wood is not as generally supposed a homogeneous substance. It contains knots, defects, soft areas adjoining hard areas, resinous or withered

areas, splits of different degrees caused by storage and seasoning. All these irregularities affect the sawing process and may thus often cause accidents.

- Contact between parts of the body usually the hands and saw teeth.
- Kickback of the saw
  Kickbacks are caused by deposits of resin on the blade which tend to adhere to the work and by binding of the blade through constriction of cut made by the saw. They are also due to clumbsy holding of the stock.
- Design faults in the machine
- Bad working methods

3.3.1 Causes of accidents in portable electric saw.

- Defective control switch which remained on during repair; no blade guard for saw when not working.
- Wearing loose clothing.
- Blade locking nut was wrongly threaded (unscrewing in the direction of blade rotation).
- Use of unsuitable teeth of blade.

Fig. 3. Nature of injuries

Fig. 4. Hazardous working conditions

3.4 Safety regulations for portable electric saws.

3.4.1 Machine design

Machine should be designed in accordance with the best engineering standards. Frames should be rigid and designed for easy anchoring. It should be provided with all necessary general safety devices.

3.4.2 Drive mechanism

All drive mechanism should be enclosed.

3.4.3 Location of control devices.

Starting and stopping devices should be safeguarded against any possibility of accidental operation.

3.4.4 Lighting

The lighting should not produce glare to the eyes. At the point of operation the level of illumination may be of the order of 80 to 100 lux (7 to 9 ft. candles) for coarse operations and 150 to 300 lux (14 to 28 ft. candles) in the case of work requiring greater precision.

3.4.5 Weight

The maximum permissible weight for a portable saw should be 15 kgs.

3.4.6 Protective guards

Portable electric saw should have an adjustable riving knife to cover the rear portion of the blade and prevent kickbacks. It should have a

of the blade; and a self-adjusting movable guard covering the working part of the blade

3.4.7 General safety measures

- Loose clothing is avoided.
- All the electrical connection is grounded.
- The teeth of the blade should be sharp
- Proper blade is selected for different materials.

3.5 Different types of portable saws

3.5.1 Portable Jig Saw

This has a straight saw blade which moves in an orbital (oval) motion rather than the straight up and down motion of the regular jig saw. In this design, the blade cuts only on the upstroke, backing away on the return stroke. This eliminates return stroke blade drag.

This saw is used to cut press board, soft wood, soft plastics, hard wood, plywood, etc. by simply changing the blade for a particular purpose. With this saw it is possible to cut along curved path also. The photograph shows a jig saw manufactured by AEG-Telefunken of West Germany.

Specifications :

Model No.	-	STSZ 330
Power input	-	330 watts
Power output	-	180 watts
Cuts per minute	-	1300
Stroke	-	18 mm
Weight	-	1.8 kg.
Depth of cut in wood	-	40 mm
Depth of cut in metal	-	3 mm

Used for A.C. only.

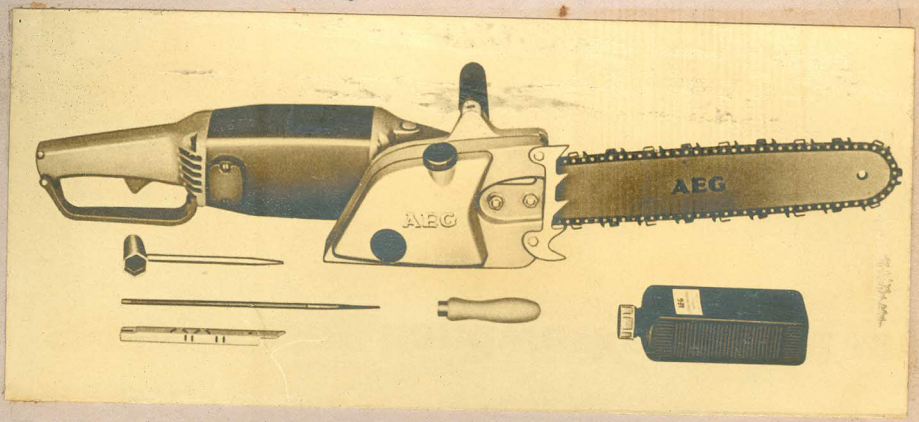
3.5.2 Portable Chain Saw

This saw is mostly used to cut trees in jungle and to cut logs of different sizes. The photograph shows an electric chain saw manufactured by AEG-Telefunken of West Germany.

Specifications :

Model No.	-	KES 36
Power input	-	1900 watts
Power output	-	1400 watts
Length of cut	-	360 mm
Rip tooth chain	-	3/8"
No load speed of chain m/sec.	-	19
Weight	-	8.5 kg.

Used for A.C. only.



3.6 Designs of existing portable circular saws

3.6.1 Ralliwolf Portable Electric Saw

Model No.SS 65

Made in India

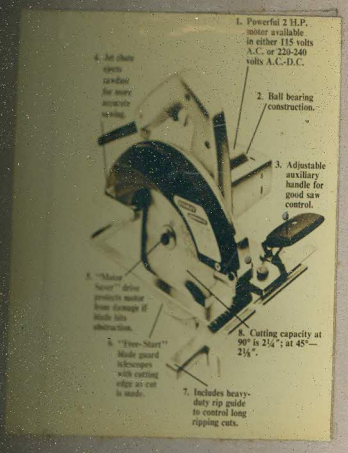
Specifications:

Blade diameter	-	165 mm
Maximum vertical cut	-	52 mm
Maximum bevel cut (45°)	-	43 mm
Saw blade R.P.M: No load	-	5000
Full load	-	3600
Watts input on full load	-	600
Overall length	-	264 mm
Weight	-	5.3 kg.

Standard voltage 220/250 volts D.C. and single phase A.C. 50 cycles.

Each machine is equipped with 1.8 m 3 cord T.R.S. cable, one combination rip and cross cut blade, spanner and tommy bar.

Price Rs.651/-



3.6.2 Stanley Portable Electric Saw

Model No.80278

Made in Hong Kong

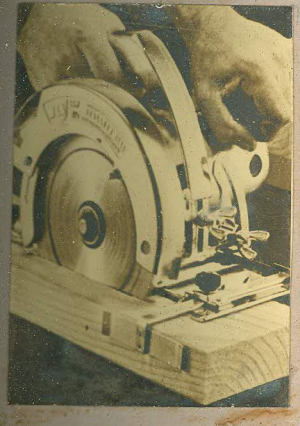
Specifications:

Blade diameter - 7¼"

Maximum vertical cut - 2¼"

Maximum bevel cut (45°) - 2-1/8"

Powerful 2 H.P. motor is used in either 115 volts A.C. or 220-240 volts A.C.-D.C. Equipped with adjustable auxiliary handle. Includes a heavy duty rip guide to control long ripping cuts.

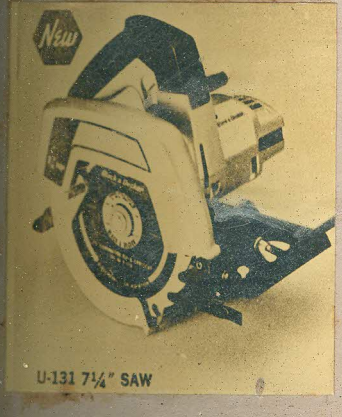


3.6.3 Wen Portable Electric Saw

Model No.1000

Made in U.S.A.

12 Amp. 2½ H.P. motor running on all friction-less ball and needle bearings. Burnout proof armature. Rigid steel angle quadrant, and heavy cast aluminium depth quadrant.



3.6.4 Black and Decker Portable Saw

Model No. U-131

Made in U.S.A.

Specifications:

Diameter of blade - 7¼"

Maximum vertical cut - 2-3/8"

Maximum bevel cut - 1-7/8"

H.P. - 1¼

3.6.5 Black and Decker Portable Saw

Model No. U-231

Made in U.S.A.

Specifications:

Diameter of blade - 7¼"

Maximum vertical cut - 2-3/8"

Maximum bevel cut - 1¾"

H.P. - 1½

3.6.6 Skil Portable Saw

Model No. 574

Made in U.S.A.

Specifications:

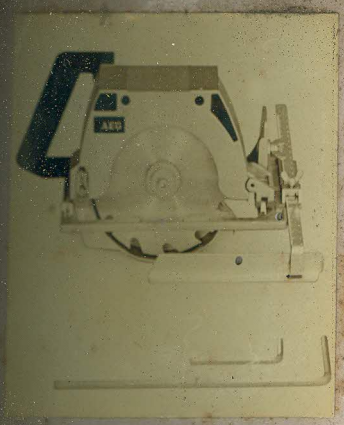
Blade diameter - 7¼"

Maximum vertical cut - 2-3/8"

Maximum bevel cut - 2"

Vari - torque clutch protects motor and gears if blade binds.

Motor - 1½ H.P.



3.6.7 AEG-Telefunken Portable Saw

Model No. HK 717

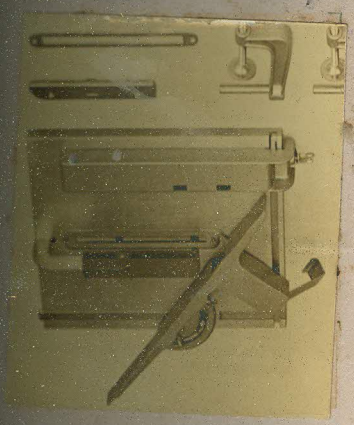
Made in West Germany

Specifications:

Saw blade diameter - 150 mm

Maximum vertical cut - 42 mm

The saw is provided with a riving knife. This can be used as a bench saw also with bench table model No. ZT 717.



3.6.8 AEG-Telefunken Portable Saw

Model No. HK 160A

Made in West Germany

Specifications:

Saw blade diameter - 160 mm

Depth of cut - 55 mm

Power input - 1050 watts

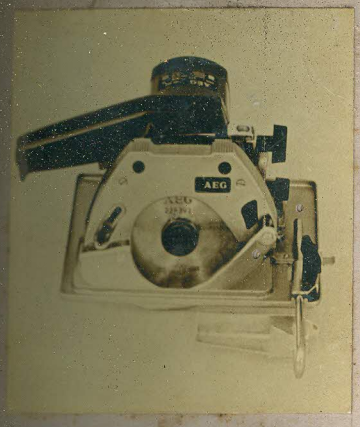
Power output - 590 watts

Full load speed - 3400 R.P.M.

No load speed - 4900 R.P.M.

Weight - 5.5 kgs.

With saw blade 32 teeth, one ring spanner for saw blade and one hexagonal wrench used for A.C. only. This saw can be used as a bench saw with table attachment No.ZT 160.

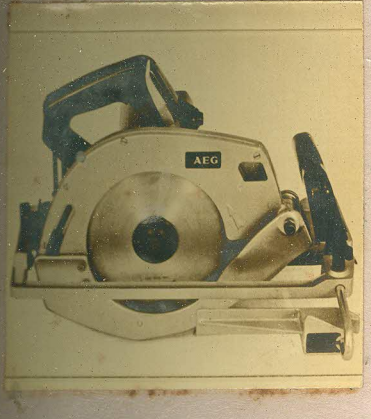


3.6.9 AEG-Telefunken Portable Saw

Model No. HK 125A

Specifications:

Saw blade diameter	-	125 mm
Power input	-	720 watts.
Power output	-	400 watts
Weight	-	3.6 kg.



3.6.10 AEG-Telefunken Portable Saw

Model No. HK 240

Specifications:

Depth of cut	-	82 mm
Saw blade diameter	-	240 mm
Power input	-	1500 watts
Power output	-	980 watts
Full load speed	-	2760 R.P.M.
No load speed	-	5100 R.P.M.
Weight	-	8.4 kg.

With saw blade 24 teeth, parallel guide and one set of keys.

For A.C. 220 volts only.

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3.7 Information from the user

3.7.1

The portable saw handle does not provide a good grip for the hand.

3.7.2

The trigger switch edges give pain to the forefinger while pressing it.

3.7.3

The spring stiffness of the trigger switch is more and the operator feels fatigue in pressing it continuously.

3.7.4

The shape of the red knob also does not provide a good grip for the left hand.

3.7.5

The fixing and loosening of the saw blade is cumbersome.

3.7.6

There is no scale on the depth gauge.

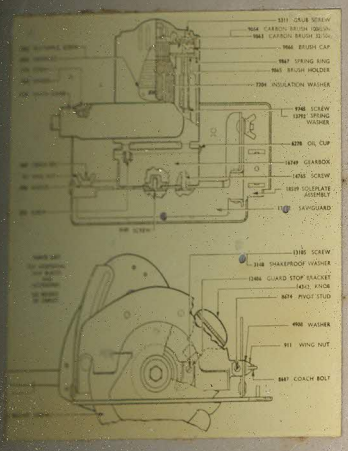
3.7.7

It cannot be kept in proper position after usage because of its total form.

3.7.8

During operation of the saw the noise is hindering the operator.

It was not possible to get much information either from the manufacturer or dealer.



4. Analysis

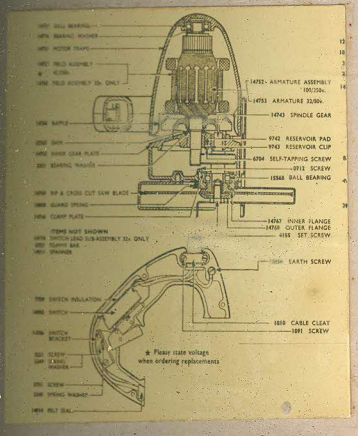
4.1 Structural Analysis

The portable electric saw is made up of five principal units.

- Motor frame
- Gear box
- Guards
- Sole plate
- Blade assembly

4.1.1 Motor frame

Motor frame is made up of die cast aluminium. It is an oval shaped hollow frame open at one end. A ball bearing is fixed at the closed end of this frame. Inside the frame is a single phase A.C./D.C. 220/250 volts, 600 watts motor. One end of the motor shaft is supported on the above ball bearing. There are several slots at the closed end of the motor frame. There is also a tapped hole for fixing a knob in it.



One half of the handle is integrated to this motor frame casting. Another half of the handle is a separate die cast aluminium piece fixed with screws to the other half of the handle. The handle provides a hollow cavity inside to facilitate electrical connections for the motor from the supply mains.

Two wires from the field windings of the motor are brought through the felt seal in the motor frame to the hollow cavity of the handle. These two wires are connected to a switch. The switch is fixed to the inside of the handle by a switch bracket. A cable with a sleeve is connected to the other end of the handle by a cable cleat. Wires are connected from the cable to the switch. There is a baffle plate at the open end of the motor frame. Since half of the handle is integrated with the motor frame casting, the complexity of the mould had been increased. The shape of the motor frame should have been improved to simplify the mould.

4.1.2 Gear box

Gear box consists of two parts. One is the main body and the other its plate. Two bushes are fixed in the inner gear plate. The other end of the motor shaft is supported on the bush which is centrally fixed to the plate. The main body of the gear box and its plate, both are made of die cast aluminium. The main body houses a ball bearing which supports a spindle carrying a spur gear. When the gear box is connected to the motor frame by screws, the gear meshes with the gear teeth which are directly cut on the motor shaft. The another end of spindle is supported by bush in the inner gear plate. When the gear box is

connected to the motor frame by screws there will be much clearance between the motor frame and the gear box.

4.1.3 Guards

There are two types of guards in the portable electric saw. One is a fixed guard or hood. Another is called telescopic guard or moving hood. The fixed hood is made up of die cast aluminium. It is connected to the gear box main body by the same two screws which are fixing the entire gear box to the motor frame. The fixed guard has another two holes in the same line as those of the above two fixing screws and holes. The fixed guard provides a pivot hole at its end.

The telescopic guard is made up of sheet steel pressing. It is connected to the fixed hood by a circular bracket. In between the circular bracket and the guard there is a wire wound for three turns. Its ends are fixed in the holes of guard and circular bracket.

4.1.4 Sole plate

It is a rectangular pressed steel plate having a rectangular slot in between. The fixed hood is connected to the mitre block by a pivot pin through pivot hole of the guard at one end and at the other end to the depth guage by coach bolt and wing nut. Both mitre block and depth gauge are connected to the sole plate by welding.

4.1.5 Blade assembly

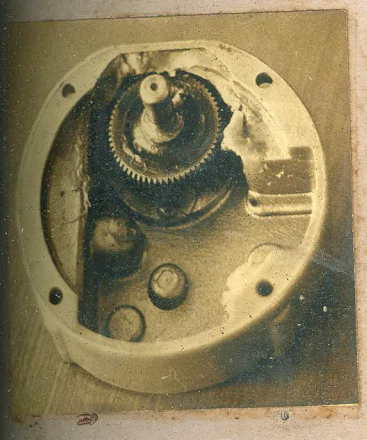
The rip and cross cut saw blade is fixed to the spindle in between two flanges by a set screw. The material of the blade is chrome venadium steel.

4.2 Functional Analysis

4.2.1 Motor frame

The function of the motor frame is to house and protect the armature and field windings from dirt and moisture. It also facilitates the housing of a ball bearing. The function of the ball bearing is to support the shaft and facilitate its rotation. The slots at the closed end of the motor frame are provided for the air circulation inside the motor windings to effect cooling.

To bring down the weight of the portable saw the frame is made up of aluminium alloy. The handle provides the grip for holding the portable saw. It also houses electrical connections within its cavity. The function of the switch is to make electrical connection between the motor and supply when it is pressed. The knob is provided to hold the saw by the left hand while its operation.



4.2.2 Gear box

The gear box houses the spur gear. The revolving gear is covered fully by the gear box for protection both to the operator and to the gear itself from outside contamination. It also provides housing for the ball bearing and two bushes. Gear box also serves the purpose

of keeping grease inside for the proper lubrication. The function of the spur gear is to reduce the motor shaft speed from 5000 R.P.M. to 3600 R.P.M.

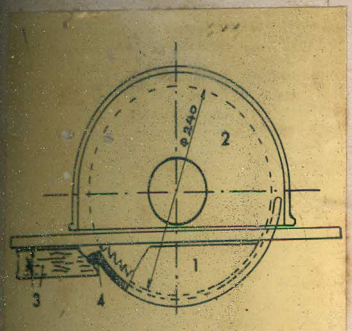


Fig. 16.
1. Lower (movable) hood 2. Upper (fixed) hood
3. Stock 4. Nose of hood

4.2.3 Guards

The function of fixed guard is to cover the upper portion of revolving blade to give protection to the operator.

The function of the telescopic guard is to cover the working part of the blade, so that in case of kickbacks the revolving blade is automatically covered to give protection to the operator.

4.2.4 Sole plate

The sole plate provides a bearing area for the saw on the work. The function of the rectangular solt in the sole plate is to accommodate the saw blade into the work. The function of the depth gauge is to set the sole plate at different depths. Mitre block facilitates to tilt the sole plate from 0^{o} to 45^{o} in the horizontal plane.

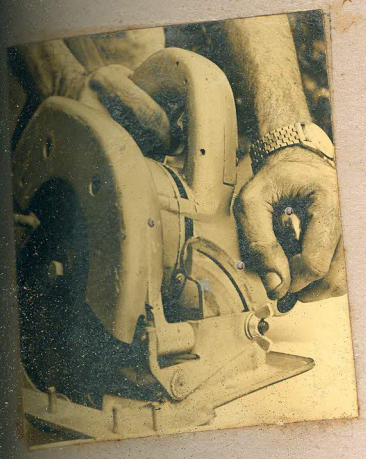
4.2.5 Blade assembly

The function of the blade is to cut the wood. The two flanges are used to secure the blade firmly to the spindle by a set screw.

4.2.6 Functional problems in the portable electric saw.

- The depth gauge near the sole plate has not provided with a scale. So, one cannot adjust the sole plate for a particular depth of cut unless by trial and error method.
- There is more clearance between the motor frame and the inner gear plate. Because of this saw dust goes inside the motor frame. Photograph shows saw dust collected on the fan of the motor.

- There is no good exhaust system for the saw dust in the existing portable saw.
- Because of its shape, the portable electric saw cannot be kept properly and it assumes awkward position during its rest period on any surface.
- There is no proper reference mark on the sole plate to guide the operator during sawing operation along the marked line on wood.
- There is no riving knife in the existing model to reduce kickbacks.



4.3 Ergonomical Analysis

4.3.1

The shape of the handle is unergonomical. It does not provide a good grip for the hand. The protruding part near the switch of the handle causes pain to the fingers. When the forefinger is pressing the switch it is away from the grip of the handle which is not desirable.

4.3.2

The shape of the switch is also unergonomical because it does not match with the cantour of the forefinger. The switch is flat and has some sharp corners at its end.

4.3.3

The shape of the knob on the motor frame does not provide a good grip for the left hand which is stressed while gripping continuously.

4.3.4

The fixing and removal of the blade from the spindle is difficult. This is because the set screw has to be tightened or loosened by a spanner and the parts like sole plate and hood near the blade obstruct the hand.

4.3.5

The existing design of gear box is such that, for applying grease to the spur gear; the entire gear box is to be separated from motor frame.

4.4 Formal Analysis

4.4.1

The red colour of the knob does not suit because red colour will repel one's feelings to grip it.

4.4.2

There is no proper colour scheme to the motor frame and handle. Handle could have been given a different colour to improve appearance of the product.

4.4.3

Since the depth gauge and mitre block are welded to the sole plate, the welding marks give a rough finish to the product.

4.4.4

Many protruding parts like depth gauge and mitre block cause visual clutter.

4.4.5

The form of the motor frame could have been simplified to improve the formal appearance.

5.1.6

There should be good air-cooling of motor windings.

5.1.7

There should be minimum number of components.

5.1.8

All the parts should be fixed properly so that there is no possibility of vibration of parts.

5.1.9

The portable saw should be easily assembled and dissembled.

5.1.10

The structure of all parts should be simple to manufacture.

5.2 Functional Hypothesis

5.2.1

A portable electric saw should be designed to cut at least 2" thickness of wood.

5.2.2

It should be possible to adjust the sole plate at required depths of cut without difficulty. This essentially requires the provision of a scale on the depth gauge.

5.2.3

The saw dust going inside the motor windings should be avoided.

5.2.4

The saw dust should be efficiently exhausted from the saw.

5.2.5

There should be provision in the saw to keep it properly after its usage.

5.2.6

There should be proper reference mark on the sole plate to guide during sawing operation along the marked line.

5.3 Ergonomical Hypothesis

5.3.1

The handle should be designed such that it provides a good and comfortable grip for the operator's hand. Sharp corners are avoided in the handle.

5.3.2

The switch should be such that the forefinger is not slipped away from it while pressing. The sharp corners are avoided in the switch for easy operation.

5.3.3

The shape of the knob should be improved for a better grip.

5.3.4

The fixing and removal of the blade from the spindle should be easy.

5.3.5

The scale on the mitre block assembly should be improved for easy angle adjustments.

5.3.6

The geat box design should be such that greasing could be done easily.

5.4 Formal Hypothesis

5.4.1

The handle and the knob should be given a good colour to avoid the monotonous colour scheme and to clearly signify their function.

5.4.2

Use of welding is minimised to give the product a good appearance.

5.4.3

The design should be such that there should be minimum protruding parts.

5.4.4

All the forms should be such that they follow the function and should be easily processed.

5.4.5

The sharp corners are avoided in the product.

5.4.6

The design should be streamlined.

6. Synthesis and Design solution

A survey of the existing portable electric saws and the needs of the people who use them showed that requirements of the users vary between wide limits from that of an ordinary carpenter to industries who use the saw mainly for portability and ease in cutting.

It was decided to design a robust general purpose saw which can be used in construction sites and in workshops with a maximum vertical cut of 2".

The main constraints were a sturdy, rigid construction, easy operation and easy maintenance.

A number of motor frame shapes are sketched and studied in terms of their suitability. They are visualised with different handle shapes. Various study models for the selection of most ergonomical handle shape are done. The final design has the following features.

Motor frame

The motor frame consists of die-cast aluminium alloy (ASTM No.B85, alloy SG100B). The shape of motor frame is best selected for easy die-casting and to improve the total form of the

portable saw. Complicated contours which cause visual clutter (as in the existing design) outside motor frame are avoided. A sealed type of ball bearing is fitted at the end of the motor frame which is completely closed and protected against dirt and dust. Since it is lifetime greased, the maintenance is not needed. The motor frame has slots at the end to provide cooling to the motor. One half of the handle is integrated with the motor frame. Another half of the handle is also made up of die-cast aluminium alloy. This is fixed by screws to the motor frame handle half. The handle shape provides a proper grip to the operator in all his working conditions.

Motor

A continuously rated universal type motor as in the existing portable saw is used. Its speed is reduced by a spur gear in the gear box to 5000 rpm.

Gear box

The gear box has two parts. One is the inner gear plate and the other main body. Both are of die-cast aluminium alloy (ASTM No.B85, alloy SG100B). The inner gear plate is fixed by four screws to the motor frame. Another half of the handle is integrated with the inner gear plate casting.

The main body is fitted with a spur gear. It is fixed to the inner gear plate by separate screws. This arrangement gives the flexibility of opening the gear box for maintenance without removing the inner gear plate from the motor frame. The design of gear box is improved for easy die-casting and for good form.

Fixed hood

The shape of fixed hood is designed such that exhaust of the saw dust is carried out efficiently. The fixing of hood to the gear box is independent of gear box fitting to the motor frame. It has been provided with three holes for fixing. Two big holes infront of the hood are avoided. There is also an exhaust opening at the end of fixed hood. Material for fixed hood is aluminium alloy.

Moving hood

Moving hood is made up of M.S. sheet pressing, the form of which is suitably designed so as to make it integrated with the total form.

Sole plate

Sole plate is of M.S. sheet pressing. The mitre block is integrated with sole plate. This avoids the use of welding on sole plate. The mitre block has improved scale for angle cutting

graduated at 0°, 15°, 30° and 45°.

Auxiliary handle

This is made up of U.F. resin. Its shape is such that it can be gripped around at any working positions.

Depth gauge

The depth gauge has improved design with a knob instead of wing nut.

Trigger switch

The trigger switch is provided in the handle. The switch button is made up of U.F. resin instead of aluminium.

Name plate

The name plate is of anodised aluminium. It is fixed to the motor frame in the depression provided.

Surface finish

The motor frame, gear box and fixed hood are spray painted. Suitable colour scheme is provided for the product to give good appearance.

Specification of the Portable Electric Saw.

Maximum vertical cut	52 mm
Maximum bevel cut	43 mm
Saw blade speed:	
No load	5000 rpm
Full load	3600 rpm
Watts input at full load	600
Overall length	255 mm
Approximate weight	5 kg

Standard voltage : 220/250 D.C. and single phase A.C. 50 cycles.

Each machine is supplied with 6 ft. 3 core TRS cable, one combination rip and cross cut blade and tommy bar.

To cut different types of wood, stone, brick, asbestos, cast iron, aluminium and other construction materials, suitable blades are supplied as accessories (Rip guide is also provided as an accessory).

6.1 Salient features of the design.

6.1.1

The motor frame design has been improved for easy die-casting and good form.

6.1.2

The handle of portable saw provides a good grip for the operator at different working conditions.

6.1.3

The trigger switch button provides easy switching. The forefinger will not be slipped away while pressing it.

6.1.4

Saw dust is avoided to go inside the motor frame by the improved gear box design.

6.1.5

The mitre block has improved scale to cut angles and is integrated with the sole plate. This avoids welding to give good appearance for the product.

6.1.6

The depth gauge has improved design.

6.1.7

An index mark guides the line of cut.

6.1.8

There is efficient exhaust of saw dust.

6.1.9

The auxiliary handle provides a good grip at all working conditions.

6.1.10

The carbon brush assembly is improved for easy maintenance.

6.1.11

The blade can be replaced by using allen key instead of spanner.

6.1.12

All the components are integrated with the total form of the product. The total form of the product is made simple and streamlined.

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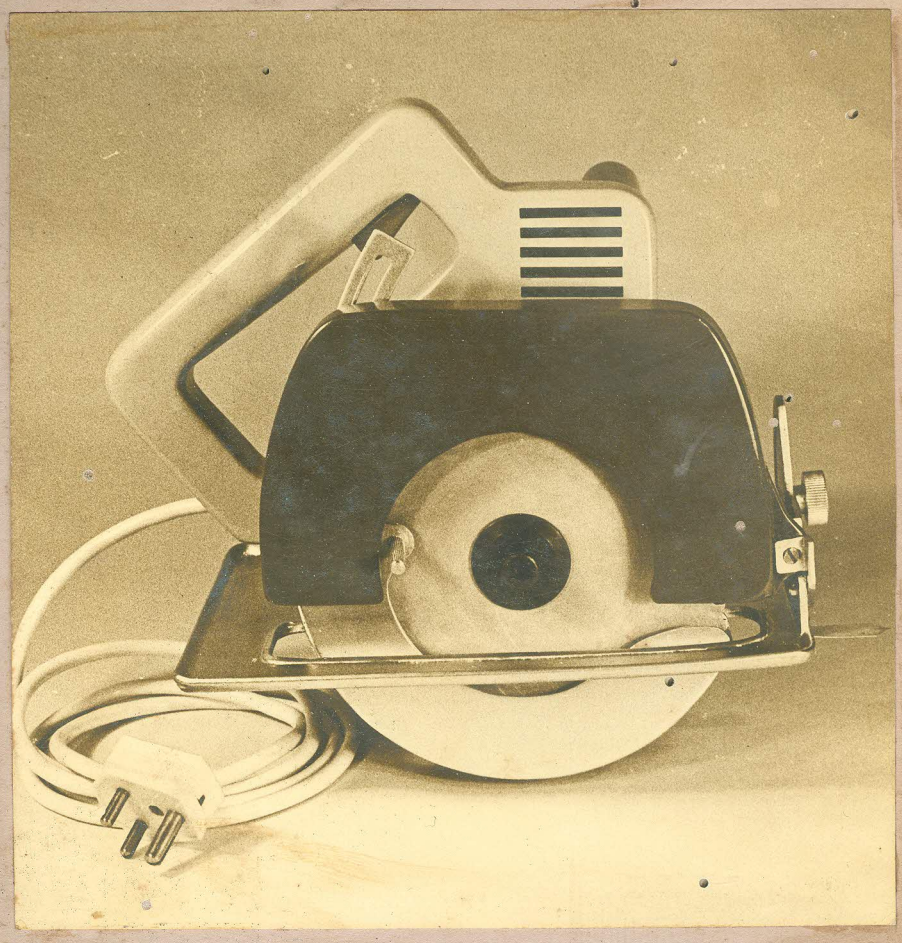
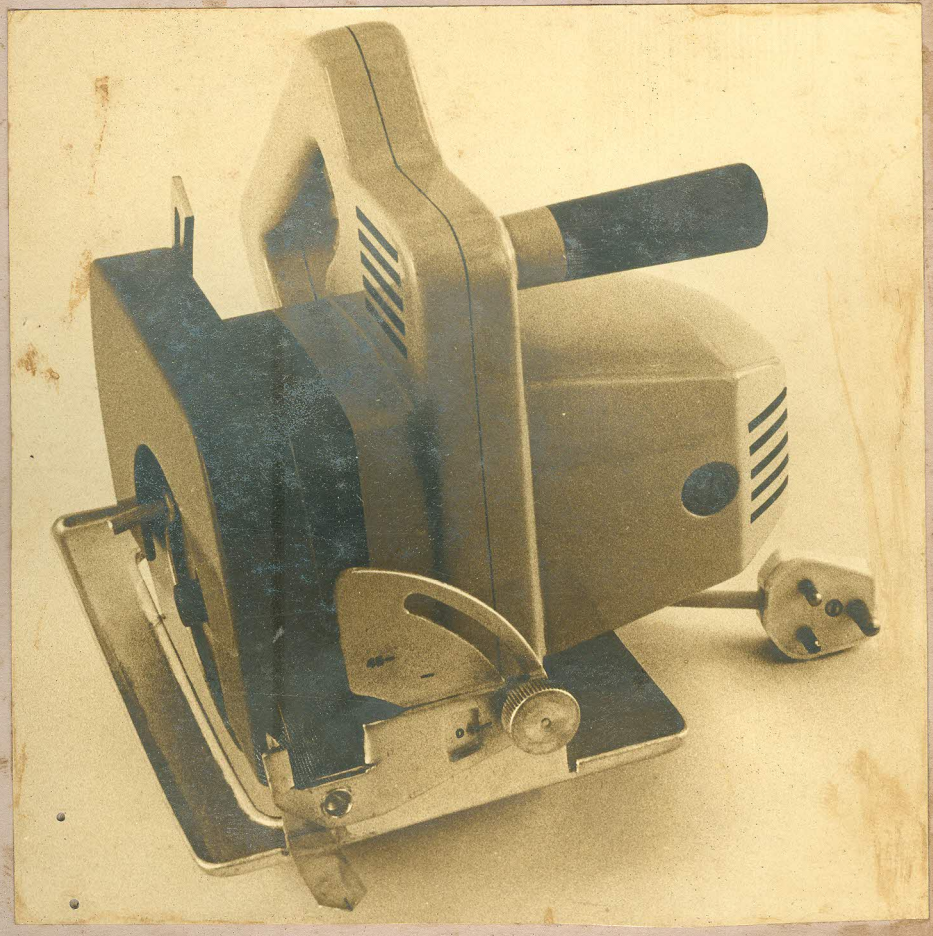
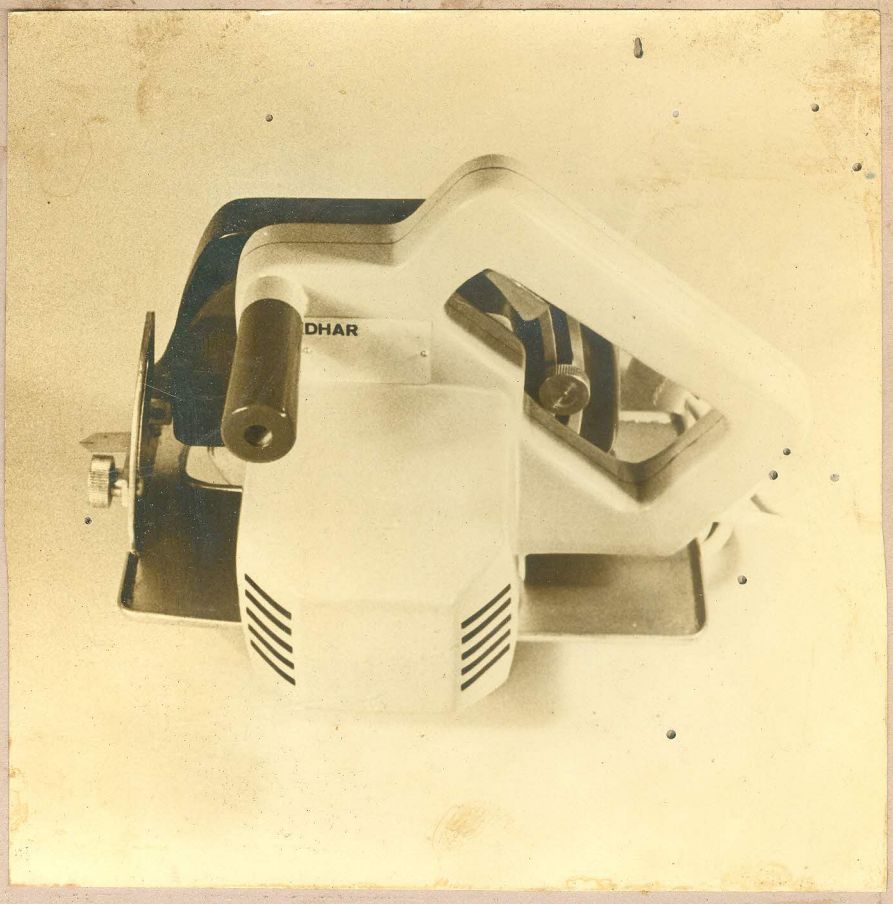
7. Communication

7.1 Photographs

7.2 Technical drawings



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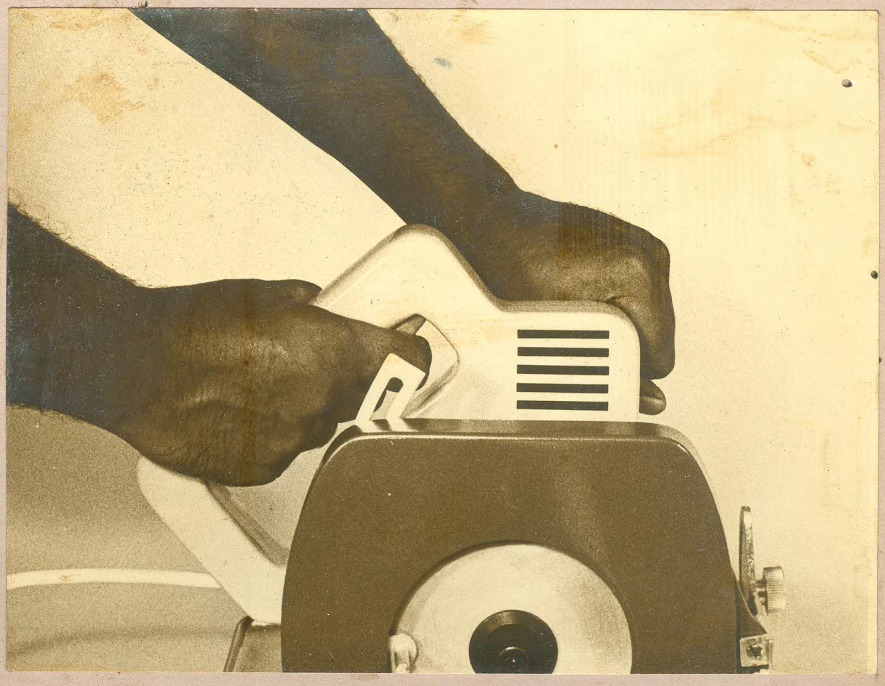

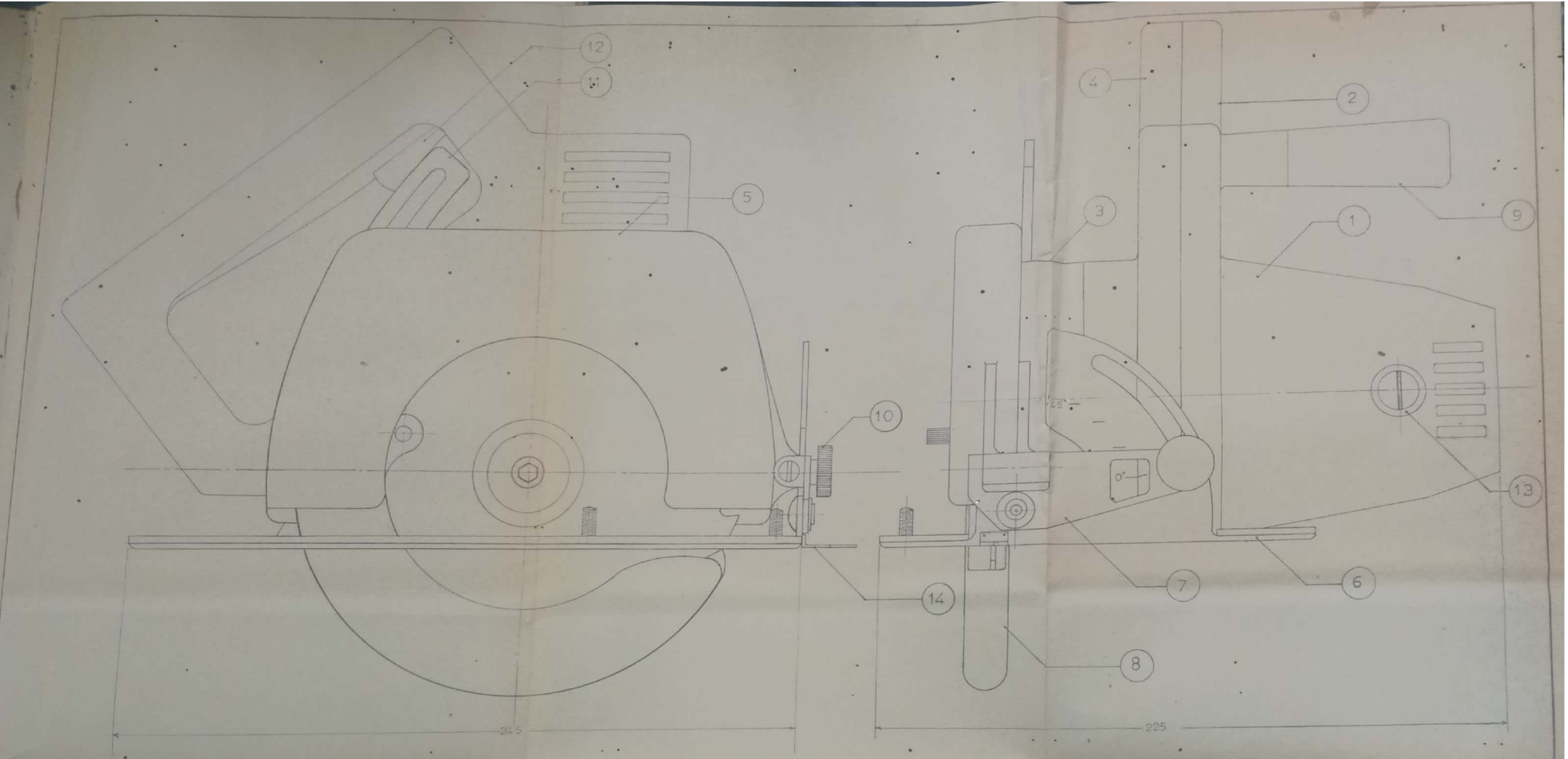

DIPLOMA PROJECT PORTABLE ELECTRIC SAW		
ASSEMBLY	U. S. DEVADIGA 1971-73	F 962 THIRD BATCH
DIMENSIONS IN MM SCALE FULL SIZE.		
INDUSTRIAL DESIGN CENTRE. I.I.T. BOMBAY-76		

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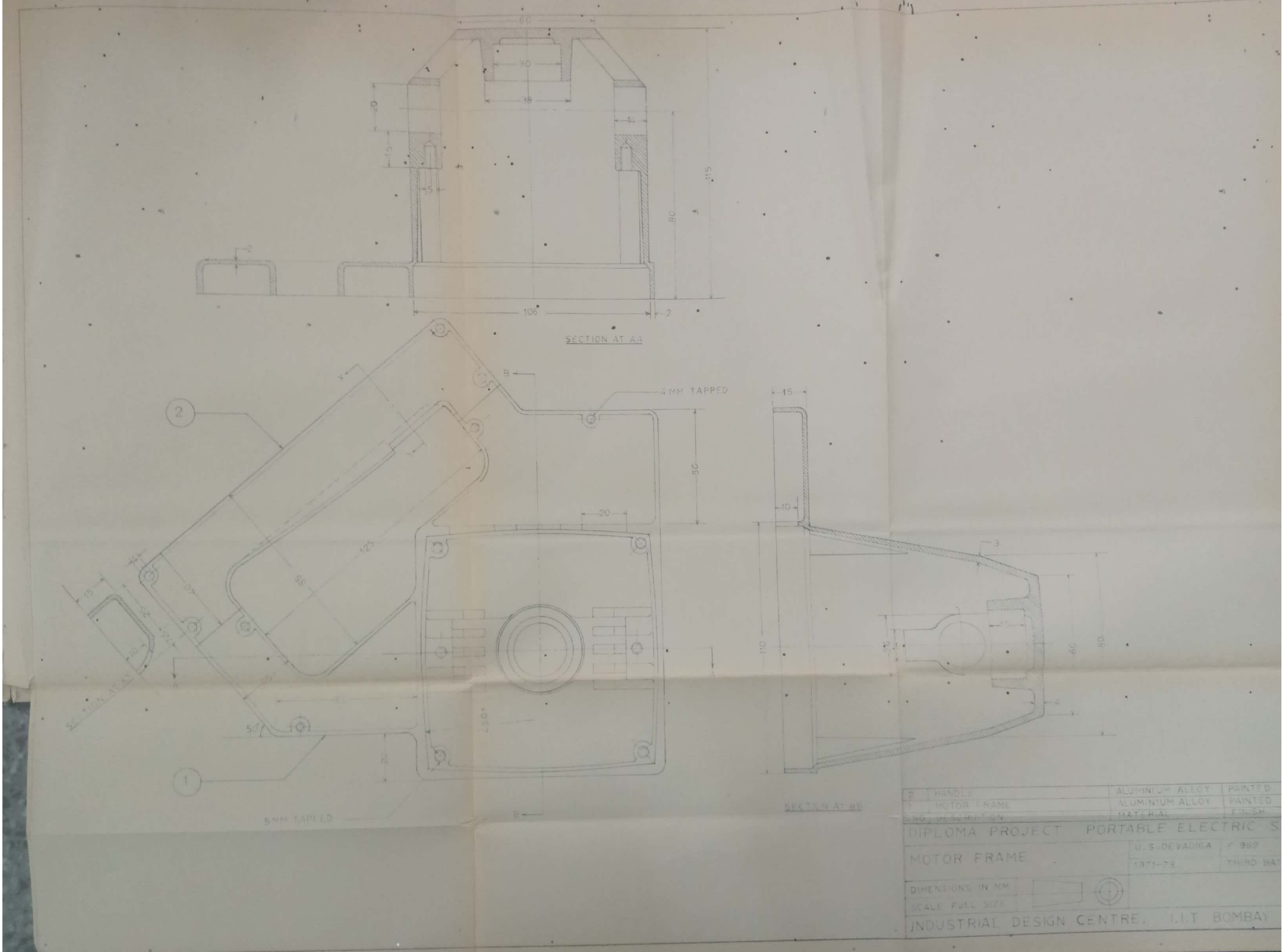

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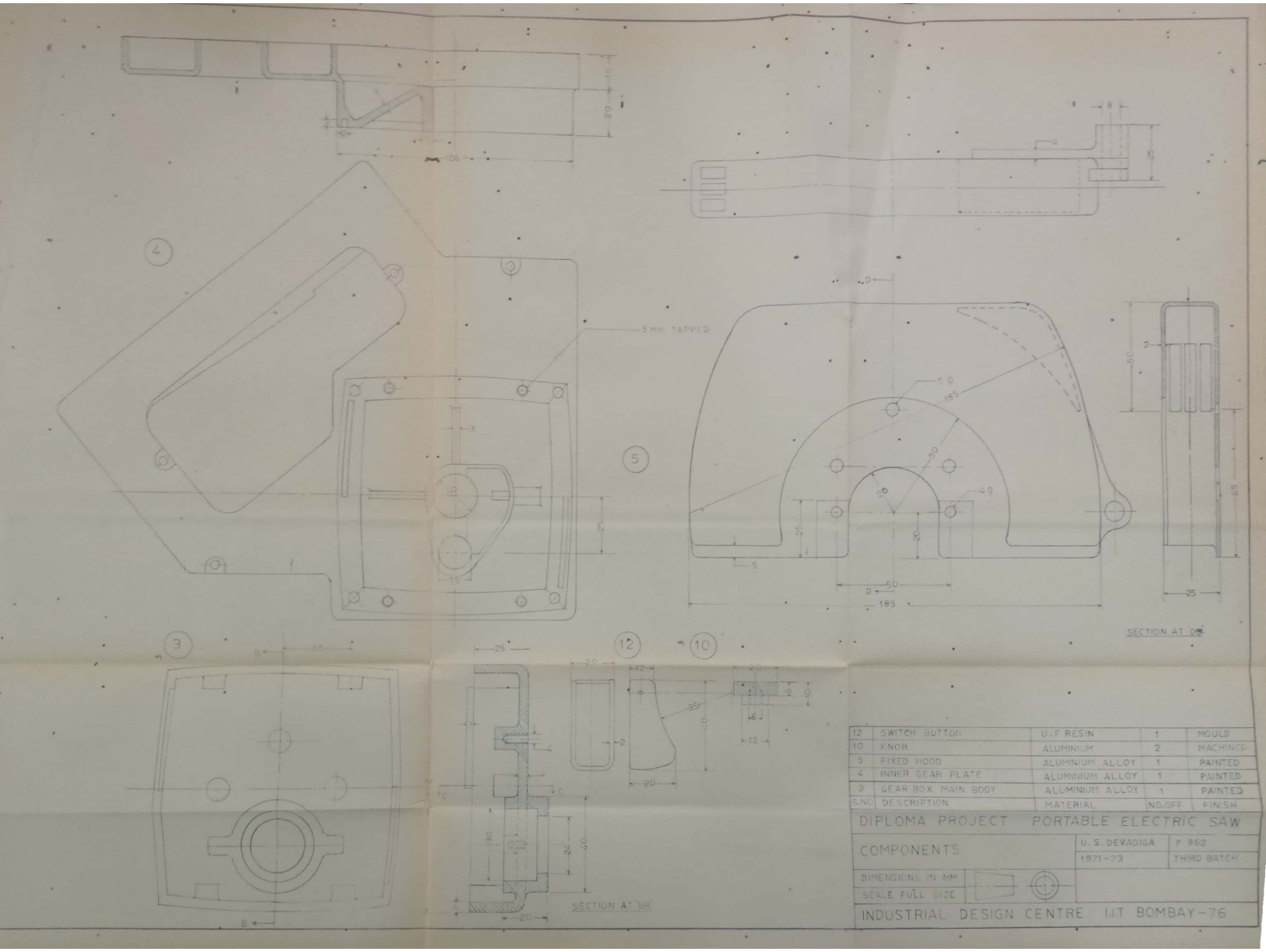

S.NO	DESCRIPTION	MATERIAL	NO.OFF	FINISH
12	SWITCH BUTTON	U.F RESIN	1	MOULD
10	KNOB	ALUMINIUM	2	MACHINED
5	FIXED HOOD	ALUMINIUM ALLOY	1	PAINTED
4	INNER GEAR PLATE	ALUMINIUM ALLOY	1	PAINTED
3	GEAR BOX MAIN BODY	ALUMINIUM ALLOY	1	PAINTED

DIPLOMA PROJECT PORTABLE ELECTRIC SAW

COMPONENTS

U. S. DEVADIGA F 962

1971-73 THIRD BATCH

DIMENSIONS IN MM

SCALE FULL SIZE

INDUSTRIAL DESIGN CENTRE I.I.T BOMBAY-76

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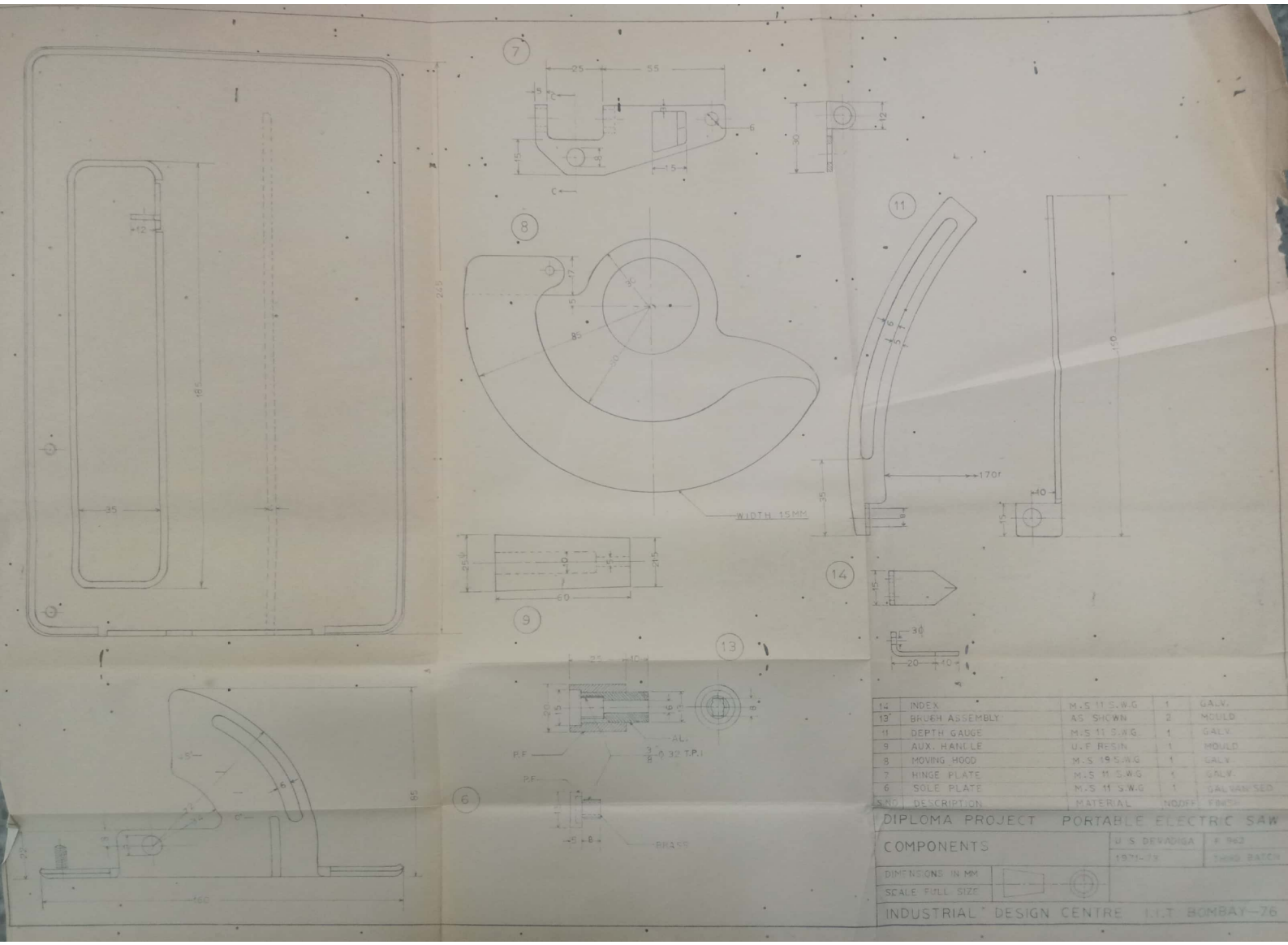

S.NO.	DESCRIPTION	MATERIAL	NO.OFF	FINISH
14	INDEX	M.S 11 S.W.G	1	GALV.
13	BRUSH ASSEMBLY	AS SHOWN	2	MOULD
11	DEPTH GAUGE	M.S 11 S.W.G	1	GALV.
9	AUX. HANDLE	U.F RESIN	1	MOULD
8	MOVING HOOD	M.S 19 S.W.G	1	GALV.
7	HINGE PLATE	M.S 11 S.W.G	1	GALV.
6	SOLE PLATE	M.S 11 S.W.G	1	GALVANISED

DIPLOMA PROJECT PORTABLE ELECTRIC SAW

COMPONENTS

U.S DEVADIGA — P 962 — 1971-73 — THIRD BATCH

DIMENSIONS IN MM

SCALE FULL SIZE

INDUSTRIAL DESIGN CENTRE I.I.T BOMBAY-76

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7. Bibliography

1. Technical Wood Working
   by Groneman and Glazener.

2. C.I.S. Information Sheet on Circular Saws, issued by the International Safety and Health Information Centre, International Labour Office, Geneva, Switzerland.

3. A.E.G. - Telefunken Electric Tools Catalogue.

4. Ralli Wolf Portable Saw Catalogue.

5. Casting Design Hand-book sponsored by the U.S. Air Force and the American Society for Metals.

6. Modern Asia - September 1972.