Fabrication Of Dual Support Bobbin Holder And Fault Control Bar And Their Influence On Yarn Quality Characteristics

Project Report 1999 – 2000

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In partial fulfillment of the requirements
for the award of the Degree of
BACHELOR OF TECHNOLOGY IN TEXTILE TECHNOLOGY
of the Bharathiar University

DEPARTMENT OF TEXTILE TECHNOLOGY

Kumaraguru College of Technology

COIMBATORE – 641 006.

Certificate

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This is to certify that the project report entitled

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has been submitted by

Mr ______________________

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during the academic year 1999 – 2000

Guide

Head of the Department

Certified that the above candidate was examined by us in the project work viva-voce examination held on ____________ and the University Register No. is ____________

Internal Examiner

External Examiner

Dedicated to

Our Beloved Parents

&

Our Nuclear Nation.

Acknowledgement

ACKNOWLEDGEMENT

First of all we would like to convey our greatfulness to the optimistic personalities who enthralled us, persuaded us and moulded us into effervescent personalities.

We thank **Mr. V. KRISHNAKUMAR**, Senior lecturer, for his guidance during the entire execution of the project.

We are thankful to **Prof. AR.PADMANABHAN**, Head of the Department, for having permitted us to execute this project.

We wish to express our sincere gratitude to **Dr.K.K.PADMANABHAN**, Principal, for his encouragement and for the ample facilities offered to us.

We would like to record our thanks to **Mr. D.JAYARAMAN**, superintendent, Customer Service Department, M/s. Lakshmi Machine Works Ltd., Coimbatore, for his technical guidance.

We sincerely thank **M/s. SENTHIL TEXTILES,** Coimbatore. for allowing us to carry out the project in their mill.

We would like to thank **M/s. YAGAPPA MACHINE WORKS** Coimbatore, for rendering their help in the fabrication work.

We would like to thank **Mr.S.RAMAKRISHNAN**, General manager (Technical) NTC (TN&P) Ltd., Coimbatore, for providing necessary raw material to complete the project.

We would like to thank **M/s. K.T.SPINNING MILLS (P) LTD.,** Salem, for providing necessary raw materials to complete the project.

Last but not the least we extend our great affection to those who support us internally and externally to achieve this triumph.

Synopsis

SYNOPSIS

The new technology emerges with the direct drafting of sliver to yarn. This System is not so vogue due to certain limitations. Besides in the regular ring spinning system the roving plays a vital role as an intermediate product to produce yarn of required quality characteristics. The roving reduces the draft required in the spinning frame. The yarn property is much depends on the roving quality produced in the simplex and its trouble free unwinding at the ring frame creel. Present day umbrella bobbin holders produce some stretch in the roving due to uncontrolled unwinding because of its cantilever arrangement. This roving stretch produce long thin faults in the yarn which create defects in woven and knitted fabrics, and also reduces subsequent process productivity through end breakage rate.

In this project new type of bobbin holder was fabricated to give a controlled unwinding. This is achieved by giving dual support to the bobbin in the creel.

With this dual support bobbin holder trials were conducted with the bobbin lift of 12" and 16" in PK225 drafting system. The produced yarn samples were tested for CSP, classimat faults, U%, imperfections and appearance. A reduction of long thin faults to the extend of 30% was observed as also 60% reduction was achieved in drafting faults.

Secondly, a Fault Control bar (FCB) was fabricated to analyze its effect on yarn quality. The yarn quality parameters CSP, U%, imperfections and yarn appearance were checked. The height of the FCB with respect to normal path of the roving was changed and kept at 1,3,5mm above the normal roving path. With 1mm height setting, there was a reduction of 18% in the imperfection level. The yarn appearance was also found to be good with this setting.

Contents

CONTENTS

Introduction

1. INTRODUCTION

With the present global scenario, that too with the introduction of GATT, the yarn quality requirement is too stringent. The motto of every manufacturer becomes "CUSTOMER DELIGHT" which over ride the old concept of "CUSTOMER SATISFACTION".

Mean while, the competition between the mills to up keep the yarn quality with minimum faults begins. Unless we take precautionary measures right from bobbin preparation, it will be very difficult to attain the level of excellence. The major requirement of yarn quality is, the reduction of stretch faults, which are produced due to many reasons such as undue stretch in the roving and improper tension drafts maintained during preparatory processes.

The yarn fault produced due to roving stretch is long thin places which have a length of approximately 8cm and longer and have a cross section of about -30 to -75% of average yarn diameter, which is relatively seldom occurring in short staple yarn and much more frequently occurring in long staple yarn. The long thin places could result in serious cloth defects like streaks, variation in dye up take, etc., Apart from this the productivity in the weaving department is affected much due to higher end breakage rate. Thus control of long thin faults needs no further emphasis.

Uncontrolled unwinding in the creel leads to roving stretch. This problem is found markedly with 16" lift bobbin. With less roving TM and higher package weights this problem of roving stretch is aggravated. Hence some means of providing controlled unwinding in the creels become necessary. This is achieved by providing dual support to the bobbins.

Secondly, the introduction of Fault Control Bar (FCB) in the break draft zone is carried out to analyze the yarn quality. It plays a major role in controlling the fiber movement in the drafting zone due to the development of friction field similar to the role of presser bar in the front zone of the draw frame. This fiber control results in the reduction of imperfections to some extent. From the results it is observed that the evenness level of the yarn was not much influenced with FCB.

Literature Survery

2. LITERATURE SURVEY

2.1 LONG THIN FAULTS

According to K.K.Lahiri[6], the stretch in the roving leads to long thin faults in the yarn due to subsequent draft given to it in the process of yarn production in the ring frame. Even though there are some other raw material faults and machine faults as listed below can produce long thin faults nevertheless, the role of roving stretch due to ring frame bobbin holders can not be ignored.

2.1.1 CARDING

Web falling in the cards is the source of long thin places. The major cause for this is the loading of cylinder under casing. Frequent air cleaning of under casing and petrol washing during full setting for cotton and tinted synthetic materials could help avoiding loading. The other major causes for cylinder loading would be the condition of wire points, too high or too low tension drafts, static generation in P/V and P/C counts etc.,

2.1.2 DRAW FRAME

Missing slivers in drawing process can also be the reason for very long thin places in the yarn. The effectiveness of sliver stop motion should be looked into regularly. The piecing practices of tenters also need attention. Cramming of slivers in drawing can also be a source. The mills can increase the gap between cans and slivers so as to avoid incidents of slivers rubbing against the inner surface of cans by suitably changing the coiler speed change wheel/can bottom change wheel.

Reducing creel tension draft and web tension draft in draw frames, maintaining the surface of feed table in smooth condition and smooth rotation of creel rollers would also help in the control of sliver stretch.

The condition of trumpets should be good. Too low top roller pressure would also cause long thin and thick places.

2.1.3 FLY FRAMES

Excessive roving stretch due to improper function of builder mechanism and use of empty roving bobbins with wide variation in diameter are causes for long thin places.

Sliver stretch in the creel of the speed frames due to too high creel draft has to be avoided. Creel tension draft should be as minimum as possible. At the same time ensuring no sagging of drawing slivers.

Too high a break draft in speed frames and inappropriate selection of condensers is other vital causes for long thin faults.

Sliver splitting in speed frame while drafting is the serious source for long thin place. The various reasons that could be attributed to this are given below:

- Wider bore diameter finisher draw frame trumpets.
- Sliver guides at feed should be adjusted in such a way that the slivers run in to the drafting system side by side, but not crossing over each other.

The method of feeding slivers in fly frames and condition of cans are important. Sliver crisscrossing each other, damaged edges of drawing sliver can etc., would disturb the free withdrawal of sliver from cans.

Roller lapping in fly frame could be the reason for long thin places. Especially, while processing tinted synthetic blends, it is suggested to clean the top rollers with chemicals like carbon tetra chloride to avoid lapping due to tint.

2.1.4 RING FRAME

CREEL STRETCH in ring frame due to improper rotation of bobbins, vibration, jerky movement of ring rails, broken roving guides etc., are a few points to be looked into ring frames for the control of long thin places.

Wider back zone settings with reduced break draft helps to produce yarns with less number of thick places and slubs. However, studies have shown that there is a tendency for the long thick and thin places to increase when setting is made wider. Hence, it is suggested to conduct controlled trials to arrive at optimum settings.

2.2 CASE STUDIES:

2.2.1 STUDY - 1

A mill has complained about the poor quality of knitted fabric produced from 20Ne combed hosiery yarn. A careful analysis of the yarn extracted from the defective fabrics showed random occurrences of long thin places.

The individual departments were analyzed for various machinery process parameters; machinery conditions and works practices adapted. Some of the observations are

- Direct blowing of overhead cleaner air in to the roving in the region between roving bobbin and drafting system resulting in stretch.
- Wider back zone setting of 60mm in ring frame drafting.
- High draft of about 30 in ring frames.
- Indication of the presence of roving stretch in fly frames and ring frames.
- Improper piecing by the draw frame tenter.

By taking corrective action on the above observation, the mill was able to minimize long thin places in yarn and consequently ensures good fabric quality.

2.2.2 STUDY - 2

A mill faced the problem of long thin and thick places in knitted fabric produced from 30Ne combed hosiery yarn. An analysis of raw material used by the mill and process parameters employed reveal the following causes:

RAW MATERIAL

- High fiber fineness range employed. This is to be controlled within 10%.
- Use of cottons. with excessive short fiber content; this would affect the drafting behavior.

BLOW ROOM

- High full laps c.v% and yard to yard c.v%. Lap rejection for the tolerance set was very high upto 20%; this is to be controlled with in 5%.
- Pre opening of cotton by bale openers resulting in very high nep generation and material irregularity. It was suggested to do manual opening of cotton which would ensure lower tuft size (as low as 50gms) and consequently better opening.

COMBING

- The mill used less number of end (18) in doubling, low break draft and total draft in comber preparatory. It was suggested to try 24 ends, 1.30 break draft and a total draft exceeding 1.5.
- Condition of unicomb and various critical settings were found disturbed and unsuitable.

DRAWING

- Sliver splitting due to improper selection of trumpet was noticed; this needs to be corrected.

FLY FRAME

- Back zone setting was found varying between frames.
- Roving stretch % was high (up to 2%).

RING FRAME

- Negligence with respect to machine cleaning resulted in higher incidence of classimat results.
- 70-degree shore hardness for front top rollers and 30mm top roller cots were suggested for better performance.

2.3 ROLE OF TECHNOLOGICAL DEVELOPMENT IN FLY FRAME FOR THE STRETCH OF ROVING IN RING FRAME CREEL

2.3.1 ROLE OF TM

According to Dr. P.Balasubramanian and Mr.D.Jayaraman[7], at the past there was no false twister with grooves at the flyer top (only nylon inserts with square centers are provided). The roving TM was usually kept large to minimize the end breakage rate. So the harder roving results, which was able to with stand the stress and strain introduced in the subsequent ring frame creel.

As the result of technological growth, a new kind of false twister, a polyurethane material with 6,8,10,12 grooves in its inner surface has been devised and incorporated in the flyer top. The false twister imparts temporary twist, to with stand the stress and strain in the roving between the front roller nip and flyer top. This helps to minimize the end breakage rate to the greater extent.

Nowadays the roving TM is kept less with the advent of false twisters to achieve higher production and with less end breakage in the fly frame. The draftability of roving with less TM is found to be good in the ring frame drafting system. With the reduction in the roving TM, the roving is no longer able to with stand the stress and strain imposed on it, in the ring frame bobbin holder. So the roving stretch takes place in the ring frame creel. According to P.H.Shah[2], the frequency of long thick and thin faults decrease by about 30% with the use of higher roving TM (from 1.1 to1.5).

2.3.2 ROLE OF ROVING PACKAGE SIZE:[3]

In the earlier days the roving package content was only about 0.5kgs for 8" lift with 4" bobbin diameter. But with the rapid technological development the package content has been increased as stated below.

LIFT(inches)	BOBBIN DIA(inches)	PACKAGE WEIGHT (kgs)
12	7.0	1.75
14	7.0	2.05
16	6.5	2.50

With the higher bobbin content and lift, controlled unwinding becomes very difficult in the ring frame, which resulted in roving stretch. This is so acute with the present umbrella bobbin holders that operate with cantilever arrangement.

2.4 DIFFERENT TYPES OF BOBBIN HOLDERS:

2.4.1 SKEWERS

A skewer is a long, hard wood spindle intended to hold the roving bobbin in the creel of the ring frame. The top end of the skewer, which projects above the bobbin is turned down to readily fit in to a hole in the creel board. The "Barrel" of the skewer is turned to correct diameter to fit loosely to the bore of the top end of the bobbin. The lower end of the skewer has an enlarged, upward rounded "base" of the roving bobbin and supports it. The underside of the skewer base is tapered down to a small point to rest in the step of the creel board.

DRAWBACKS:

- If a skewer is dropped, it is likely that the point of the bottom end would be burred up. This produces too great a bearing surface in the step of the creel. This produces enough extra tension to cause the roving to stretch and to break repeatedly.

- Maintenance cost is more. The damaged point has to be repaired with the knife or by using a special tool design to repoint skewers and it is laborious one.
- The sider has to use both of his hands to handle skewers for donning and doffing the bobbins.
- Obstruction of light due to creel frame hinders the piecing process.

2.4.2 UMBRELLA BOBBIN HOLDER

A bobbin holder consists of a short cylindrical head, with projecting springs, which fits inside the top of the roving bobbin with enough friction to hold it. This head hangs from a small plate fasten to the under side of the creel. Because of the head revolves on a ball bearing, it turns very freely, and as the roving is unwound, subjects it to a slight tension.

If a frame, with these holders to be ideal, it is quite possible that the vibration of the floor and the frame may be sufficient to cause the bobbin to turn enough on the ball bearing. It permits the roving to unwind and pile up on the creel board giving uncontrolled unwinding. To prevent this trouble, a braking plate with the breaking spring having a tension of 1-8gf

From the earliest days of mule or ring spinning, the creels have been made of wood. When some innovation was proposed, this was given some name to distinguish it from the regularly used creels. Consequently, in these paragraphs, the creel commonly used for a hundred years or more will be called a 'regular' creel to distinguish it from other type of ring spinning creel.

2.5.1 REGULAR CREELS

The space between the roll beams is covered in with boards. Behind each roll beam, and flush with it, is a side of lever board from 4 to 6 inches wide. This board is slotted at regular intervals to permit the weight hooks to pass through.

Between the two sideboards is a wide deck or centerboard. This is wide enough to cover the open space between the two sideboards. These creel boards prevent dirt and lint from dropping down to the cylinder and tapes.

In most cases, there are three levels of boards: the deck or centerboards just described, a middle level called the middle creel board and the top creel board. The two upper levels are adjustable to accommodate roving bobbins of different lengths.

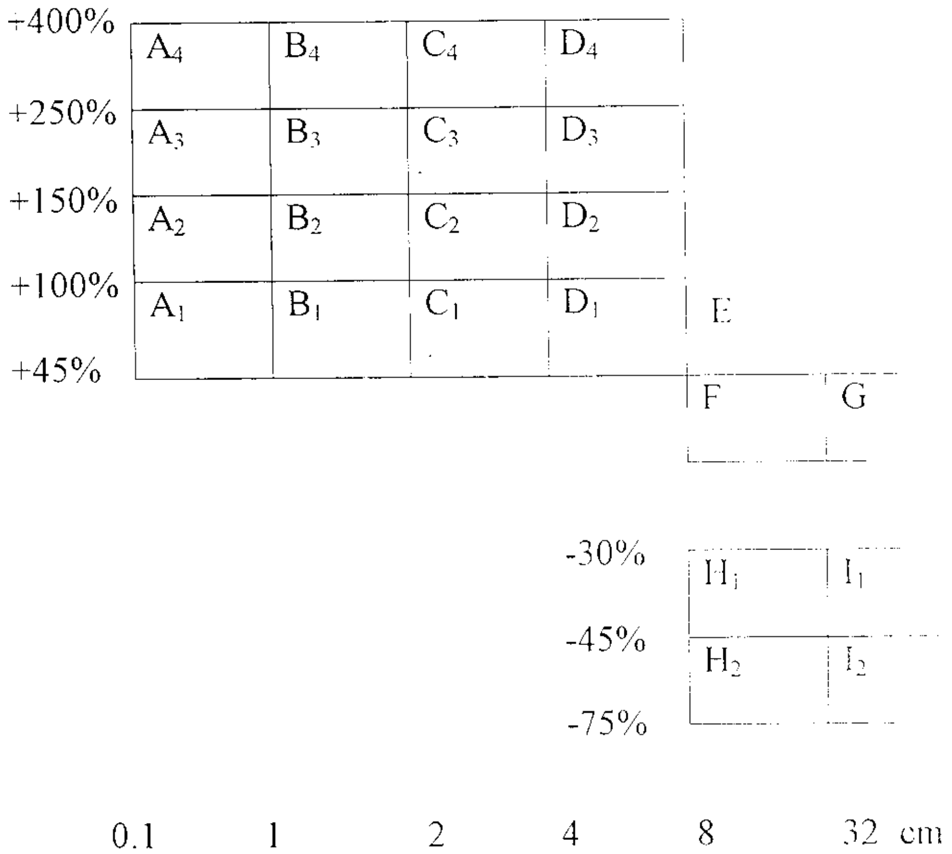
length of the frame. Figure shows two spans carried by the bottom T support and six spans carried by the top T support. The span clamps are not adjustable. Thus the spacing of the spans, across the frame is fixed.

Each span is a specially shaped, extruded aluminum channel, as illustrated in the enlarged section at the lower right of figure. The inverted 'v' shape of the top is used to avoid lint collection. The inside rib adds stiffness and prevents the heads of the adapter screws from turning.

2.6 CLASSIMAT FAULTS

CLASSIFICATION OF FAULTS BY UCM II

The UCM II system provides a detailed breakup of yarn faults based on the length and dimension of the faults. This instrument provides the results in the format as given below



There are totally 23 types of faults, each fault is identified by an alphabet and a number. The alphabet represents the length range of the fault and the number indicates the dimensional size of the fault. 'A' faults have a length range of 0.1 to 1cm; 'B' faults 1-2cm; 'C' faults 2-4cm and so disturbing yarn faults for each length classes. The 23 classes of faults are further grouped in to three categories. They are: 1.short thick faults: A + B_1 + C_1 + D_1. 2.Long thick faults : E + F + G. 3. Long thin faults : H_1 + I_1.

2.7 FAULT CONTROL BAR

It has been stated by SITRA[5], at wider back zone setting the imperfections are reduced. This can be further reduced to about 50%, by the use of fault control bar in the back zone due to fiber guidance given to it in the break draft zone, this is more prominent, when the mixing contains more number of short fibers. According to SITRA the following results are obtained for 40^s Ne with back zone setting of 60mm.

Particulars	With out FCB	With FCB
Imperfections(thick places+thin places)per1000m	1112	428
Unevenness	13.6	13.4

From the above study, it is clear that the imperfection is reduced by about 50%, with the use of FCB.

Methodology

3. METHODOLOGY

3.1 DESCRIPTION:

Dual support bobbin holder consists of a fixed upper support and an adjustable bottom support, which can be altered for different lifts of bobbins. The top support is fixed onto the rectangular bar, which runs through out the length of the machine. The bottom support is fixed on the bottom bar, which also runs throughout the length of the frame. The top piece consists of a top center stud over which a tension helical spring is placed, which is held in position by two pins. The helical spring facilitates easy creeling operation . One end of the top center stud is machined as ball edge, on which tiny balls of about 2mm rolls over, which acts as a bearing surface. The tiny ball is housed in a steel ring, which is tightly fitted on to the top nylon support, on which the bobbin top bore engages.

The bottom piece consist of a bottom central stud, one end of which has a threading for fixing it on to the bottom rectangular bar. The round nylon piece with a hole at the center is tightly fixed on the bottom center stud. A thrust bearing, which is free to rotate is placed on the bottom center stud, in the hole of the round nylon piece. A round nylon piece with rectangular projection on its upper surface and with hole in its center is passing through the bottom center stud. It is seated over the thrust bearing, hence it is free to rotate. Circlip is placed on the stud so as to avoid slipping of the round nylon piece with rectangular projection from the bottom center stud. The assembled view of bobbin holders in the creel is as shown in figure and photograph in the annexure III.

3.2 SAMPLE PLAN

12" lift bobbins

Umbrella Bobbin holder | Dual support bobbin holder

16" lift bobbins

Umbrella Bobbin holder | Dual support bobbin holder

3.7.2 SAMPLE PLAN:

Without FCB – four cops.

With FCB -1mm – four cops.*

-3mm – four cops.*

-5mm – four cops.*

*Deflection of roving from its normal path.

3.7.3 PROCESS PARAMETERS

Process parameters are given in Annexure I.

3.7.4 SAMPLE YARN PRODUCTION

- Four spindles on NMM frame with PK225 drafting system were selected for study and all the parameters were maintained same through out the study.
- Count – 44Ne.
- Settings:- back zone – 56mm

Front zone – 44mm

Break draft – 1.45

- Four cops for each setting of 1mm, 3mm, 5mm and without FCB were Collected.

3.7.5 SAMPLE MARKING

We marked our samples as follows for the settings given below:

1mm * = A1, A2, A3, A4.

3mm * = B1, B2, B3, B4.

5mm * = C1, C2, C3, C4.

Without FCB =D1, D2, D3, D4.

*Deflection from normal path of roving strand.

Results and Discussions

4. RESULTS AND DISCUSSION

4.1 INFLUENCE OF DUAL SUPPORT BOBBIN HOLDER ON YARN QUALITY

The yarn samples produced from umbrella type bobbin holder and dual support bobbin holder were tested for the following quality parameters and values are given in the tables 1 to 4.

4.1 YARN QUALITY PARAMETERS

- Classimat faults
- CSP
- Count CV% & Strength CV%
- U% & Imperfection Level
- Yarn Appearance

4.1.1 EFFECT ON CLASSIMAT FAULTS

With reference to Table 1 & 2 (Annexure III) a reduction of 23% of long thin faults in the case 12" lift bobbins and 31% of reduction in long thin faults in the case of 16" lift bobbins with dual support bobbin holder was bobbins the reduction in the count C.V% was 0.61, which may be due to the reduction of classimat faults in 16" bobbins.

As for as strength CV% is concerned 12" lift bobbins with dual support bobbin holder shows a reduction of 0.5% and 16" lift bobbins shows as reduction of 1.38%. This may be due to the overall reduction of classimat faults in both the cases.

The necessary graphs are plotted and shown in Annexure IV.

4.1.4 EFFECT ON U% AND IMPERFECTIONS

With reference to the values given in the Table 4 of Annexure-III, for both 12" lift bobbins and 16" lift bobbins, only minimum reduction was found in U% and imperfection level. As they are frequent yarn faults, the amount of reduction was not proportionate to the reduction of classimat faults. Classimat faults are infrequent yarn faults with high fault length as compared to fault length measured by unevenness tester.

The necessary graphs are plotted and shown in Annexure IV

4.1.5 EFFECT ON YARN APPEARANCE

With reference to Annexure V, the yarn appearance was found to be improved from B+ level to A level in both the cases of 12" and 16" lift bobbins with dual support bobbin holders.

4.2 INFLUENCE OF FAULT CONTROL BAR(FCB) ON YARN QUALITY

The yarn samples produced with and without fault control bar were tested for the following basic yarn properties.

- U% and imperfection.
- CSP
- Yarn appearance.

4.2.1 EFFECT ON U% & IMPERFECTIONS

With reference to table 5 given in Annexure III, the imperfection level went high for the 3mm and 5mm deflections. This may be due to high disturbance created in inter fibre cohessional properties which resulted in more thin places. Where as in the case of 1mm setting the imperfections were found reduced by about 18%. This maybe due to slight breaking up of roving twist without disturbing the fiber assembly and drafting force. but with necessary fibre guidance provided to the roving strand.

As far as U% is concerned there is no much variation in all the settings.

The necessary graphs are plotted and shown in Annexure IV.

4.2.2 CSP

With reference to table 6 given in annexure III, there is no significant change in CSP values with all the settings studied.

The necessary graphs are plotted and shown in Annexure IV.

4.2.3 YARN APPEARANCE

With reference to Annexure V and Table given below, it is observed that the yarn hairiness increases at higher deflections, which reveals it clearly in 5mm settings. This may be due to more opening out of roving strand, which causes the short fibers and sheath fibers to come out of the fibre assembly in the spinning triangle. These fibres did not entered well into the core of the yarn and appeared as hairy fibres.

Particular	With out FCB	FCB with 1mm deflection	FCB with 5mm deflection
Hairiness Index	5.07	5.34	5.38

Conslusion

5. CONCLUSION

The following conclusions are made in the project:

INFLUENCE OF DUAL SUPPORT BOBBIN HOLDER ON YARN QUALITY

- With the dual support bobbin holder, the long thin faults are reduced by about 23-31%. This is due to the reduction of stretch in the roving in the ring frame creel with dual support bobbin holder.
- The overall improvement was found in case of the classimat faults. Especially the drafting faults were reduced by about 50-60%. Which may be due to the feeding of roving with uniform tension and controlled unwinding in the creel .
- There is no much variation in U%, imperfection, CSP and C.V% values.
- With the dual support bobbin holder it is recommended to go for higher bobbin content and reduction in roving TM, without sacrificing the yarn quality.

INFLUENCE OF FAULT CONTROL BAR ON YARN QUALITY

- Out of the studies carried out with 1mm, 3mm and 5mm, the 1mm setting shows better results with 18% reduction in imperfection. The improvement in U% was not so significant. This may be due to even drafting force with out any obstruction to the fibre assembly. Slight opening is found in the roving strand due to the introduction of FCB which in turn provides better fibre guidance.
- The improvement in CSP was not that much significant in all the settings.
- Yarn hairiness increases at higher deflection, that is in 5mm setting due to more friction and curved path given to the fibre strand.

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Appendix

Annexure I

Process Parameters

<u>**ANNEXURE I**</u>

SPINNING PROCESS PARAMETERS

A. FOR 16" LIFT BOBBIN

MIXING DETAILS

Cotton : SANKAR6

2.5% span length : 30mm.

Uniformity ratio : 48.

Micronnaire : 4.

Tenacity : 20.3 g/Tex.

Trash : 5%.

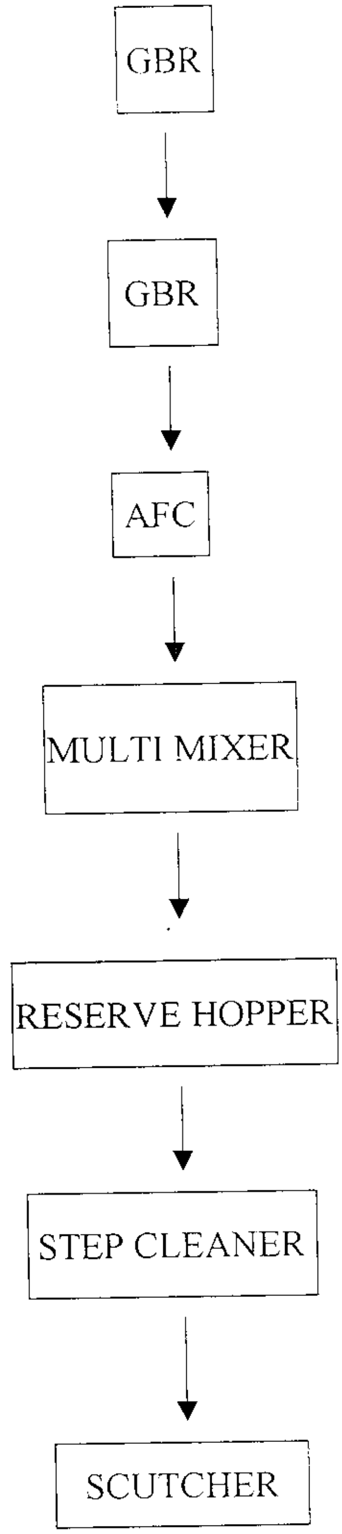
BLOW ROOM PARAMETERS

Make : Trutztschler.

Lap weight : 21kgs/60meters

Delivery rate : 10m/min.

BLOW ROOM PASSAGE FOR 16" LIFT BOBBIN



CARDING PARAMETERS

Make	: LRC1/3.
Licker-in speed	: 1100rpm.
Cylinder speed	: 380rpm.
Doffer speed	: 28rpm.
Sliver Hank	: 0.14.
Total Waste %	: 7%.

DRAW FRAME PARAMETERS

Make	: LR DO/2S.
Delivery Rate	: 220mpm.
Number of passages	: 3.
Number of doublings	: 8.
Finisher Sliver Hank	: 0.16.
Front zone Setting	: 34mm
Back zone Setting	: 38mm.

SIMPLEX PARAMETERS

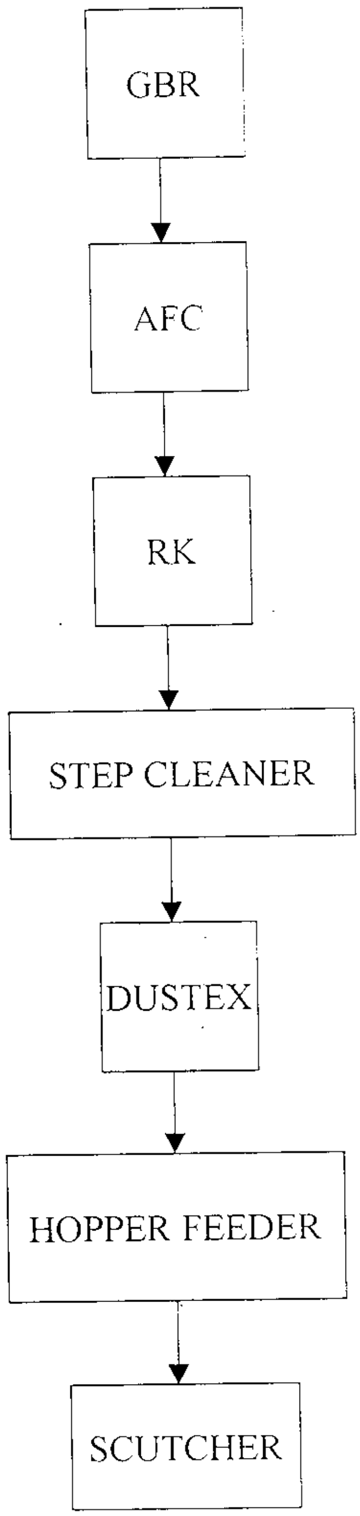
Make	: Texmaco Howa.
Flyer Speed	: 1000rpm.
Roving Hank	: 1.6.
Twist Multiplier	: 1.3.
Front zone setting	: 40mm.
Middle zone setting	: 63mm.
Back zone setting	: 43mm.

B. FOR 12" LIFT BOBBINS

MIXING DETAILS

Cotton	: LRA
2.5% span length	: 28.8mm.
Uniformity ratio %	: 50.
Micronnaire	: 3.5.
Tenacity	: 19.8gm/tex.
Trash %	: 5%.

BLOW ROOM PASSAGE FOR 12" LIFT BOBBINS



CARDING

Make	: Trumac DK-740.
Licker-in speed	: 1100rpm.
Cylinder speed	: 400rpm.
Doffer speed	: 38rpm.
Sliver Hank	: 0.14.
Total Waste %	: 7%.

DRAW FRAME PARAMETERS

Make	: LR DO/2S.
Delivery rate	: 250mpm.
Number of passages	: 2.
Number of doubling	: 8.
Sliver Hank	: 0.15.
Front zone setting	: 32mm.
Back zone setting	: 36mm.

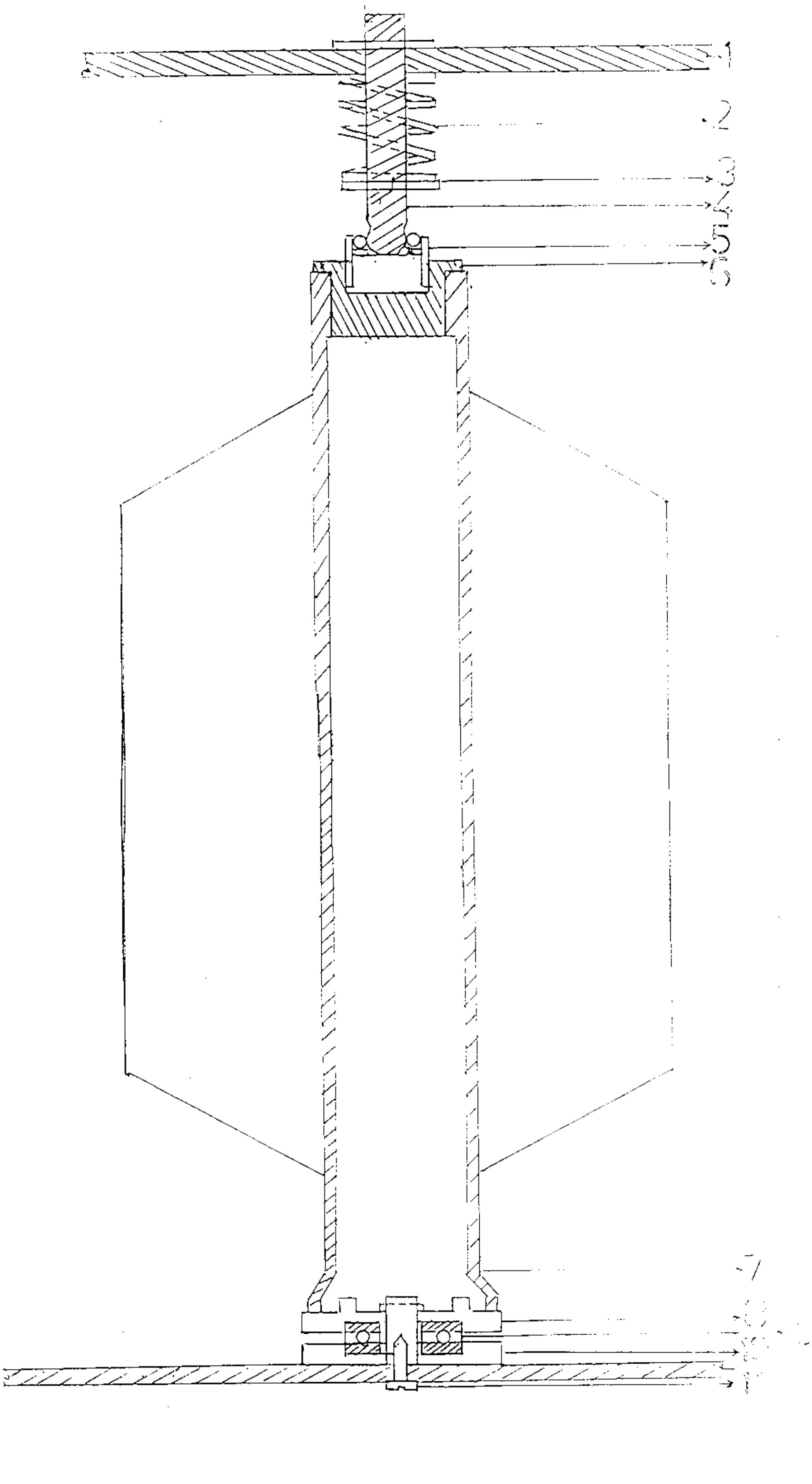
SIMPLEX PARAMETERS

Make	: LR LF1400-A.
Roving Hank	: 1.45.
Flyer Speed	: 1000rpm.
Front zone setting	: 48mm.
Back zone setting	: 39mm.
Twist Multiplier	: 1.03

Annexure II

Drawings and Photos

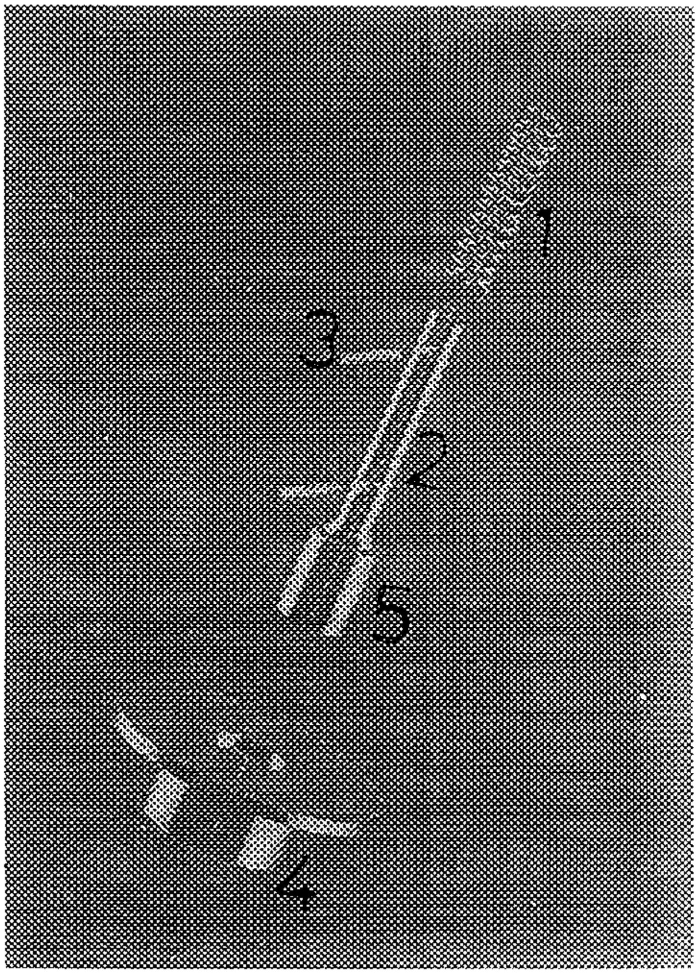
DUAL SUPPORT BOBBIN HOLDER ASSEMBLY



Parts for Dual Support Bobbin Holder Assembly

1. **Rectangular Bar**
2. **Helical Spring**
3. **Pin**
4. **Central Stud**
5. **Ball Housing**
6. **Nylon Top Support**
7. **Bobbin**
8. **Round Nylon Piece with Projection**
9. **Thrust Bearing**
10. **Bearing Housing**
11. **Screw**

TOP SUPPORT
DRAWING I



PARTS FOR DUAL SUPPORT BOBBIN HOLDER

PARTS FOR DRAWING 1

1. Helical spring

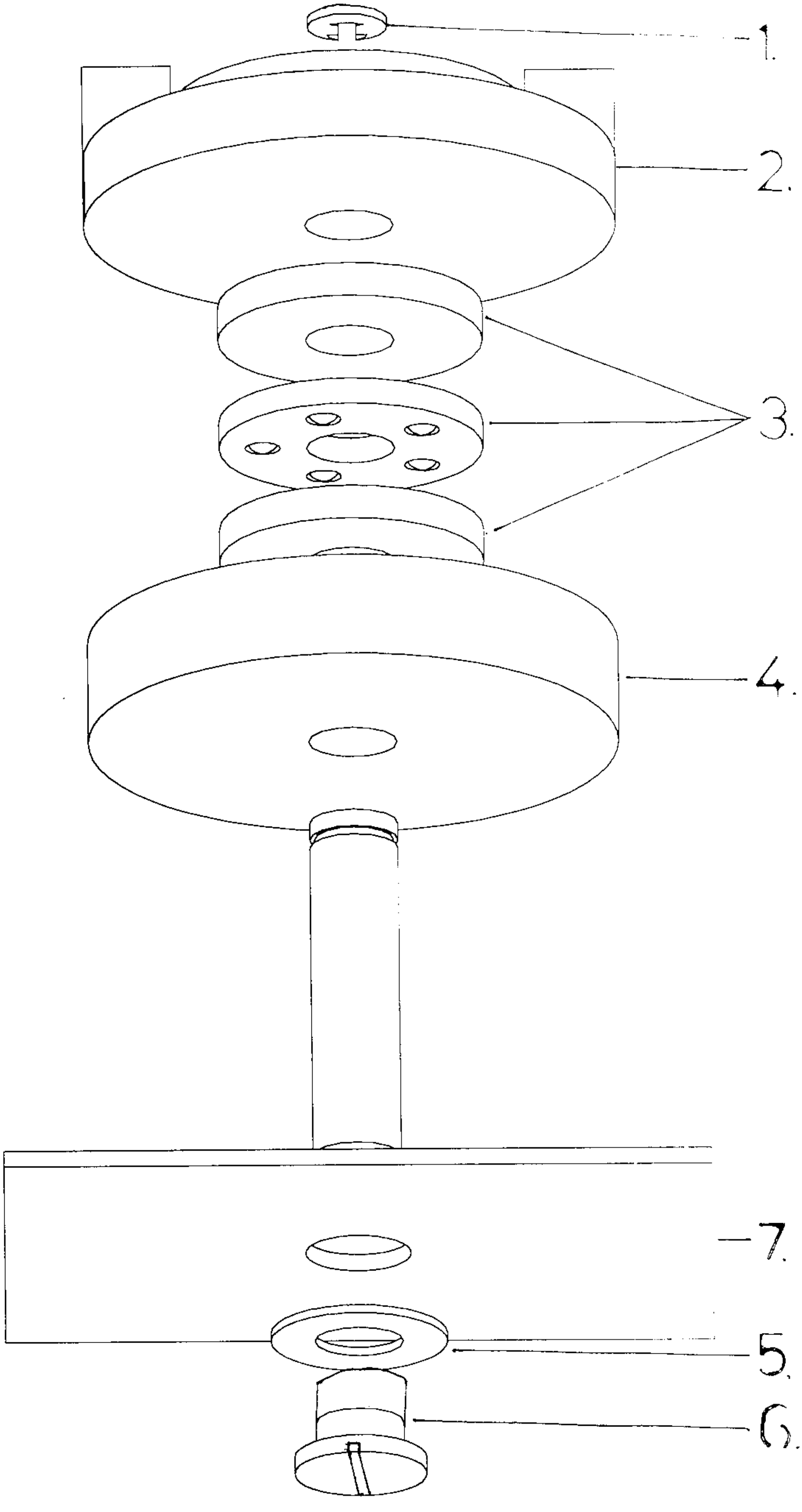
2. Central stud

3. Pin for holding spring

4. Top nylon bobbin support

5. Ball housing

BOTTOM SUPPORT DRG II



PARTS FOR DRAWING II

1. Circlip

2. Round nylon piece with projection

3. Thrust bearing

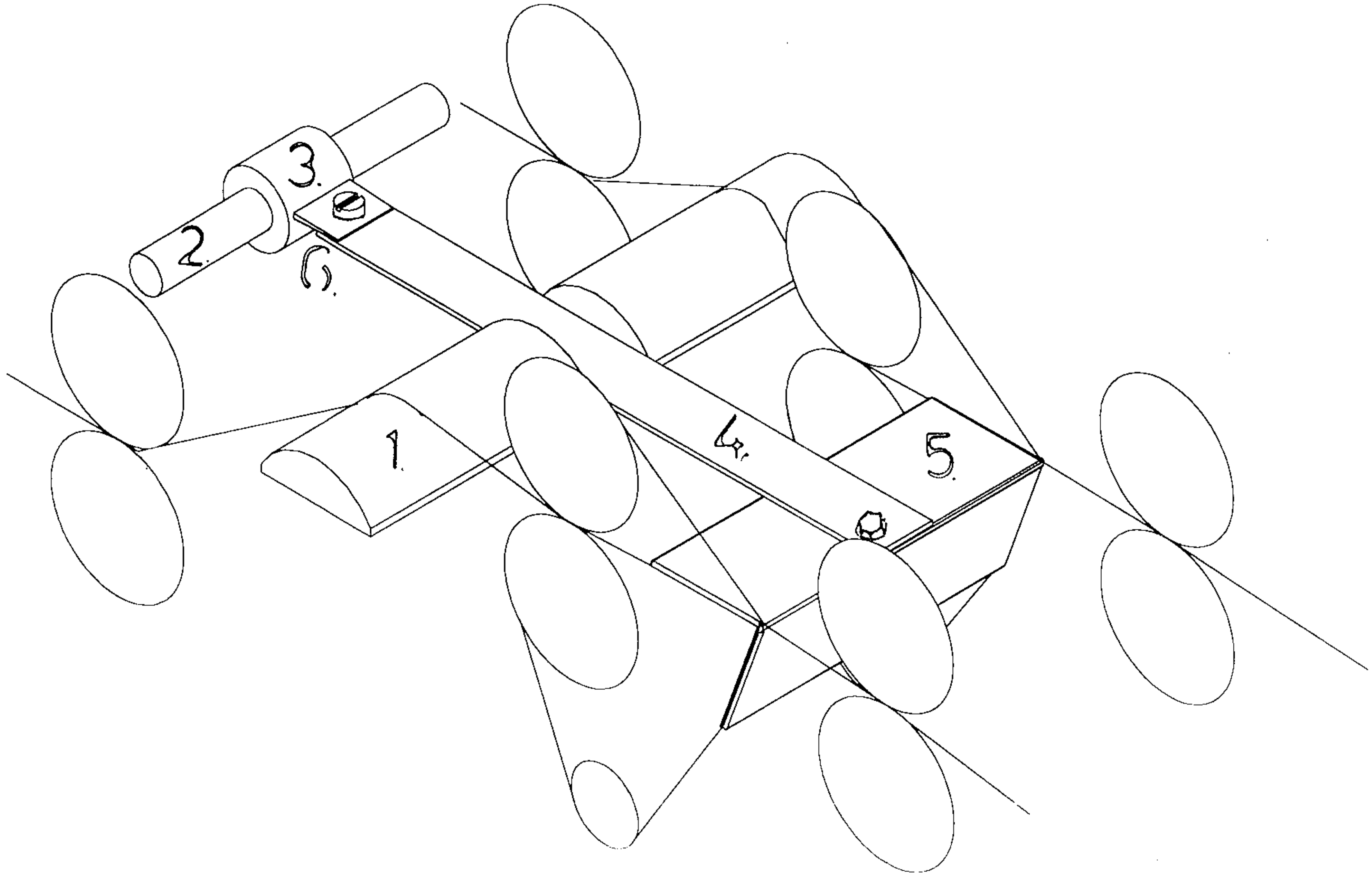
4. Nylon bearing housing

5. Washer

6. Screw

7. Rectangular bar

FC13 ASSEMBLY



PARTS FOR FAULT CONTROL BAR

1. *Polished Steel Bar*
2. *Top Arm Bar*
3. *Collar*
4. *Rectangular Bar*
5. *Nose Bar*
6. *Holding Arrangement*

Annexure III

Tables

ANNEXURE III

CONSOLIDATED RESULTS FOR DUAL SUPPORT BOBBIN HOLDER

TABLE 1

CONSOLIDATED CLASSIMAT RESULTS FOR 12" LIFT BOBBINS

PARTICULARS	SHORT THICK				LONG THICK			LONG THIN	
	A1	B1	C1	D1	E	F	G	H1	I1
12" LIFT UMBRELLA BH	6713	347	76	29	4.4	52	11	189	2.6
12" LIFT DUAL SUPPORT BH	4327	183	38	21	2.4	18	1.6	116	0.9
% REDUCTION OF FAULTS	35%	47%	50%	27%	45%	65%	85%	23%	65%

TABLE 2

CONSOLIDATED CLASSIMAT RESULTS FOR 16" LIFT BOBBINS

PARTICULARS	SHORT THICK				LONG THICK			LONG THIN	
	A1	B1	C1	D1	E	F	G	H1	I1
16" LIFT UMBRELLA BH	6196	222	40	10	3.5	14	2.6	312	0
16" LIFT DUAL SUPPORT BH	3142	91	15	6.7	1.6	4.2	0	214	0
% REDUCTION OF FAULTS	49%	59%	62.5 %	33%	54%	70%	100 %	31%	-

TABLE 3

CONSOLIDATED RESULTS FOR COUNT AND STRENGTH:

	PARTICULAR	COUNT Ne	STRENGTH Lbs	CORRECTED CSP	COUNT C.V%	STRENGTH C.V%
12" LIFT	UMBRELLA BH	44.56	49.77	2206	1.63	4.46
	DUAL SUPPORT BH	44.93	50.37	2246	1.56	3.96
16" LIFT	UMBRELLA BH	37.73	61.125	2306	2.69	6.5
	DUAL SUPPORT BH	38.14	63.875	2433	2.08	5.12

TABLE 4

U% AND IMPERFECTIONS

PARTICULAR	U%	THIN PLACES	THICK PLACES	NEPS
12" LIFT UMBRELLA BH	15.91	340	1210	1000
12" LIFT DUAL SUPPORT BH	15.33	326	1056	1056
16" LIFT UMBRELLA BH	15.29	252	1005	820
16"LIFT DUAL SUPPORT BH	15.20	240	991	800

CLASSIMAT CHART:

12"lift with UMBRELLA TYPE BOBBIN HOLDER

Yarn count : 44 Ne

8	16	9.8	3.5		
78	48	14	7.1		
995	142	29	12		
6713	347	76	29	4.4	
				52	11
				189	2.6
				23	1.7

12" lift with DUAL SUPPORT BOBBIN HOLDER:

yarn count : 44 Ne

7	9	8	3.5		
67	36	12.5	6.3		
749	89	18.4	11		
4327	183	38	21	2.4	
				18	1.6
				116	0.9
				24	0

16" LIFT BOBBIN WITH UMBRELLA TYPE BOBBIN HOLDERS:

Yarn count: 38 Ne

3.5	12	6.2	1.7		
52	20	9.8	3.5		
731	83	20	7.1		
6196	222	40	10	3.5	
				14	2.6
				312	0
				6.2	0

16" lift bobbin with DUAL SUPPORT HOLDER:

Yarn count: 38 Ne

4.2	6.7	5.0	2.5		
39	13	7.6	3.3		
458	43	10	5.9		
3142	91	15	6.7	1.6	
				4.2	0
				214	0
				8.4	0

FAULT CONTROL BAR

TABLE 5

CONSOLIDATED RESULTS

PARTICULARS	U%	THIN PLACE	THICK PLACE	TOTAL	CSP
WITHOUT FCB	15.19	195	1162	1357	2352
1mm	14.72	107	1045	1152	2300
3mm	15.09	210	1172	1382	2403
5mm	15.00	227	1170	1397	2338

Annexure IV

Graphs

ANNEXURE IV

GRAPHS

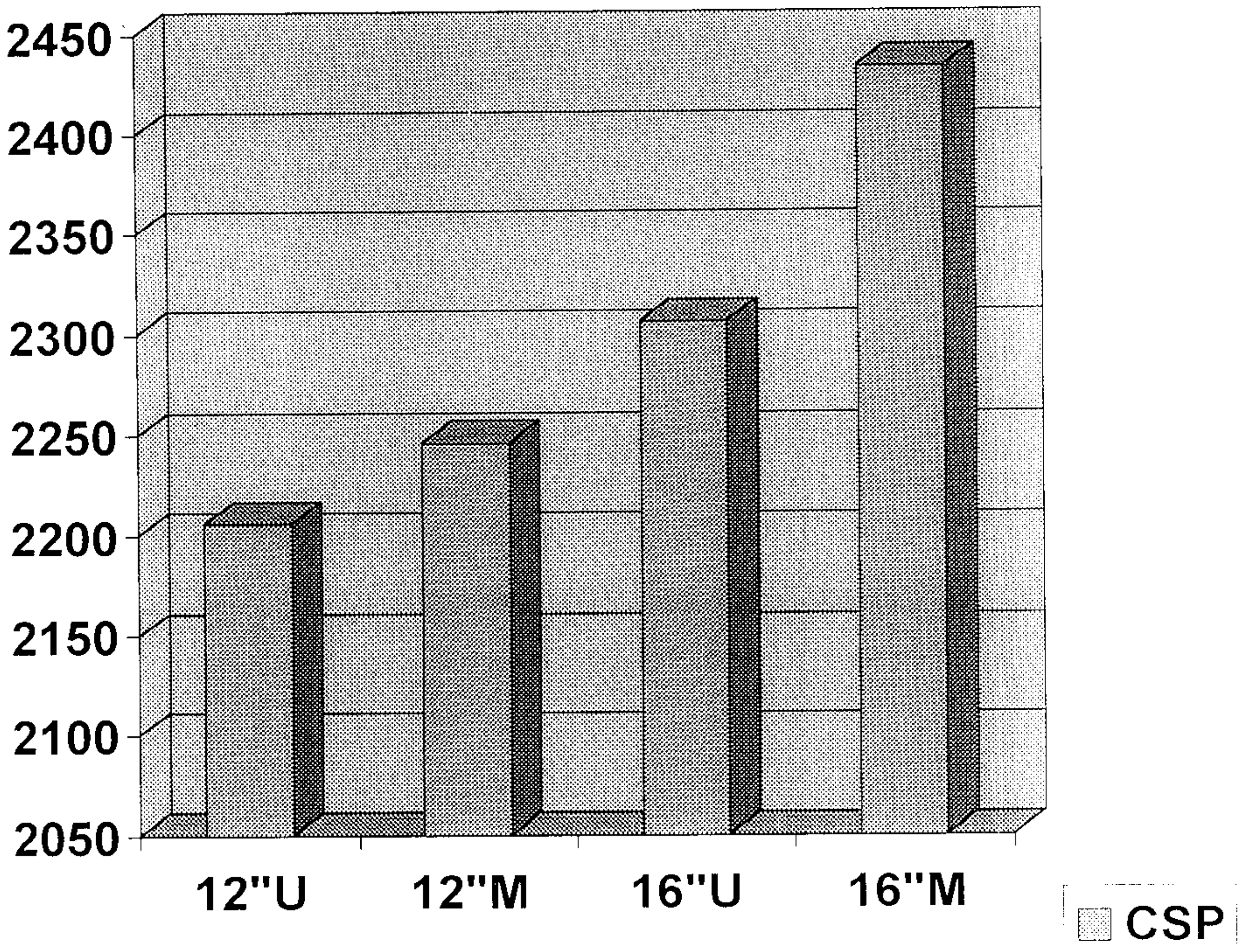
THE NOTATIONS USED IN THE FOLLOWING GRAPHS ARE:

12" U	12" LIFT BOBBINS WITH UMBRELLA TYPE BOBBIN HOLDERS
12" M	12" LIFT BOBBINS WITH DUAL SUPPORT BOBBIN HOLDERS
16" U	16" LIFT BOBBINS WITH UMBRELLA TYPE BOBBIN HOLDERS
16" M	16" LIFT BOBBINS WITH DUAL SUPPORT BOBBIN HOLDERS

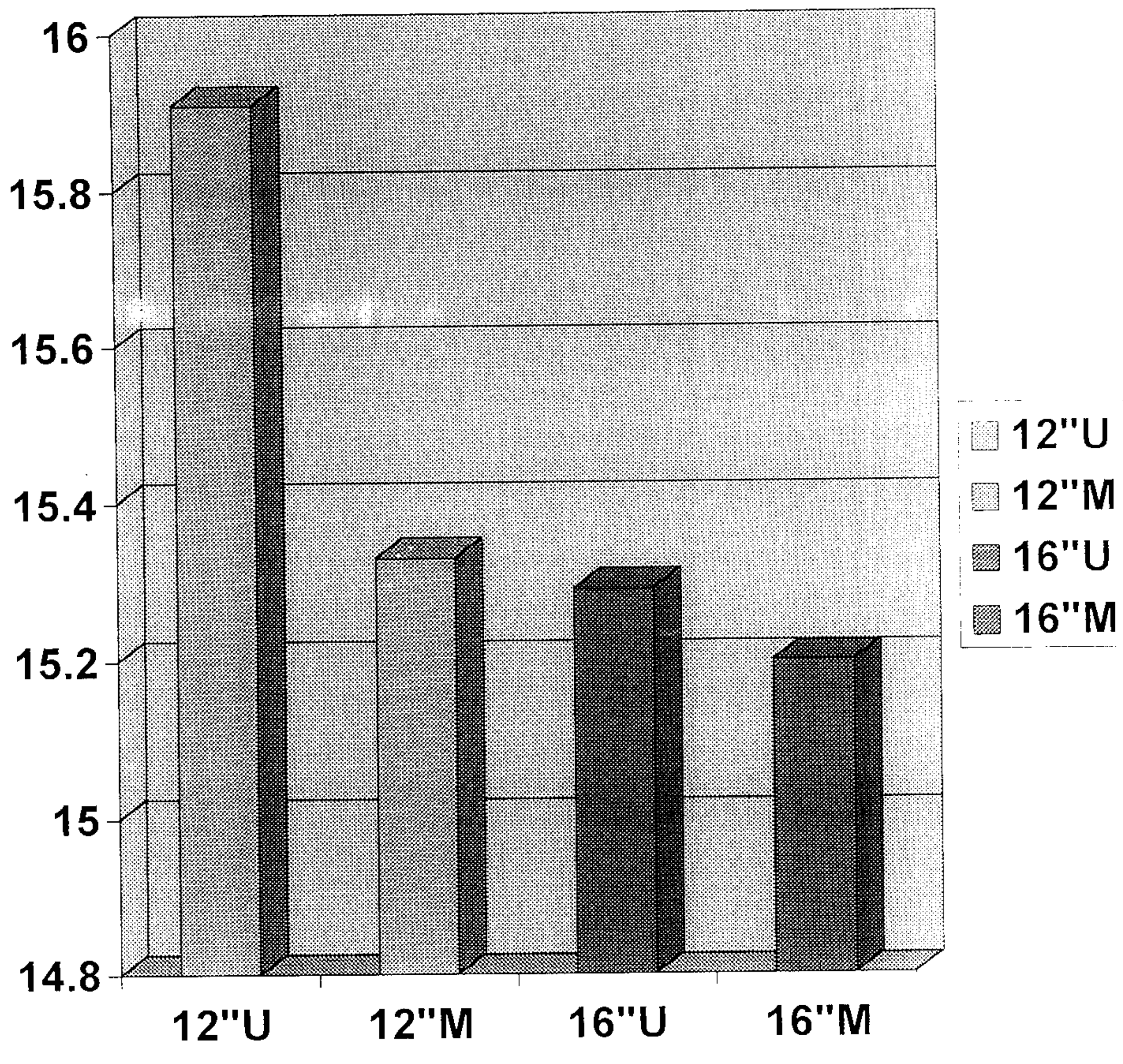
With Out	With out FCB
1mm	Upper deflection of roving 1mm from its normal path in the back zone
3mm	Upper deflection of roving 3mm from its normal path in the back zone
5mm	Upper deflection of roving 5mm from its normal path in the back zone

COUNT STRENGTH PRODUCT

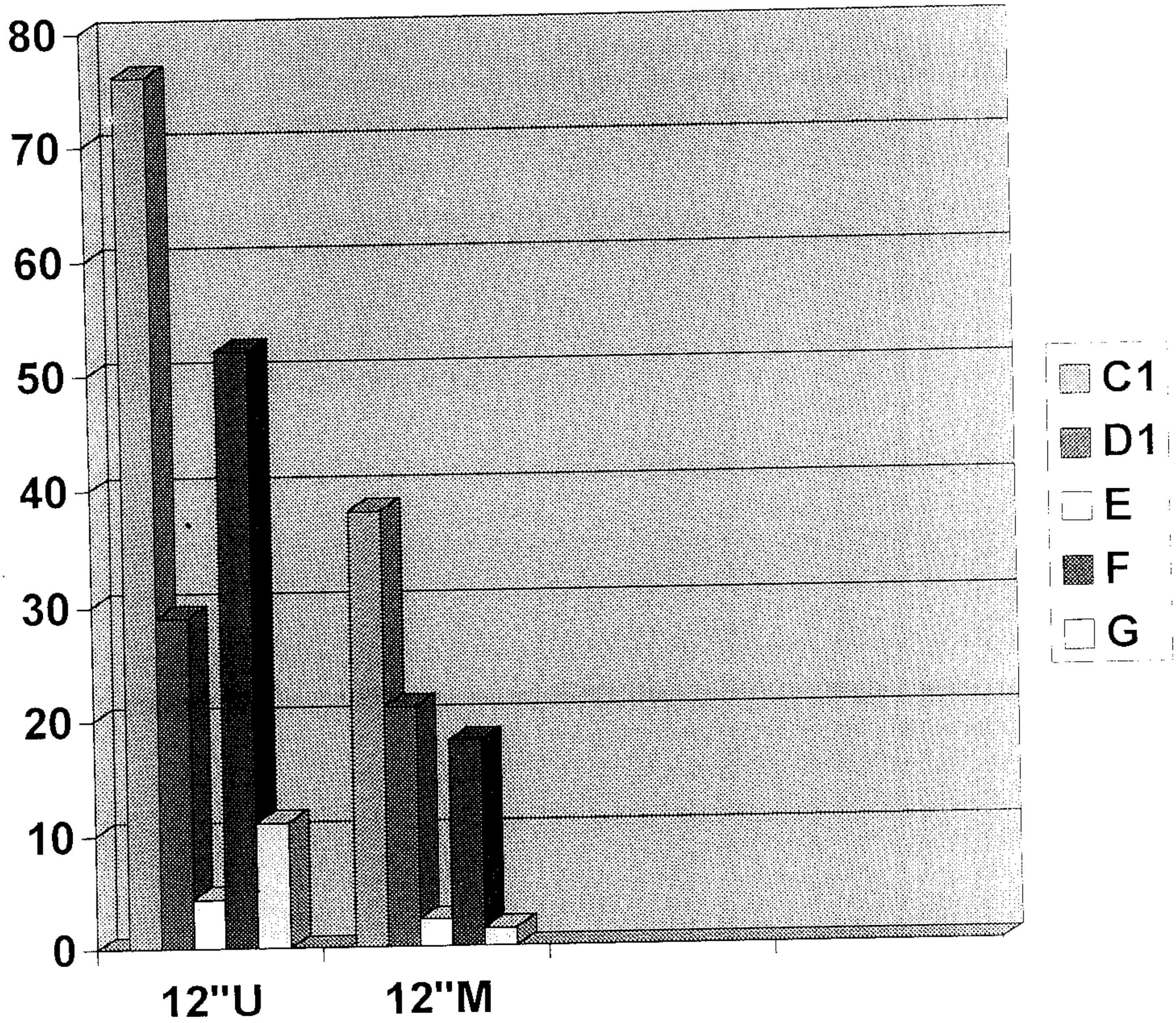
FOR DUAL SUPPORT AND UMBRELLA BOBBIN HOLDERS



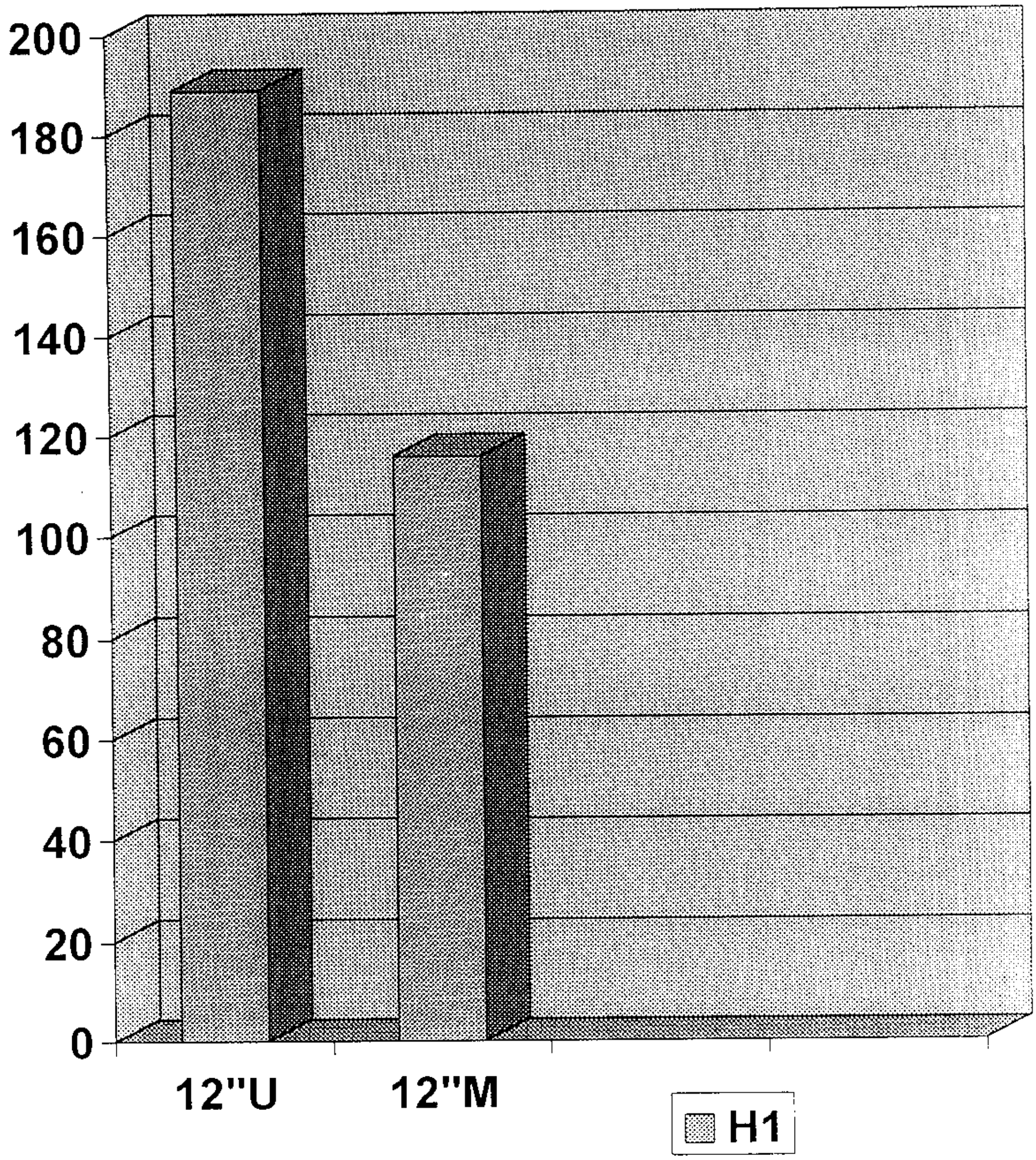
UNEVENNESS



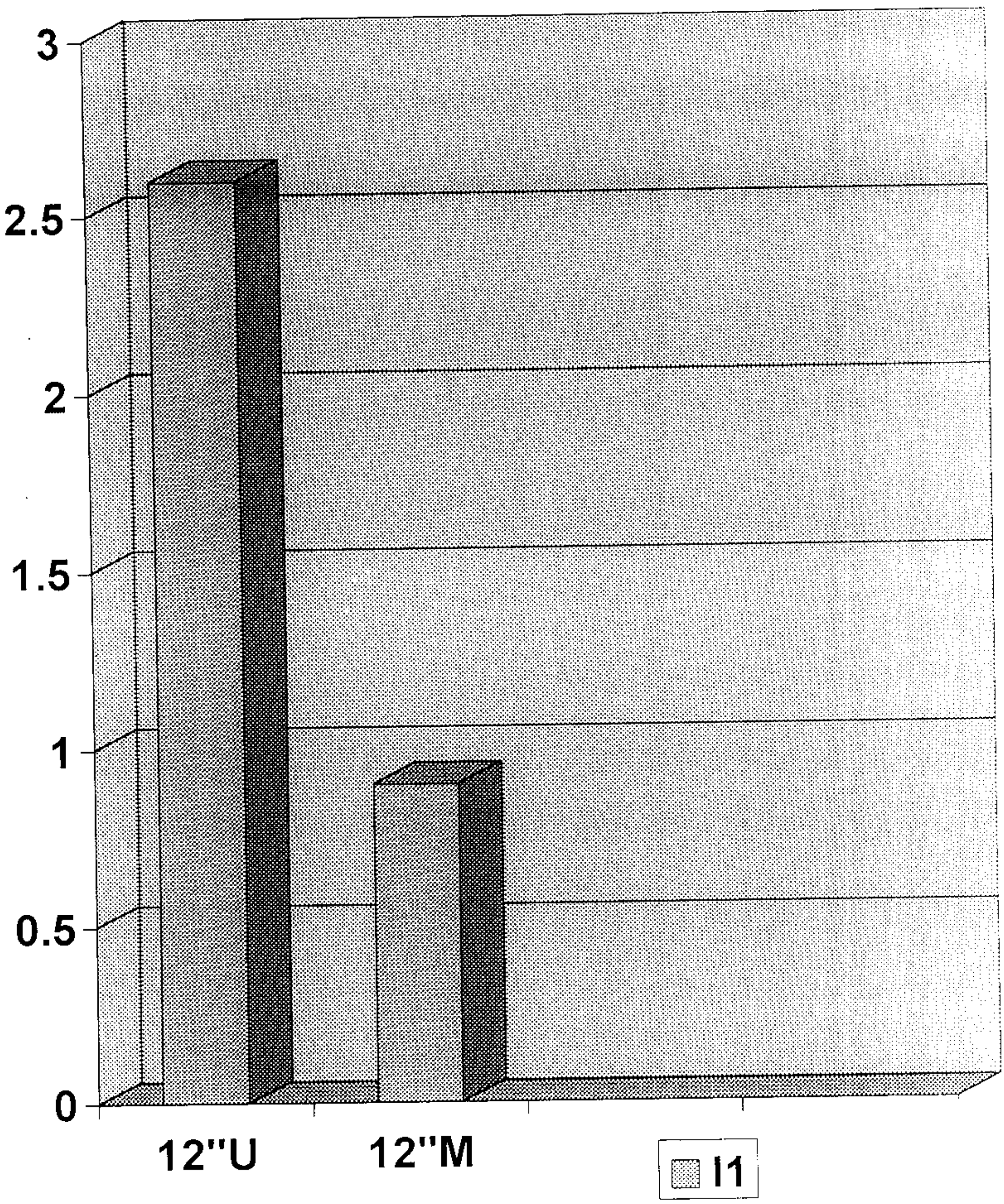
DRAFTING AND LONG THICK FAULTS FOR 12" LIFT BOBBINS



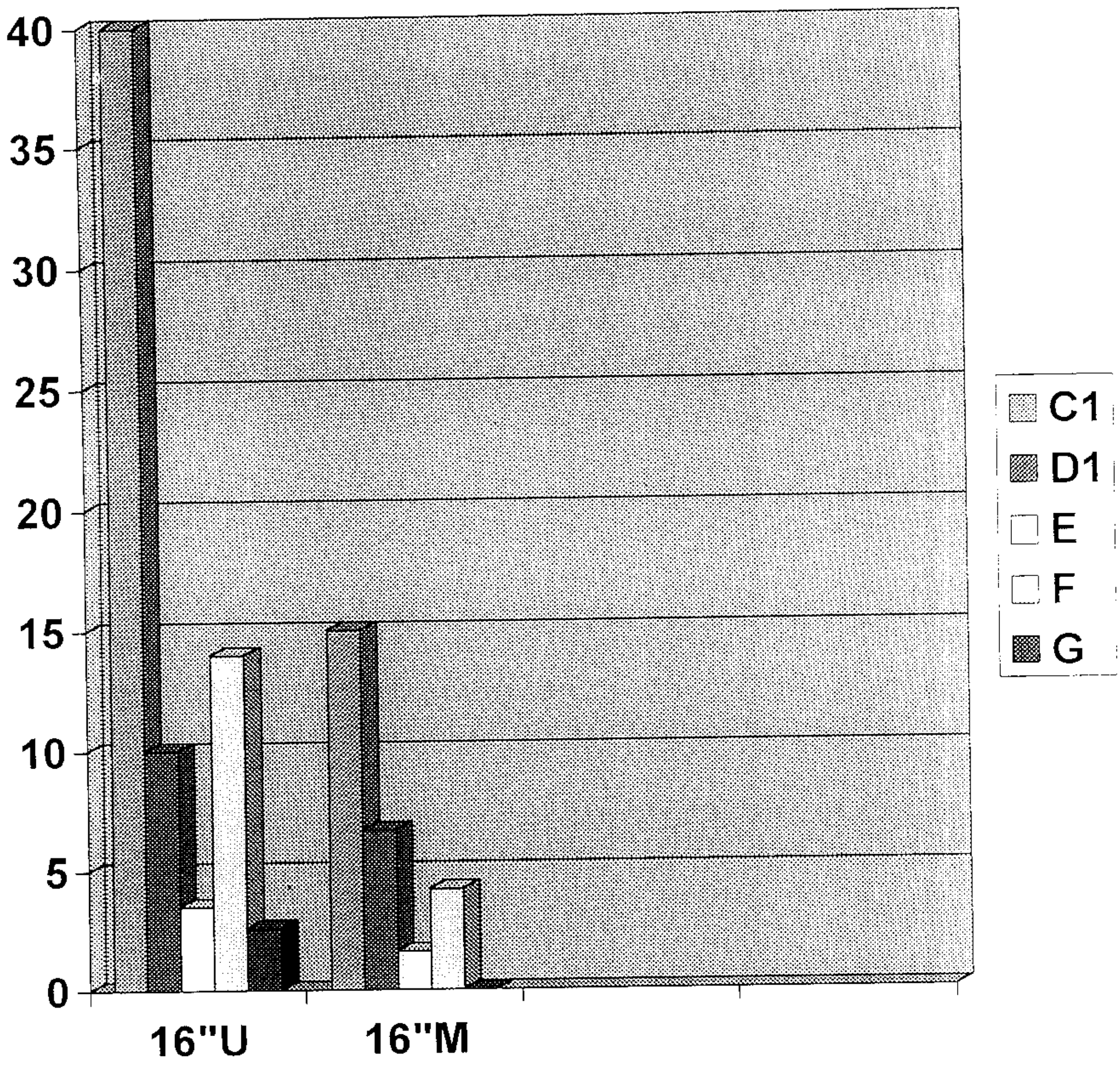
H1 FAULTS FOR 12" LIFT BOBBINS



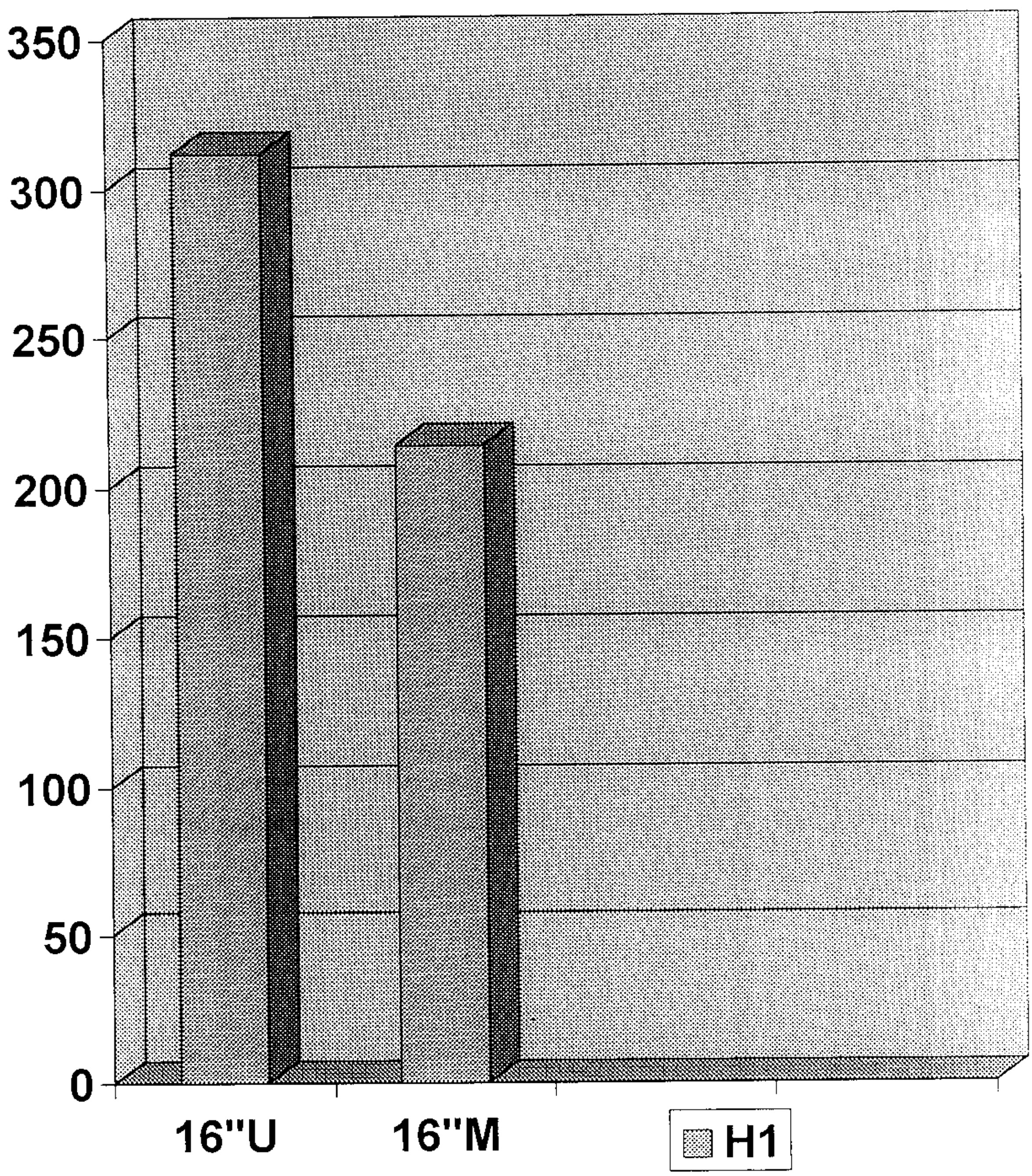
I1 FAULTS FOR 12" LIFT BOBBINS



DRAFTING AND LONG THICK FAULTS FOR 16" LIFT BOBBINS

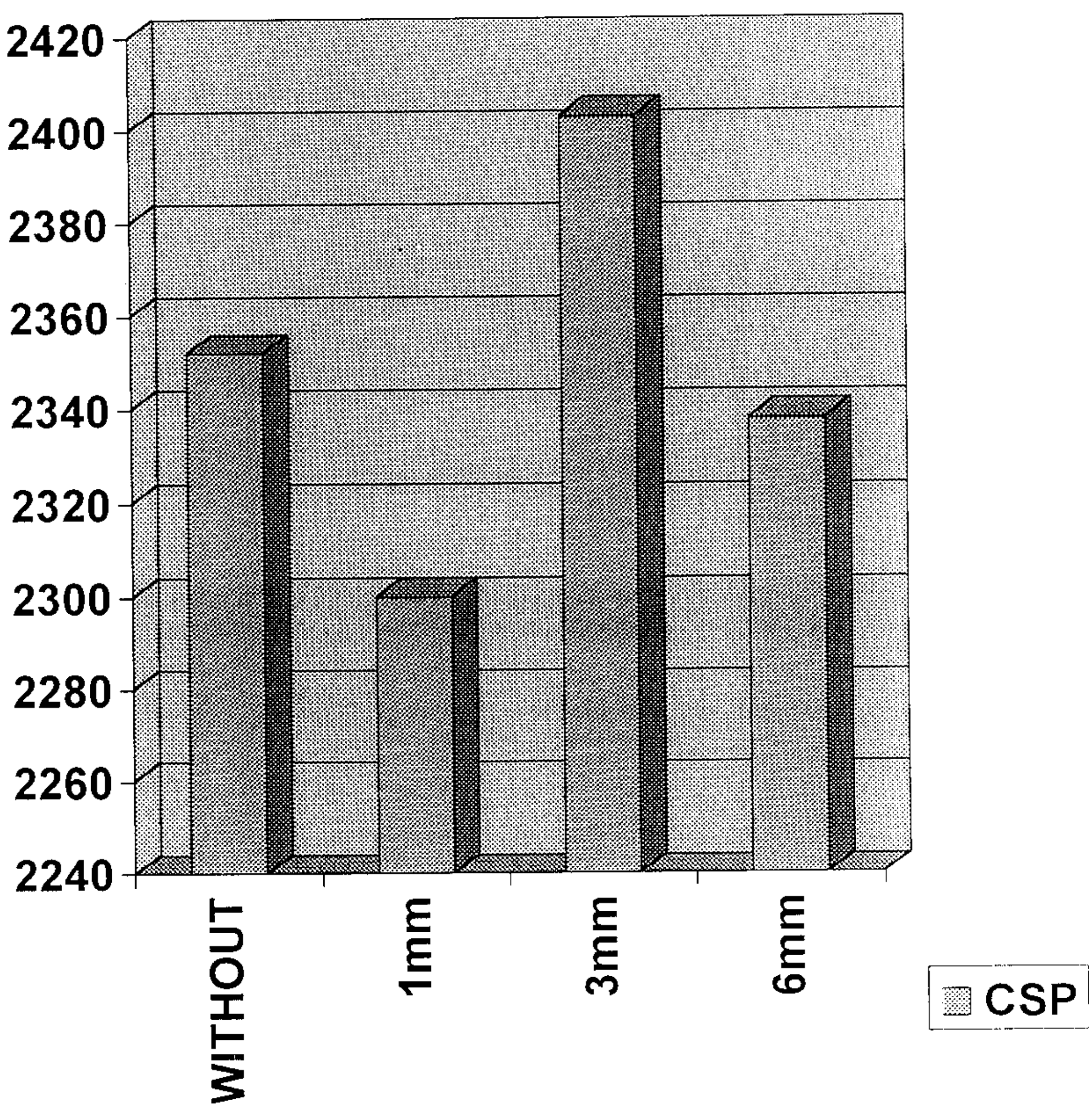


H1 FAULTS FOR 16" LIFT BOBBINS

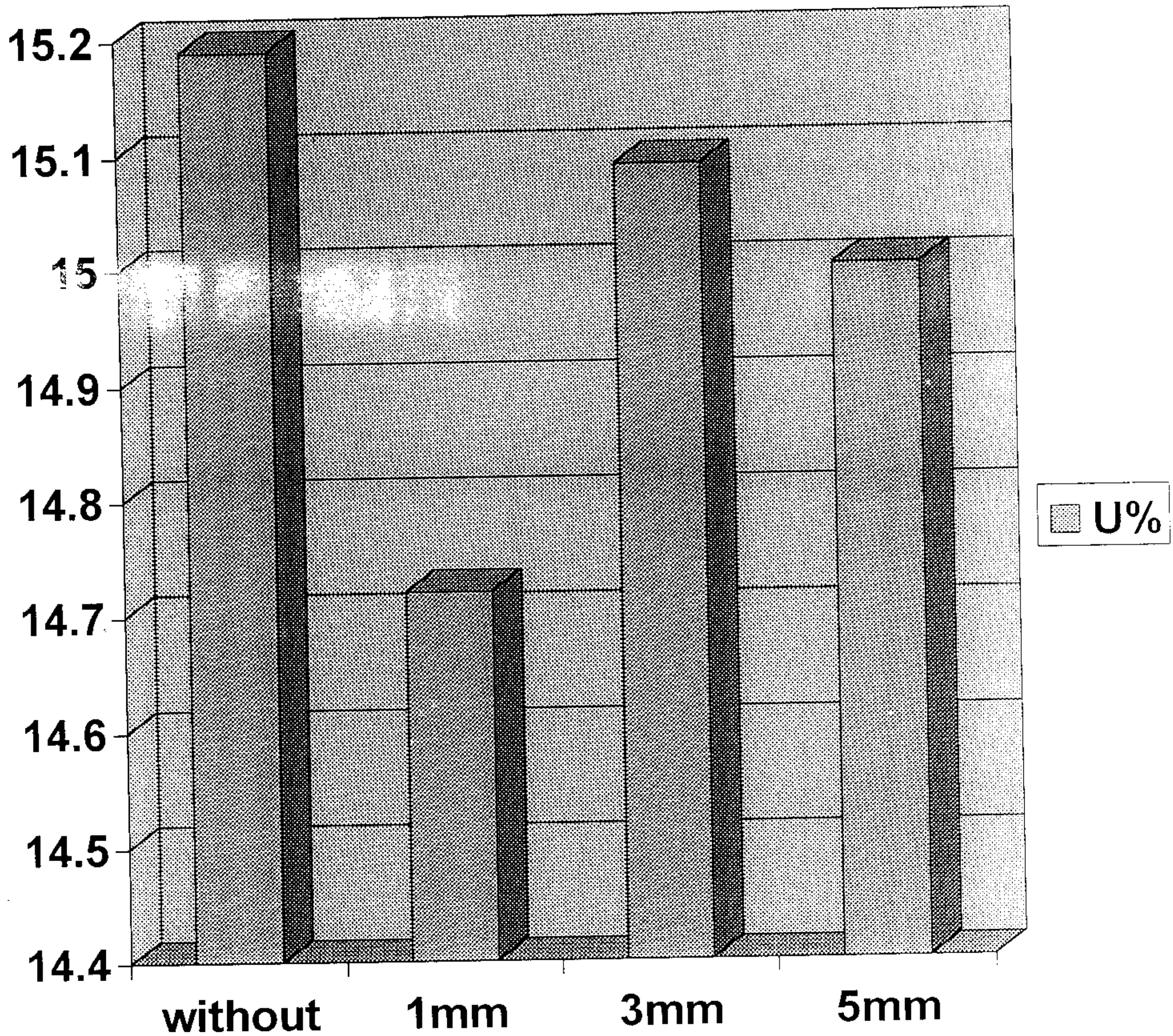


FAULT CONTROL BAR

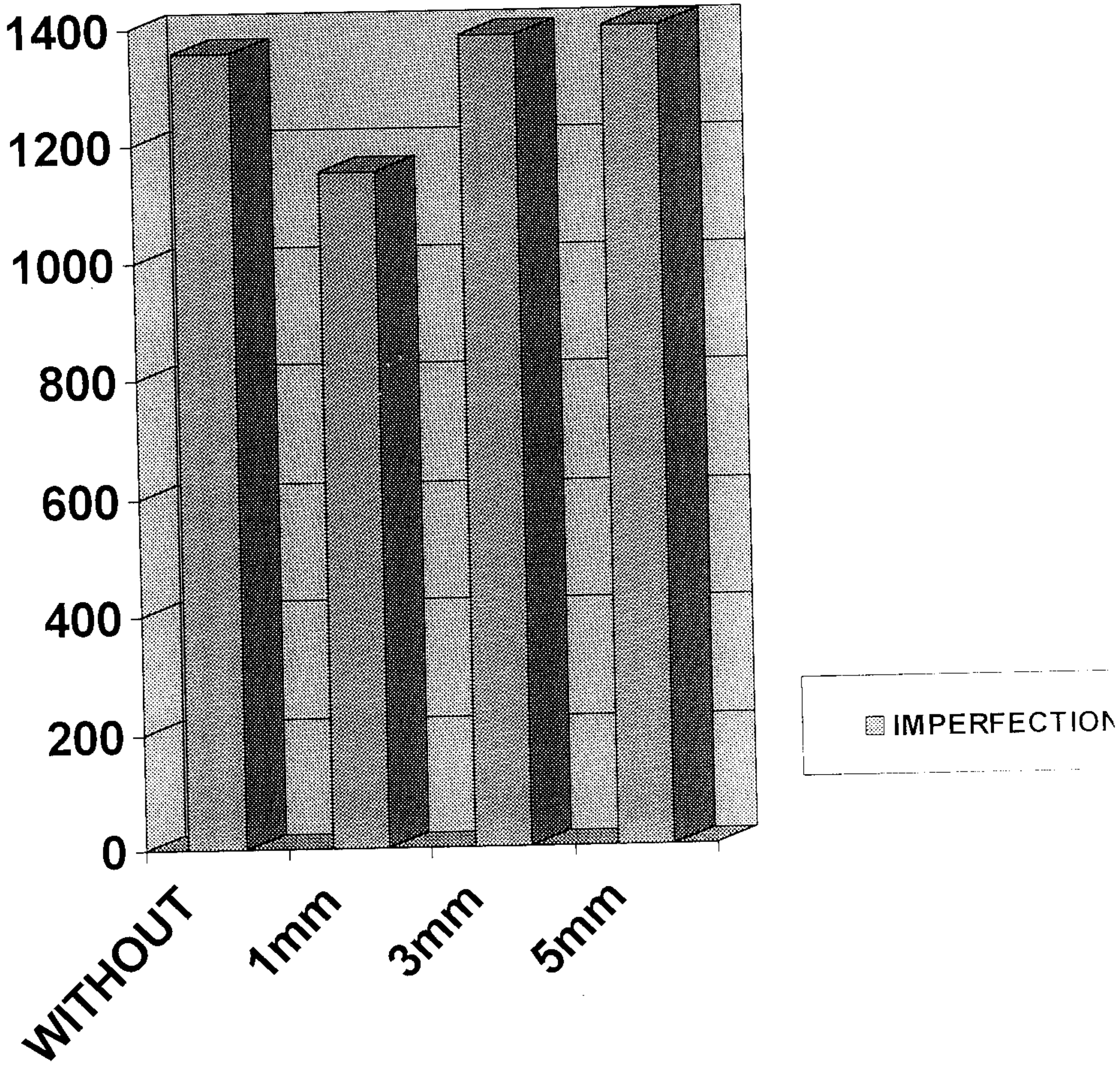
COUNT STRENGTH PRODUCT



UNEVENNESS



IMPERFECTIONS:



Annexure V

Yarn Appearance Photo Copies

IDENTIFICATION MARKS FOR YARN APPEARANCE PHOTO COPIES

A. 12" lift umbrella type bobbin holder

B. 12" lift dual support bobbin holder

C. 16" lift umbrella type bobbin holder

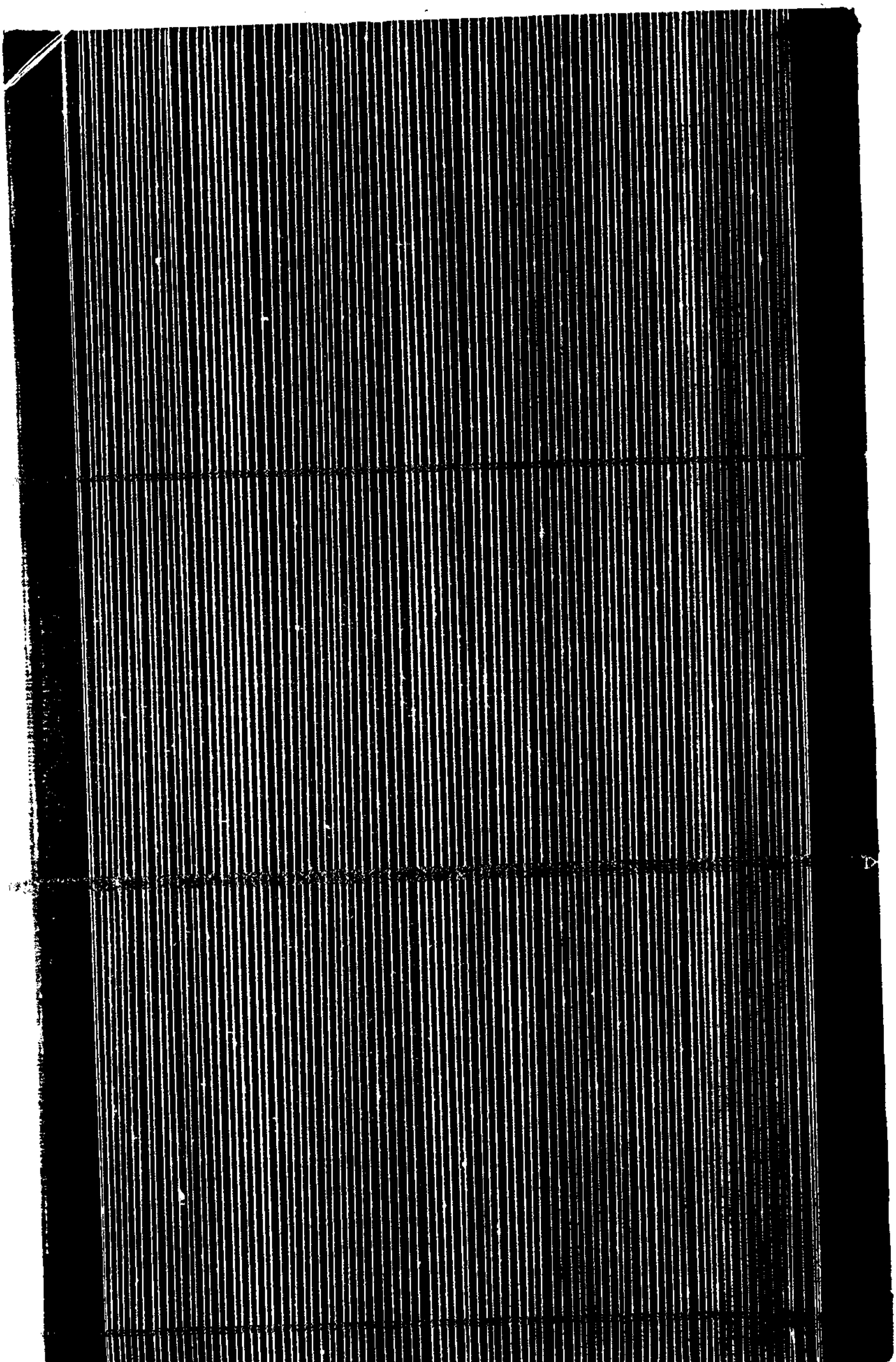
D. 16" lift dual support bobbin holder

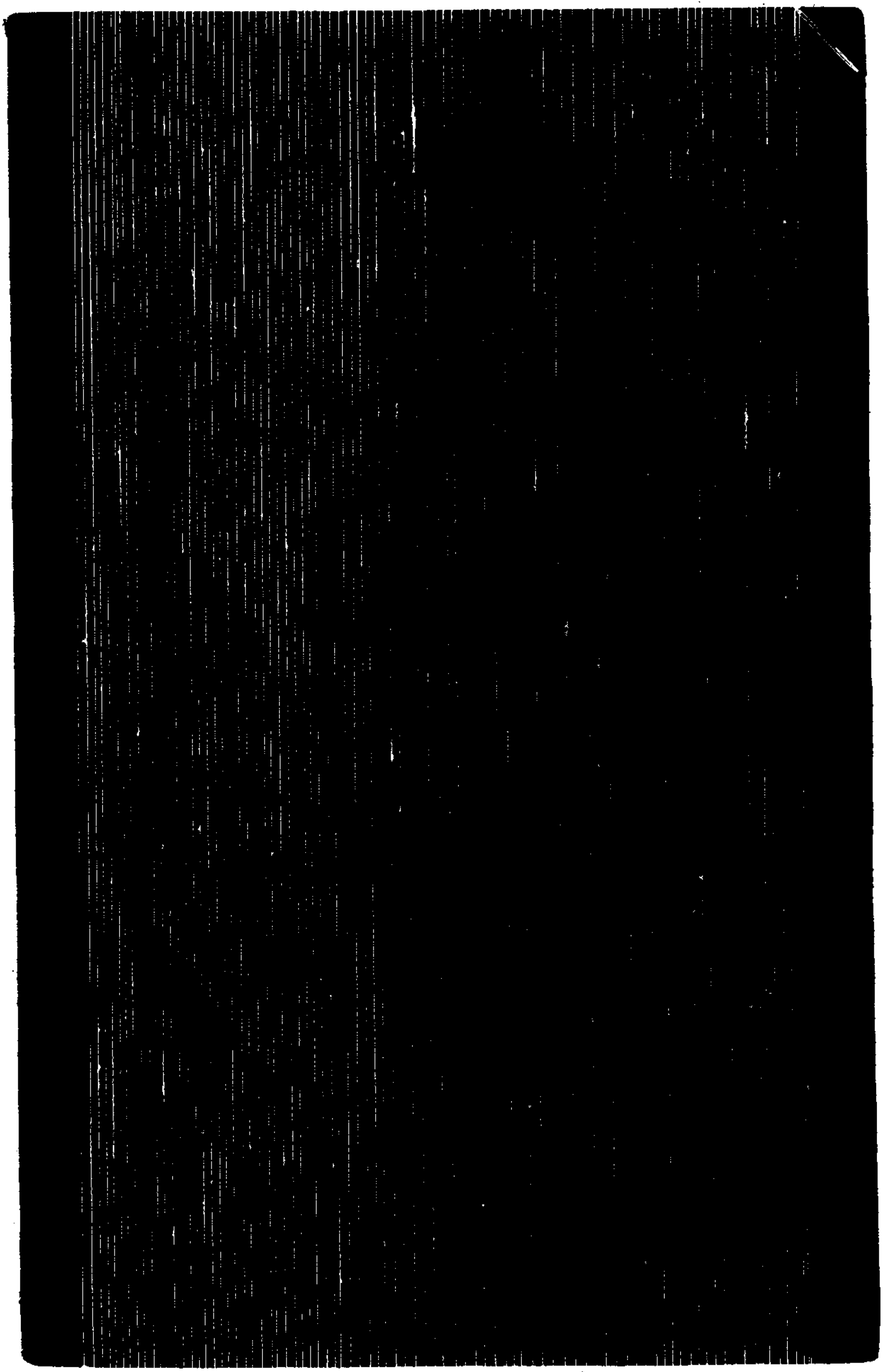
E. Without FCB

F. FCB with 1mm setting

G. FCB with 3mm setting

H. FCB with 5mm setting





12

F

G