

TS  
1669  
S65

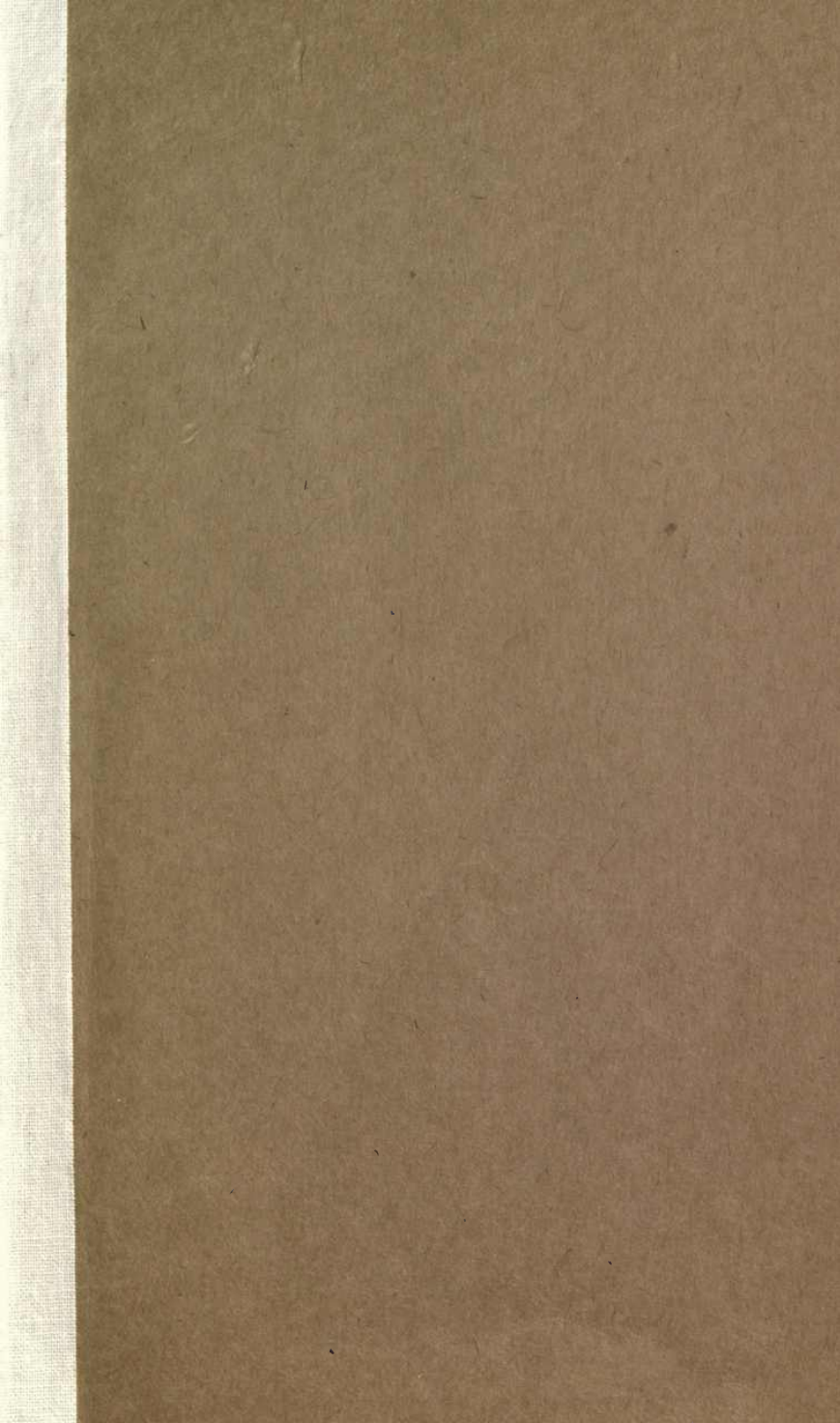
UC-NRLF

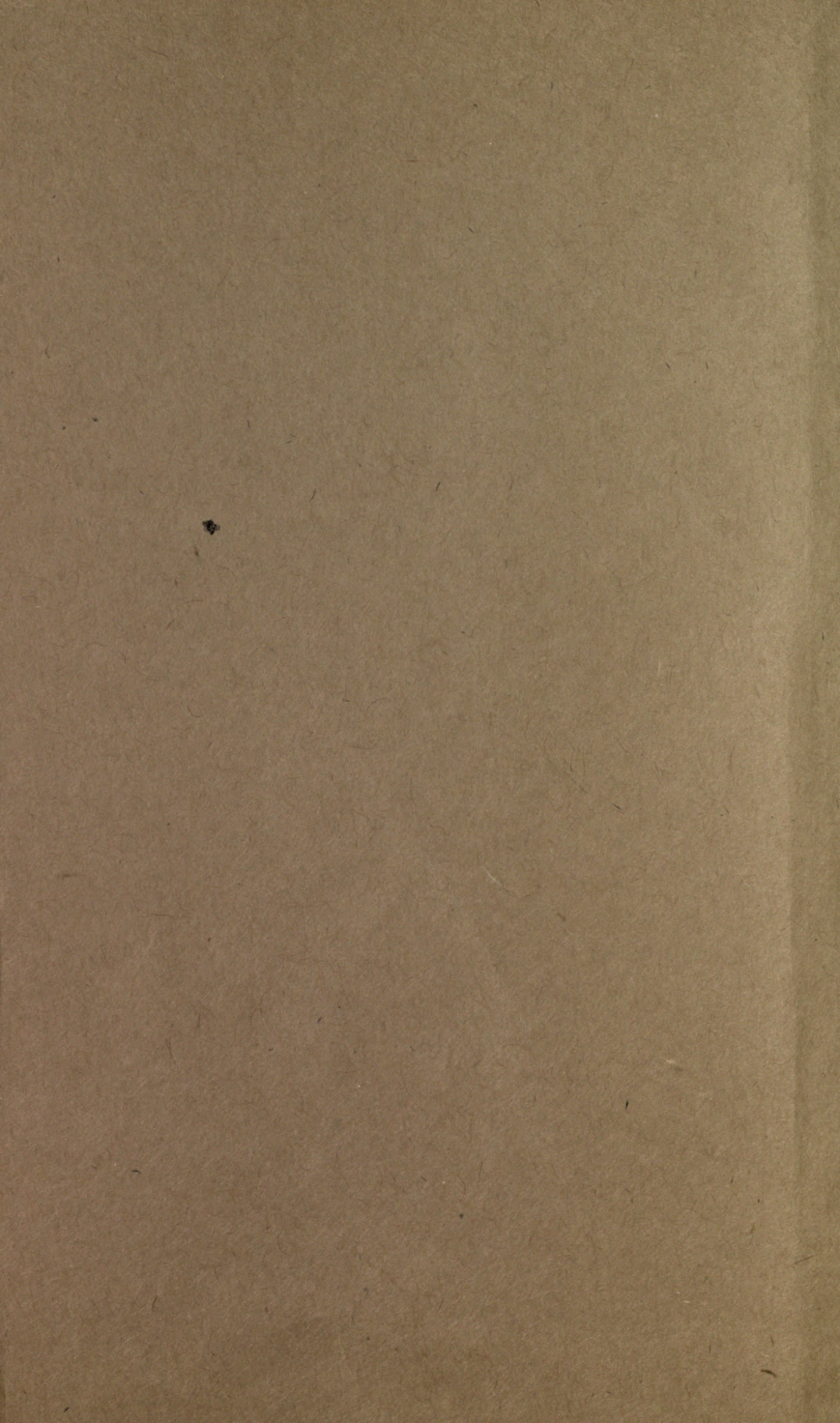


QB 104 548

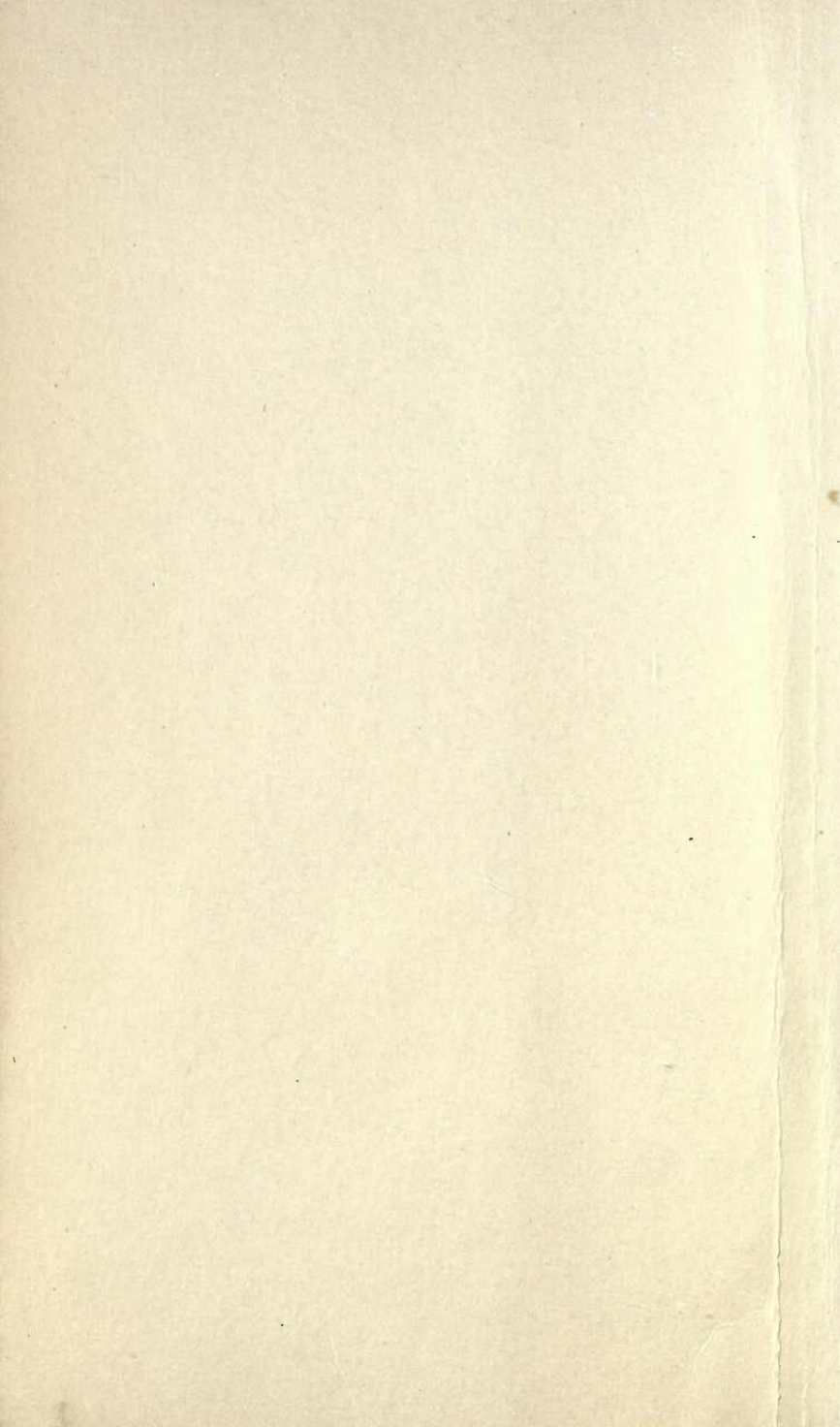


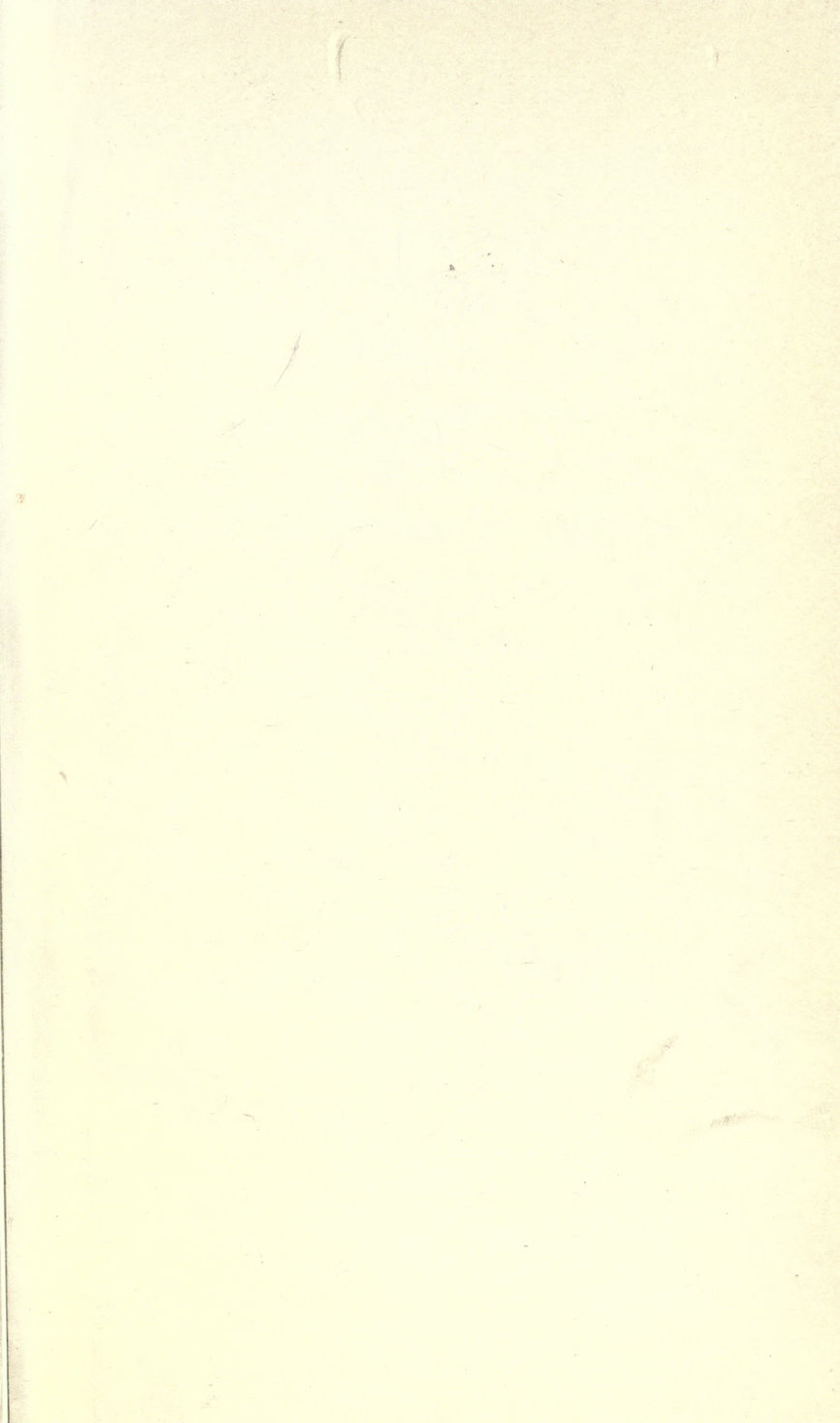
















**REPORTS**  
**of the**  
**RAW SILK CLASSIFICATION COMMITTEE**  
**of**  
**THE SILK ASSOCIATION OF AMERICA**

*Price, one dollar*

Copyright, 1922,  
By THE SILK ASSOCIATION OF AMERICA

REPORTS  
of the  
RAW SILK CLASSIFICATION  
COMMITTEE

NO. 1

STANDARD TESTS FOR RAW SILK  
TENTATIVE STANDARD TESTS FOR RAW SILK  
TENTATIVE CLASSIFICATION  
AMERICAN STANDARD SILK SKEIN

THE SILK ASSOCIATION OF AMERICA  
354 FOURTH AVENUE  
NEW YORK

TS1669  
S65

THE  
UNIVERSITY OF  
MICHIGAN  
LIBRARY

G. F.

THE REPORTS of the Raw Silk Classification Committee were submitted to the Board of Managers of The Silk Association of America at their meeting on September 21, 1921, and received as follows:

RESOLVED, That the Board of Managers of The Silk Association of America in meeting assembled September 21, 1921, do hereby receive the three reports of the Raw Silk Classification Committee of the Association on methods of testing, their interpretation and application, as follows:

- I. Standard and Tentative Standard Tests
- II. Tentative Classification
- III. Specifications for the Standard American Silk Skein

and it is further

RESOLVED, That the Secretary of the Association be directed to have these reports printed and distributed.

I, the undersigned, Secretary of The Silk Association of America, do hereby certify that the above resolutions are the true and accurate transcripts from the minutes of the adjourned meeting of the regular meeting of the Board of Managers of said Association held in the office of the Association on the twenty-first day of September, 1921, and recorded in the minutes of said Association.

Witness my hand and the seal of the Association this twenty-fifth day of January, 1922.

*Frank G. Barry*

Secretary.





# LETTER OF TRANSMITTAL

AS SUBMITTED BY THE

## RAW SILK CLASSIFICATION COMMITTEE

To the Board of Managers  
of The Silk Association of America:

Your Raw Silk Classification Committee, designated and organized during the Spring of 1915, following the Essay Competition and award of prizes in 1914, wishes to submit the following reports and recommendations.

The Committee held its first meeting June 29, 1915, and began a careful study of the problem before it. A survey was made of laboratories engaged in the testing of silk and advice and assistance was sought from the technical men available in the New York market.

The meetings during 1915 and 1916 revealed a very wide divergence of opinion within the Committee regarding the essentials of a system of classification. Aside from the European methods of testing and inspection, numerous special tests were being used. Naturally, each member considered his methods the most satisfactory and was quite unwilling to discard them without definite evidence to show something better. The intervening years have been devoted to collecting, compiling and interpreting data, and meetings have been held to discuss progress.

The Committee is pleased to report that its work has reached a point where it seems advisable to submit recommendations on:

STANDARD TESTS FOR RAW SILK

TENTATIVE STANDARD TESTS FOR RAW SILK

TENTATIVE CLASSIFICATION FOR ITALIAN, JAPANESE  
AND CHINESE STEAM FILATURE (SHANGHAI) RAW  
SILK

SPECIFICATIONS FOR AMERICAN STANDARD SILK SKEIN

The Standard Tests for raw silk recommended are the Winding Test, the Sizing Test and the American Sizing Test and are sufficiently in conformity with the present testing practice so as not to be a decided change.

The Tentative Standard Tests for raw silk are recommended as tentative standards because they are still in the state of development, but are sufficiently advanced to represent the best current laboratory practice. They are not involved in the Rules and Regulations Governing Transactions in Raw Silk and, therefore, do not affect sales contracts under the rules of the Silk Association. These Tentative Standard Tests are:

THE GAGE TEST

THE SERIMETER TEST

THE SERIGRAPH TEST

THE COHESION TEST

The Tentative Classification proposes four grades of silk as sufficient to meet the present needs. The specifications in each grade are the minimum requirements which must be met for that grade. Raw silks which fail to meet the requirements of the fourth or lowest grade will constitute a group of low quality silk not requiring classification.

The values specified for the properties in each group are based upon large numbers of tests made in the laboratories



represented on the Raw Silk Classification Committee, compiled and compared by the staff of the United States Testing Company, Inc., and made sufficiently broad so as to be well within the practical attainment of any well managed filature.

The Tentative Classification, as recommended, represents the best composite opinion that can be secured in the Committee at the present time. It has received the unanimous approval and support of the individual members and is recommended for approval with the understanding that as the knowledge of the Committee upon testing of silk and the application of test results increases and expands, this Classification may be amended and amplified.

The American Standard Silk Skein is based fundamentally upon the present specification and does not differ from it in any vital particulars, but so completely revises both the form and subject matter as to constitute a new specification and should be adopted in that manner rather than as an amendment to the present one.

Increased emphasis has been laid upon the proper diamond formation, the elimination of gum spots, the skein weights for various denier and the proper lacing both as to manner of lacing and material used. Special figures illustrating these subjects have been prepared, and it is believed that they will be more easily understood than in the present specification.

Three appendices are added and are intended to assist those striving to produce the American Standard Skein.

Appendix A contains the Winding Test and a tentative method of classifying Italian, Japanese and Chinese (Shanghai) Steam Filature Raw Silk as to its winding quality.

Appendices B and C describe the mechanical essentials in design of reeling and re-reeling machines for making the

*Grant reeled skein and furnish diagrams from which very simple and inexpensive machines may be constructed in localities possessing limited machine shop facilities and skill.*

*Respectfully submitted,*

*Raw Silk Classification Committee.*

*D. E. Douty, Chairman*

*Albert Bosshard*

*W. F. Edwards*

*John H. Jewett*

*Charles Muller*

*George A. Post*

*Frederick Schmutz*

*Warren P. Seem*

*June 10, 1921.*

# CONTENTS

## PART ONE

	PAGE
STANDARD TESTS FOR RAW SILK .....	15-29
ARTICLE I. GENERAL .....	15
ARTICLE II. WINDING TEST .....	17
ARTICLE III. SIZING TEST (450 METER) .....	22
ARTICLE IV. AMERICAN SIZING TEST (225 METER) .....	27

## PART TWO

TENTATIVE STANDARD TESTS FOR RAW SILK	33-51
ARTICLE I. GAGE TEST .....	33
ARTICLE II. SERIMETER TEST FOR EVENNESS ...	40
ARTICLE III. SERIGRAPH TEST .....	43
ARTICLE IV. COHESION TEST .....	48

## PART THREE

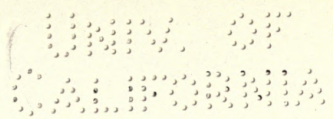
TENTATIVE CLASSIFICATION .....	55-58
ITALIAN, JAPANESE AND CHINESE STEAM FILATURE (SHANGHAI) RAW SILK, BASED UPON TENTA- TIVE STANDARD TESTS .....	55
APPENDIX A. COHESION .....	57
APPENDIX B. WINDING .....	58

## PART FOUR

SPECIFICATIONS FOR AMERICAN STANDARD SILK SKEIN .....	61-71
APPENDIX A. WINDING OF THE AMERICAN SILK SKEIN .....	65
APPENDIX B. SUGGESTIONS FOR REELING MACHINE CONSTRUCTION AND USE .....	65
APPENDIX C. SUGGESTIONS ON REREELING MA- CHINE CONSTRUCTION AND USE .....	70

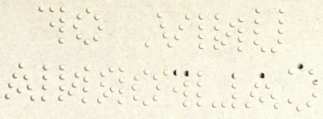
## ILLUSTRATIONS

FIG.	PAGE
1. BOBBIN FOR STANDARD WINDING TEST .....	17
1 A. SUGGESTED HOLLOW ALUMINUM BOBBIN FOR WINDING TEST .....	18
2. PIN SWIFTS .....	18
(A) AUTOMATIC SELF-CENTERING PIN HUB SWIFT	
(B) TWELVE STICK, PIN HUB SWIFT,	
3. LABORATORY RECORD — WINDING TEST .....	21
4. MEASURING MACHINE .....	22
5. SKEIN BALANCE WITH SPECIAL PAN .....	23
6. QUADRANT BALANCE .....	23
7. LABORATORY RECORD — SIZING TEST (450 METER)..	25
8. LABORATORY RECORD — AMERICAN SIZING TEST (225 METER) .....	29
9. GAGE .....	32
10. GAGE REEL COMPLETE .....	32
11-15. MAJOR DEFECTS.....	35
FIG. 11, WASTE; 12, SLUGS; 13, BAD CASTS; 14, SPLIT THREADS; 15, VERY LONG KNOTS	
16-20. MINOR DEFECTS .....	37
FIG. 16, CORKSCREWS; 17, LOOPS; 18, LONG KNOTS; 19, NIBS; 20, RAW KNOTS	
21. LABORATORY RECORD — GAGE TEST .....	39
22. SERIMETER .....	40
23. LABORATORY RECORD — SERIMETER TEST .....	41
24. SCOTT SERIGRAPH .....	44
25. LABORATORY RECORD — SERIGRAPH TEST .....	47
26. SEEM COHESION MACHINE .....	49
27. LABORATORY RECORD — COHESION TEST .....	51
28. CROSS SECTION OF REEL BAR .....	62
29. GRANT REELED SKEINS .....	62
30. DIAGRAMMATIC SKETCH OF GRANT REEL AND STANDARD AMERICAN SKEIN .....	63
31. GRANT REELED SKEIN, LACED IN THREE PLACES ....	64
32. DETAILED LACING OF A GRANT REELED SKEIN .....	65
33. SET OF GEARS .....	66
34. SKEINS MADE BY DIRECT REELING .....	66
35. METHOD OF GEARING TRAVERSE AND REEL FOR DIRECT REELING INTO A STANDARD AMERICAN SKEIN .....	68
36. METHOD OF GEARING TRAVERSE AND REEL FOR REREELING INTO STANDARD AMERICAN SKEIN .....	70
37. REREELING MACHINE WITH SMALL REELS SEPARATED..	71



**PART ONE**

**Standard Tests for Raw Silk**



# STANDARD TESTS FOR RAW SILK

---

## ARTICLE I.—GENERAL

---

### SECTION 1.—OBJECT

These specifications for standard tests for raw silk are promulgated by The Silk Association of America for the purpose of standardizing the official methods of testing silk in the United States, in order to facilitate the transactions between buyers and sellers of silk, and to furnish the producers of raw silk on the primary markets accurate information upon the methods by which the characteristics of their products are to be determined by the American consumers. While the test methods herein described constitute the standard tests, they are not to be construed as waiving the right in individual cases to make any or all of them in any other manner, or to make such other tests as may be desired.

They shall apply and govern as the methods to be used for official tests by the United States Testing Company, Inc., relating to contracts in which they are specified, under the Rules and Regulations of The Silk Association of America, and in other cases where no special or specific methods are specified.

### SECTION 2.—DEFINITIONS

*Raw silk* is the single thread as reeled from cocoons and is understood to be a continuous thread from beginning to end of the skein. The skeins in general conform in weight,

circumference and length to the specifications for the American Standard Silk Skein described in Part IV of this report, as issued by The Silk Association of America.

*Standard Condition.* Where the expression "standard condition" is used in these specifications, it shall be understood to mean the condition of the silk when it contains 11% of its dry weight, of moisture.

*Standard Atmosphere.* The expression "standard atmosphere" shall be understood to mean such condition of the air that silk placed in it will, within a reasonable period, assume a standard condition.

### SECTION 3.—SAMPLING

It is important in testing by means of samples drawn from the merchandise, that the samples should be so selected as to be representative of the merchandise and that a sufficient proportion of the lot should be sampled to be representative of the entire lot to which the tests are to apply.

The amount of sample and the number of samples herein specified are understood to be the minimum which can be considered as representative and which shall constitute an official sample in size and distribution.

*Sample for Test.* The sample for a test shall consist of at least ten average original skeins, selected at random from different parts of a bale, not more than one skein to be drawn from any one book or bundle, and only skeins from a single bale to be included in any single test. Test samples for two or more different kinds of tests may be taken from the original ten skeins.

*Sample from Lot.* If the results of test are to represent and be applied to a lot, at least two tests must be made upon every five bales of the lot, one from each of two bales selected at random.



---

## ARTICLE II.—WINDING TEST

---

### SECTION 1.—OBJECT

The Winding Test is intended to show the manner in which the raw silk thread will pass through the winding operation.

### SECTION 2.—SAMPLE

The sample for the test and the sampling of the lot is as specified in Article I, Section 3. Only original, intact skeins, drawn fresh from the bale, shall be used.

### SECTION 3.—APPARATUS

The winding frame upon which the test is made shall run at a uniform speed and be capable of adjustment to the following average thread speeds, 110, 137½, 165 meters [120, 150, 180 yards] per minute.

*Standard Bobbin.* To insure a uniform tension and speed, the bobbin should have the following dimensions (Figure 1):

Diameter of head, 50 millimeters (2 inches)

Diameter of drum, 44 millimeters (1¾ inches)

Length between heads, 75 millimeters (3 inches)

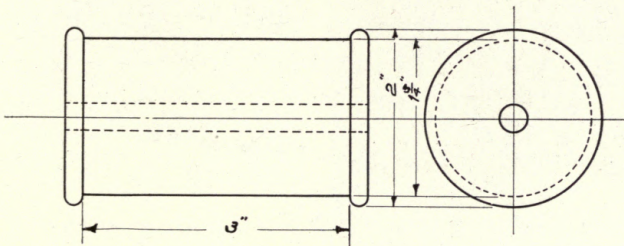


Fig. 1. BOBBIN FOR STANDARD WINDING TEST

The bobbins should be constructed so as to be light, well-balanced and smooth, and should revolve smoothly.

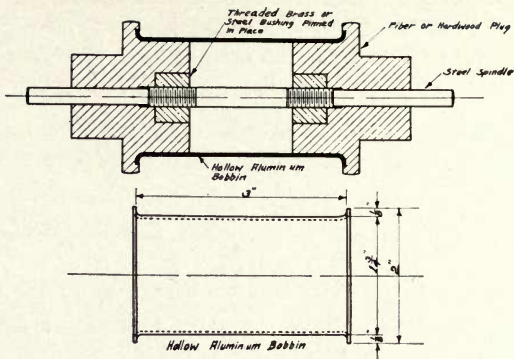


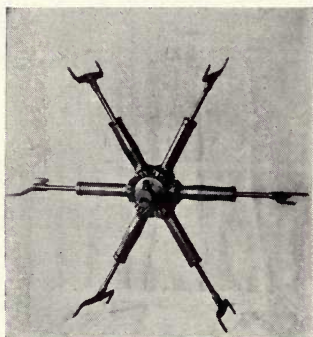
Fig. 1 A. SUGGESTED HOLLOW ALUMINUM BOBBIN FOR WINDING TEST

NOTE—The bobbin is to be spun from seamless, light weight aluminum tubing one and three quarters inches O. D. The fiber or hardwood plugs are to be interchangeable and the steel spindle is to be universal so as to be used in either direction.

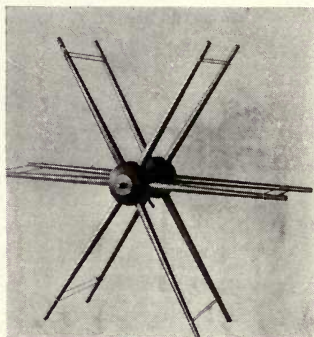
For single end drive the hub is to be removed from one plug. The design of the removable plugs and spindle may be modified in any way to reduce cost of manufacture.

Trays holding ten bobbins should be made from light wood and in such a form as to stack without injuring the bobbins and provided with a clip for a card bearing the number of the test, the weight of the ten bobbins empty, the weight filled, etc.

*Swifts.* The swifts (tavelle) used in the test should be self-centering geared pin hub swifts without weights, or twelve stick, pin hub swifts without weights. (Figure 2.)



(A) Automatic self-centering pin hub swift



(B) Twelve stick, pin hub swift

Fig. 2. PIN SWIFTS

#### SECTION 4.—SKEINS

The sample skeins shall be put on the swifts with care to insure that each skein is in good condition. The degree of the gum spots, if any are present, should be recorded. Five skeins shall be wound from the top and five from the bottom.

*Speed of Winding.* The average thread speed of winding shall be adjusted according to the average size of the raw silk and shall be regulated as nearly as possible to the following speeds.:

Below 13 denier . . . .	110 meters (120 yards) per minute
13 denier to 17 denier	137.5 meters (150 yards) per minute
Above 17 denier . . . . .	165 meters (180 yards) per minute

The maximum thread speed of winding at the completion of the test shall not exceed the following:

Below 13 denier . . . . .	130 meters (140 yards) per minute
13 denier to 17 denier	155 meters (170 yards) per minute
Above 17 denier . . . . .	180 meters (200 yards) per minute

*Winding.* During the winding test, the winding laboratory shall be maintained at as nearly a standard atmosphere as possible.

*First Period.* The skeins should be wound onto spare bobbins for fifteen minutes. They should then be inspected to determine if any are in bad condition due to damage, mis-handling or improper putting on. If any skeins are found to be in bad condition due to causes other than poor reeling, they shall, provided they do not exceed two in number, be omitted from the test which shall be completed on the remaining skeins. If they do exceed two in number, additional samples shall be drawn and replace the damaged ones.

*Second Period.* The spare bobbins shall then be replaced by standard bobbins and the winding continued until the

standard bobbin for each skein is filled flush with the heads, care being taken to insure proper traverse to wind a smooth, compact bobbin.

NOTE—The second period should require about one hour for a fourteen denier raw silk and yield about 10,000 yards from each skein, or 100,000 yards for the test. Other sizes will require proportionately other yardages to fill the standard bobbins.

#### SECTION 5.—RECORD

*First Period.* A separate record (Figure 3) shall be kept of the number of breaks occurring in the first fifteen minutes and special note made of excessive breaks in any particular skeins, stating the cause.

*Second Period.* After the inspection of the skeins, a record shall be kept of the breaks and special attention given to any skeins showing an excessive number of breaks.

*Weighing.* When the bobbins are filled, the raw silk will be reeled, without waste, into skeins, and placed for at least two hours in a space maintained at a standard atmosphere so that the silk will regain moisture to the standard condition.

The skeins will then be weighed in grams and the number of breaks per 100 grams calculated by proportion. The breaks per 100 grams may be converted into approximate breaks per pound by multiplying by four and one-half.

The breaks per 100 grams may be converted into approximate breaks per 100,000 yards by multiplying by one-tenth of the average size of the silk.

NOTE—If the suggested Hollow Aluminum Bobbin (Figure 1A) is used, the hubs and spindle can be removed and the silk weighed on the aluminum tube before rewinding into skeins, thus avoiding waste and delay.

Figure 3

LABORATORY RECORD

*Winding Test*

Test No..... Order No..... Date..... Kind.....

Marks..... Bale No..... Chop.....

Average Size (S).....Denier.

TEST

Speed of Winding..... Yards per minute

Condition of Gum Spots .....

First Period:                      Breaks.....

Remarks .....

Second Period:                      Time.....Minutes

Skein Numbers		1	2	3	4	5	6	7	8	9	10	Breaks per ton
Breaks	1st ten											
	2nd ten											
	3rd ten											

No. of Skeins Wound..... Weight Wound (W) = ..... Grams  
 .....(B) Breaks.

Breaks per 100 Grams =  $B \times \frac{100}{W} = \dots\dots (C) \text{ Breaks.}$

Breaks per Pound =  $C \times 4.5 = \dots\dots \text{Breaks.}$

Breaks per 100,000 Yards =  $C \times \frac{S}{10} = \dots\dots \text{Breaks.}$

Winding Quality (as per Tentative Classification, Appendix B) .....

Wound by..... Weighed by.....

Computed by..... Checked by.....

---

## ARTICLE III.—SIZING TEST (450 METER)

---

### SECTION 1.—OBJECT

The Sizing Test is intended to determine the average size, i. e., the weight in deniers of the raw silk thread, per 450 meters. One denier equals five centigrams.

### SECTION 2.—APPARATUS

The measuring machine for making the 450 meter sizing skeins shall have a reel  $112\frac{1}{2}$  centimeters in circumference (400 revolutions equal 450 meters), revolving at a uniform velocity of 300 revolutions per minute; provided with a dial showing the number of revolutions, and equipped with an automatic stop motion to stop the reel abruptly in case the thread breaks and when the skein is complete. (Figure 4.)

The balance for determining the total weight of the skeins shall be capable of being read to five centigrams. (Figure 5.)

The balance for weighing the individual test skeins should be of the quadrant type, graduated in half deniers. (Figure 6.)

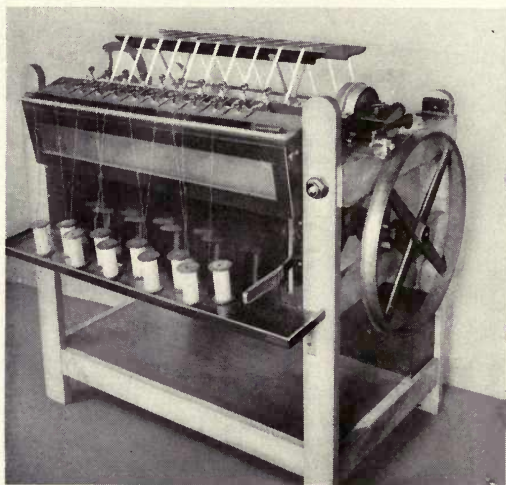


Fig. 4. MEASURING MACHINE

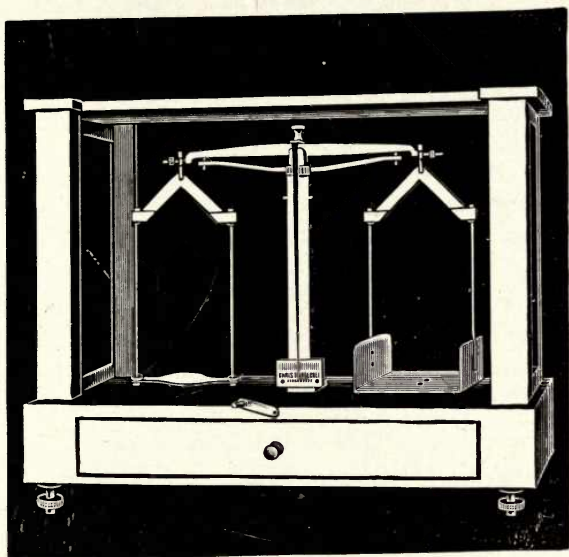


Fig. 5. SKEIN BALANCE WITH SPECIAL PAN

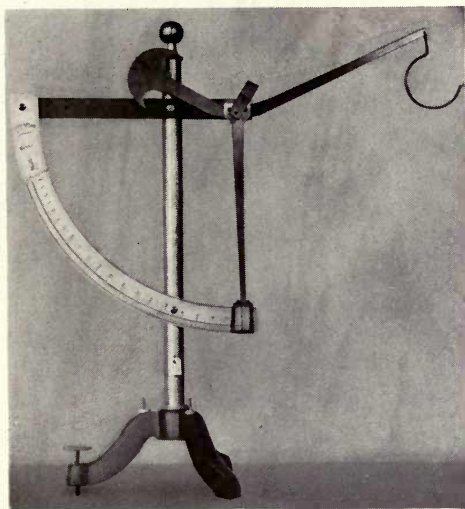


Fig. 6. QUADRANT BALANCE

### SECTION 3.—S A M P L E

The sample for the test and the sampling for the lot shall be taken as specified in Article I, Section 3.

### SECTION 4.—T E S T

From the ten sample skeins, ten bobbins (one from each skein) shall be wound five from the outside and five from the inside. The ten bobbins shall be placed upright on the measuring machine and three test skeins, 450 meters each, reeled from each bobbin, a total of thirty sizing skeins. The sizing test skeins may, if desired, be taken from the bobbins wound in the winding test.

The room in which the reel is located should have temperature and humidity control regulated to maintain a standard atmosphere and the silk should be in as nearly standard condition as possible at the time of reeling. The tension on the thread should be sufficient to hold it taut without excessive stretching. Care should be exercised to see that no short test skeins are reeled by the stop motion failing to act quickly upon breaking of thread, or long skeins by running over 400 revolutions.

The sizing skeins, which lose moisture during reeling, even in a standard atmosphere, should be allowed to remain in the standard atmosphere for a sufficient time (about one hour) to allow them to return to standard condition and then they should be weighed as follows:

*Regular Sizing.* If the standard condition assumed by the sizing skeins in the reeling room is sufficiently accurate, the thirty skeins should be weighed together and their total weight expressed in deniers.

Each skein should then be weighed on a quadrant balance to the nearest half denier and the sum of the individual weighings should not differ from the total weight by more than one-half denier.



Figure 7

LABORATORY RECORD

Sizing Test (450 Meter)

Test Number.... Order Number.... Date..... Kind....

Marks..... Bale No..... Chop.....

Number of sample skeins drawn.....

Number of sizing skeins reeled and weighed.....

TEST

REGULAR SIZE

Denier (D)	Number of Skeins (N)	(D x N)	Number of Skeins (N)	Denier (D)
0				0
0½				0½
1				1
1½				1½
2				2
2½				2½
3				3
3½				3½
4				4
4½				4½
5				5
5½				5½
6				6
6½				6½
7				7
7½				7½
8				8
8½				8½
9				9
9½				9½
Sum of Weights				
Total Weight				
Average Size				

CONDITIONED SIZE

Absolute dry weight of skeins =  
---- Grams.

----- Multiplied by  
20 = ---- Denier.

----- Plus 11% =  
-----

Conditioned weight  
= ---- Denier.

Average conditioned size =  
---- Denier.

Observers

Measured by  
-----

Weighed by  
-----

Conditioned weight  
by -----

Computed by  
-----

Checked by  
-----

NOTE—In the column headed "Denier (D)" by placing a 1 or a 2 before the "o" at top the numbers may be made to read anything from "o" to "30."

*Conditioned Sizing.* If a more accurate average size than the regular sizing is desired, the sizing skeins should, after completion of the regular sizing, be placed together in a conditioning oven, dried to constant weight at 130° C. to 140° C. (266° F. to 284° F.) and weighed in the dry, hot atmosphere.

#### SECTION 5.—RECORD

The record should show (Figure 7):

- (a) The number of sample skeins drawn
- (b) The number of sizing skeins reeled and weighed
- (c) The total weight of the test skeins in deniers
- (d) The average weight per skein, i. e., the average size in deniers
- (e) The weight of the individual skeins arranged in the order of increasing magnitude and the sum of the individual weighings.

*Conditioned Sizing.* In addition to the record made for the regular sizing, the record of the conditioned sizing should show the total dry weight in deniers; the total conditioned weight in deniers, i. e., the dry weight plus 11%; and the average conditioned weight per skein, i. e., the average conditioned size in deniers.

---

## ARTICLE IV.—AMERICAN SIZING TEST (225 METER)

---

### SECTION 1.—OBJECT

The American Sizing Test is intended to determine the variation in weight, in deniers, of 225 meter lengths of the thread; the average weight in deniers of 225 meters of the thread; and the average size, i. e., the weight in deniers per 450 meters.

*Range.* The range for a test is the difference in deniers between the weight of the lightest and heaviest 225 meter test skein in the test. The range for a lot is the difference between the lightest and the heaviest test skein in the lot.

### SECTION 2.—APPARATUS

The measuring machine for making the 225 meter test skeins, the balance for determining their total weight and the balance for weighing the individual skeins, shall be as specified for the Sizing Test (Article III, Section 2).

### SECTION 3.—SAMPLE

The sample for the test and sampling for the lot shall be taken as specified in Article I, Section 3.

### SECTION 4.—TEST

From the ten sample skeins, ten bobbins (one from each skein) shall be wound, five from the outside and five from the inside. The ten bobbins shall be placed upright on the reeling machine and six test skeins, 225 meters each, reeled from each bobbin, a total of sixty test skeins. The test skeins may be taken from the bobbins wound in the winding test, if desired. The room in which the reel is located should have temperature and humidity control regulated to maintain standard atmosphere and the silk should be in as nearly standard condition as possible at the time of reeling. The test skeins, which lose moisture during reeling, even in a

standard atmosphere, should be allowed to remain in the standard atmosphere for a sufficient time (about one hour) to allow them to return to standard condition, and then they should be weighed as follows:

*Weighing.* The sixty test skeins should be weighed together and their total weight expressed in deniers. Each skein should then be weighed on a quadrant balance to the nearest half denier.

*Conditioned Sizing.* If the conditioned size is desired, the skeins may then be placed in a drying oven, dried to constant weight at 130° C. to 140° C., (266° F. to 284° F.) and weighed in the dry, hot atmosphere.

#### SECTION 5.—RECORD

The record should show (Figure 8):

- (a) The number of sample skeins drawn
- (b) The number of test skeins wound
- (c) The total weight of the test skeins
- (d) The average weight of the test skeins
- (e) The weight of the individual test skeins, arranged in order of increasing magnitude
- (f) The sum of the weight of the individual test skeins
- (g) The difference between the weight of the lightest and heaviest test skeins expressed in deniers, i. e., the range.

The average size may be calculated by multiplying the average weight of the test skeins by two, or by dividing the total weight of the sixty skeins by thirty.

CAUTION—The range found for 225 meter skeins cannot be converted into the "spring" ("ecart") in 450 meter skeins by multiplying by two nor by doubling the weight of the lightest and heaviest 225 meter skein and taking their difference. Such a calculation would assume that the extreme fine and coarse portion from which the lightest and heaviest 225 meter skeins were reeled, continued for another 225 meters. This is not a safe assumption, for the reason that the "spring" ("ecart") determined by the 450 meter sizing test is always less than double the range found by the 225 meter test upon the same silk.

Figure 8

LABORATORY RECORD

American Sizing Test (225 Meter)

Test Number.... Order Number.... Date.... Kind....

Marks..... Bale Number..... Chop.....

Number of sample skeins drawn.....

Number of sizing skeins reeled and weighed.....

TEST

REGULAR SIZE

CONDITIONED SIZE

Denier (D)	Number of Skeins (N)	(D x N)	Number of Skeins (N)	Denier (D)
0				0
0½				0½
1				1
1½				1½
2				2
2½				2½
3				3
3½				3½
4				4
4½				4½
5				5
5½				5½
6				6
6½				6½
7				7
7½				7½
8				8
8½				8½
9				9
9½				9½
Sum of Weights				
Total Weight				
Average Size				

Absolute dry weight of skeins =  
----- Grams.

----- Multiplied by  
20 = ----- Denier.

----- Plus 11% =  
-----

Conditioned weight  
= ----- Denier.

Average condition-  
ed size =  
----- Denier.

Observers

Measured by  
-----

Weighed by  
-----

Conditioned weight  
by -----

Computed by  
-----

Checked by  
-----

Range ..... to ..... = ----- Deniers.



**PART TWO**

**Tentative Standard Tests for Raw Silk**

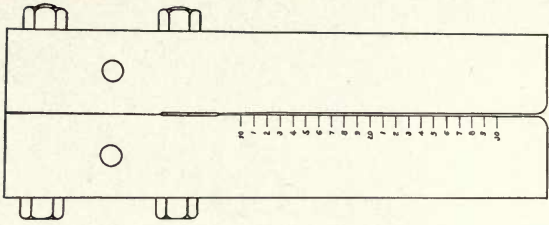


Fig. 9. THE GAGE

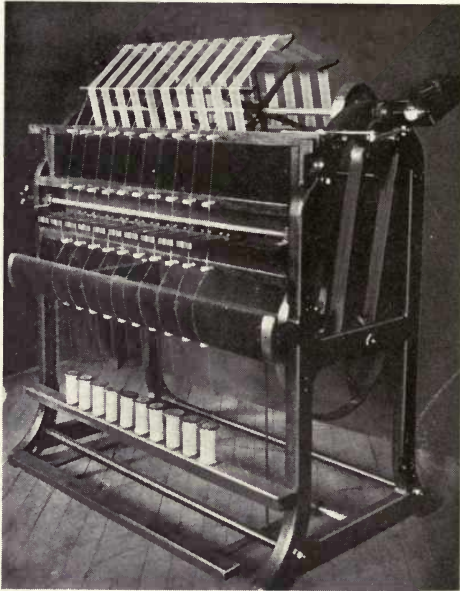


Fig. 10. THE GAGE REEL



# TENTATIVE STANDARD TESTS FOR RAW SILK

---

## ARTICLE I.—GAGE TEST

---

### SECTION 1.—OBJECT

The Gage Test is intended to measure the reeling defects in raw silk and consists of a determination of the number and kind of defects in a given length of the thread.

### SECTION 2.—APPARATUS

The gage (Figure 9) consists of two pieces of hardened tool steel approximately six and one-half inches long, one inch wide, and one-half inch thick. One narrow side of each piece is ground accurately to a plane, and the two pieces are bolted together so that the plane surfaces form a very narrow V-shaped slit between them. The gage is graduated to read in deniers by determining fixed points at which the width of the V-slit is equal to the calculated diameter of raw silk of a selected denier, and by dividing the distance along the gage into spaces proportional to the diameter of the thread.

Ten gages constitute a set, which is mounted on a reeling machine (Figure 10) in such a manner as to be adjusted to allow the silk, as it passes through guides from bobbins onto a measuring reel, to run through the gages at its average denier as determined by a sizing test.

### SECTION 3.—EVENNESS DEFECTS

(A) *Weak Threads* (tender or fine) are those which break 30% to 50% below the average strength of the thread.

(B) *Very Weak Threads* (tender or fine) are those which break 50% or more below the average strength of the thread.

(C) *Coarse Threads* are those which catch and break in the gages and of which the strength is 30% to 50% above the average strength of the thread.

(D) *Very Coarse Threads* are those which catch and break in the gages and of which the strength is 50% or more above the average strength of the thread.

#### SECTION 4.—CLEANNESS DEFECTS

On account of the unequal importance of the different cleanness defects in the manufacturing and finishing processes and in their effect upon the quality of the finished goods, cleanness defects are divided into two classes, viz.—Major Defects and Minor Defects.

(A) *Major Defects* — (Figures 11, 12, 13, 14, 15.)

(1) *Waste* is a mass of tangled open fiber attached to the raw silk thread. (Figure 11.)

(2) *Slugs* are thickened places several times the diameter of the thread, of three millimeters (one-eighth inch) or over in length. (Figure 12.)

(3) *Bad Casts* are abruptly thickened places on the threads due to the cocoon filament not being properly attached to the thread. (Figure 13.)

(4) *Split Threads* are large loops, loose ends, or open places on the thread where one or more cocoon filaments are separated from the thread. (Figure 14.)

(5) *Very Long Knots* are knots which have loose ends exceeding two and one-half centimeters (one inch) in length. (Figure 15.)

(B) *Minor Defects* — (Figures 16, 17, 18, 19, 20.)

(1) *Corkscrews* are places on the thread where one or

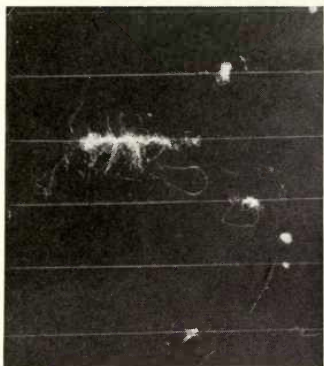


Fig. 11. WASTE



Fig. 12. SLUGS

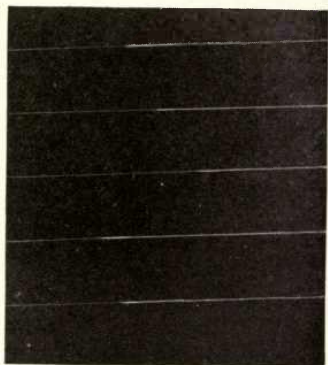


Fig. 13. BAD CASTS

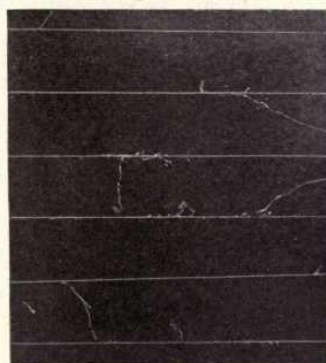


Fig. 14. SPLIT THREADS

Figs. 11-15.

MAJOR DEFECTS



Fig. 15. VERY LONG KNOTS

more cocoon filaments are longer than the remainder and wrap around the thread in a spiral form. (Figure 16.)

(2) *Loops* are small open places in the thread caused by the excessive length of one or more cocoon filaments. (Figure 17.)

(3) *Long Knots* are knots which have loose ends from six to thirteen millimeters (one-quarter to one-half inch) in length. (Figure 18.)

(4) *Nibs* are small thickened places less than three millimeters (one-eighth inch) in length. (Figure 19.)

(5) *Raw Knots* are the necessary knots for tying breaks in the raw silk thread during the reeling and rereeling operation. The ends of the knot should be less than three millimeters (one-eighth inch) long. (Figure 20.) The number of raw knots should be recorded but they should not be counted among the defects.

#### SECTION 5.—S A M P L E

The sampling for the test and the sampling of the lot shall be as specified in Part I, Article I, Section 3.

#### SECTION 6.—W I N D I N G

Sufficient silk for the test shall be wound from the sample skeins onto bobbins under the same conditions as specified in the winding test in Part I, Article II, Sections 3 and 4. A record shall be kept of the number of winding breaks and care should be exercised to tie all winding breaks without removing any of the thread, with a distinguishing knot (bow knot) in a manner to be easily recognized. The silk wound onto bobbins in the Winding Test, Part I, Article II, may be used for the Gage Test, provided care is exercised during the Winding Test to tie all winding breaks with a distinguishing knot (bow knot), so that the nature of the defect causing the winding break may be determined and recorded.

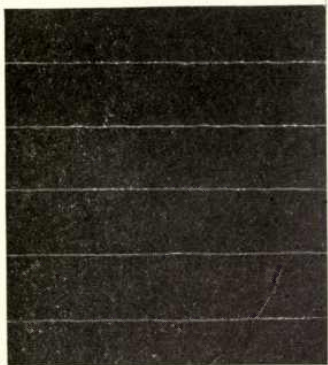


Fig. 16. CORKSCREWS



Fig. 17. LOOPS

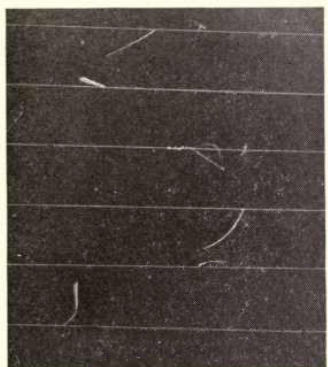


Fig. 18. LONG KNOTS



Fig. 19. NIBS

Figs. 16-20.

MINOR DEFECTS

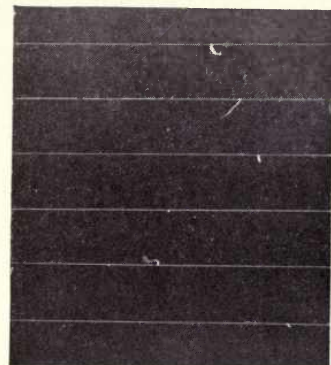


Fig. 20. RAW KNOTS

## SECTION 7.— T E S T

The bobbins shall be placed upright on the gage reeling machine, and the ends of the threads passed through guides and the gages with just sufficient tension to keep the thread taut. The gages shall be adjusted to such a position that the thread will run through them at the average size. The thread speed should be approximately 230 meters (250 yards) per minute. When the thread breaks, the reel should be stopped and both ends of the thread examined to determine the kind of defect as defined by Section 3 of this Article. If either portion appears fine or coarse it should be tested on a serimeter to determine if it is an evenness defect. (Section 3 [A] [B] [C] [D].) When 1000 yards have been wound from each of the ten bobbins (10,000 yards in all) the reel should be stopped and a record made of the number of defects in each class. The test should be continued until a total of 30,000 yards has been reeled, stops and records being made of each 10,000 yards.

CAUTION—The operator should see that no waste or loose matter collects on the gages to interfere with the passage of the thread and care should be exercised to keep the gages clean, well coated with oil to avoid rusting, and protected with covers when not in use. The gages should be frequently tested to determine if the width of the slit is correct.

## SECTION 8.— R E C O R D (Figure 21).

The records of the test shall show the number of each defect for each 10,000 yards reeled and the total number of each defect for the total number of yards tested.

Figure 21

LABORATORY RECORD

*Gage Test*

Test Number.... Order Number.... Date.... Kind....

Marks..... Bale Number..... Chop.....

*TEST*

EVENNESS

DEFECTS	1st 10,000 Yards	2nd 10,000 Yards	3rd 10,000 Yards	Total For 30,000 Yards
Weak Threads				
Very Weak Threads				
Coarse Threads				
Very Coarse Threads				
Total				

CLEANNES

MAJOR	Waste				
	Slugs				
	Bad Casts				
	Split Threads				
	Very Long Knots				
	Total				
MINOR	Corkscrews				
	Loops				
	Long Knots				
	Nibs				
	Total				
Raw Knots					

Tested by.....

---

## ARTICLE II.—SERIMETER TEST FOR EVENNESS

---

### SECTION 1.—OBJECT

The Serimeter Test for evenness is made to determine the variation of the breaking points of one hundred different portions of the raw silk thread, from the average breaking point found by taking the average of the hundred portions tested.

### SECTION 2.—APPARATUS

The serimeter (Figure 22) used for the test must be sensitive and capable of being read to one gram and have a maximum capacity of 250 grams. It must be provided with a type of clip which does not cut the thread. The pulling clip of the testing machine shall move at a uniform speed of eighty centimeters per minute.

### SECTION 3.—SAMPLE

The sampling for the test and the sampling of the lot shall be as specified in Part I, Article I, Section 3. The test shall be made upon ten sizing skeins.

### SECTION 4.—TEST

Each sizing skein should be cut once and from each of the ten sizing skeins, ten strands shall be selected at random, and examined to see that they appear to be clean threads (i. e., contain no cleanness defects as defined and illustrated

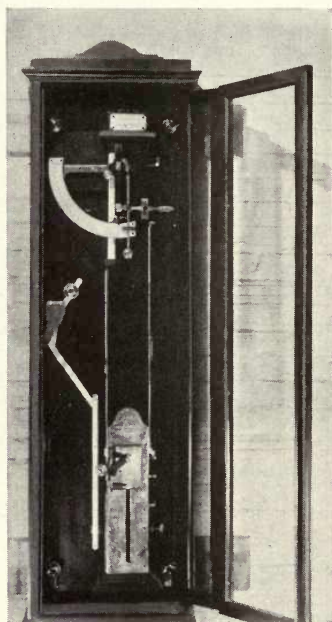


Fig. 22. SERIMETER



Figure 23

LABORATORY RECORD

*Serimeter Test*

Test Number.... Order Number.... Date.... Kind....

Marks..... Bale Number..... Chop.....

*TEST*

Breaking Point Grams (G)	Number of Breaks (N)	Product G x N	Frequency Grams No.	DIAGRAM																
5																				
10																				
15																				
20																				
25																				
30																				
35																				
40																				
45																				
50													*							*
55																				
60																				
65																				
70																				
75																				
80																				
85																				
90																				
95																				
100																				
Total Products																				
Average Breaking Point																				

\* This line is average breaking strength line.

Tested by.....

Computed by.....

in Part II, Article I). The strands shall be placed in the serimeter, inspected again to make sure they are clean, and the breaking point determined. Any strands found to contain cleanness defects should be replaced by clean ones and strands which break in the clips should not be counted. The length of thread between the clips at the beginning of each test shall be fifty centimeters (twenty inches).

#### SECTION 5.—RECORD

The breaking point of each strand (Figure 23) should be read and recorded to the nearest five grams, the values being arranged in the order of increasing magnitude. The record should show the frequency, i. e., the number of breaks at, above and below the average breaking point.

NOTE—The following arrangement will be found simple, convenient and easily interpreted. The report blank should have a portion ruled both horizontally and vertically. Each space from the top downward may be taken equal to five grams and each space across the sheet equal to five strands. Assigning values to the spaces vertically, the breaking point of the individual strands may be tallied beside their corresponding values and at the completion of the test the total number of tallies for each breaking point can be entered in an adjoining space. A graphical representation of the result of the test can be easily made by drawing at each breaking point, horizontally from a fixed vertical line, a heavy line with its length indicating the number of strands breaking at that point.

---

## ARTICLE III.—SERIGRAPH TEST

---

### SECTION 1.—OBJECT

The Serigraph Test is designed to determine the tenacity, elasticity and elongation of raw silk.

NOTE—As a raw silk thread is pulled, it stretches at first proportionally to the pulling force and if the pulling force is relieved the thread will return to its original length. If the force continues to increase, it will reach a point at which the thread begins to stretch more rapidly and to be permanently stretched.

### SECTION 2.—DEFINITIONS

The three physical characteristics determined in this test are defined as follows:

*Tenacity* is the strength of a single thread expressed in grams per denier.

*Elasticity* is the limiting force expressed in grams per denier which the thread will just support without permanent elongation. It is indicated in the test by the yield point on the serigraph record at which the straight line portion ends and the diagram becomes curved.

*Elongation* (heretofore called Elasticity) is the amount that the silk is stretched when pulled to the breaking point.

### SECTION 3.—APPARATUS

The apparatus for the test consists of a tensile strength testing machine with an autographic attachment recording simultaneously the pulling force and the corresponding elongation of the thread. (Figure 24.) The machine must be located in a room having humidity and temperature control and must be capable of being tested for correctness of reading by direct loading with standard weights. The total capacity of the machine should not be greater than twice the ultimate strength of the specimen to be tested. The uniform speed of the pulling jaw should be fifteen centimeters (six inches) per minute.

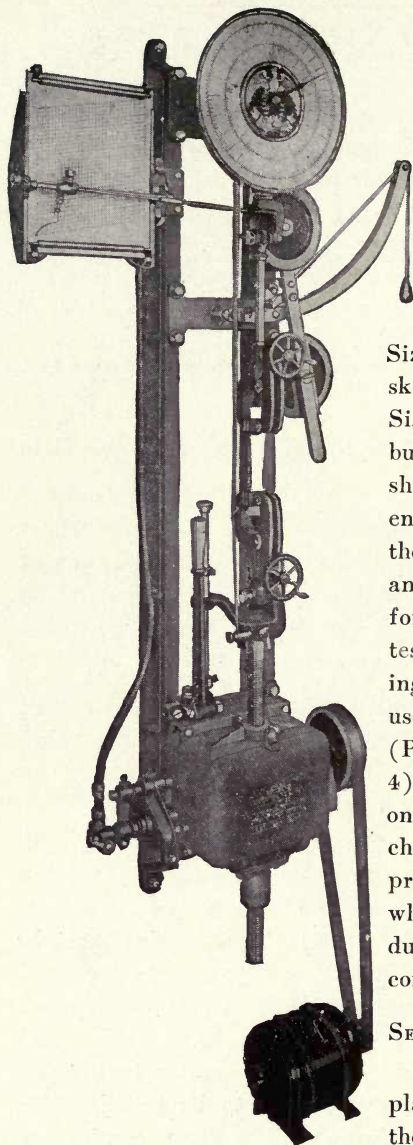


Fig. 24 SCOTT SERIGRAPH

#### SECTION 4.—S A M P L E

The sample for the test and the sampling for the lot shall be taken as specified in Part I, Article 1, Section 3. The test sample shall consist of ten sizing skeins. The 450 meter skeins used in the Sizing Test or the 225 meter skeins used in the American Sizing Test may be used, but in either case, the skeins should not be twisted tight enough to injure the gum and the skeins should be opened and allowed to hang loose for some time before being tested in the serigraph. Sizing skeins which have been used for a conditioned sizing (Part I, Article III, Section 4) cannot be used in this test on account of the possible changes in the physical properties of the thread which may have taken place due to the heating in the conditioning oven.

#### SECTION 5.—T E S T

The test skeins shall be placed in a space in which the relative humidity and temperature can be regulated

to the standard regain, and they shall remain a sufficient time (usually one to two hours) to allow them to become adjusted to a standard moisture content. Each skein should then be carefully weighed to the nearest one-quarter denier, placed in the recording serigraph and tested for tenacity, yield point and elongation.

NOTE—The skein must be secured in the clamps of the serigraph in such a manner that all strands are held firmly and none of the threads are cut by the pressure of the clamps or any sharp edges. This can be easily accomplished by wrapping all of the strands around a strip of soft cardboard and placing the cardboard in the clamps of the machine in such a manner that all strands are securely held, but not crushed. It is convenient to place the test specimen in the upper clamp of the testing machine first, then carefully draw all of the strands smooth and taut, and wrap them around a second cardboard at the position in which the lower clamp should seize the strands. Caution should be exercised to see that all strands are parallel, uniformly taut, and none excessively stretched.

The length of the tested portion should be ten centimeters (four inches) between the clamps of the machine when the test begins. Care should be exercised to prevent the portion of the skein which is not between the clamps, from supporting any portion of the pulling force.

#### SECTION 6.—RECORD

The autographic record should show (Figure 25) a load-elongation diagram from which the load and the elongation at any point during the test can be read with an accuracy of 5% and the final reading on the dial of the testing machine should check with the breaking load as shown on the autographic diagram. By placing a ruler along the straight line portion of the diagram, the point at which the diagram begins to depart from a straight line can be marked. This point will be called the *yield point*.

The pulling force at the yield point divided by the number of strands, and by the weight of the skeins in deniers is called the *elasticity of the silk* and is expressed in grams per denier.

The total stretch to the breaking point, divided by the original length is the *elongation* and should be expressed in per cent.

The tabulated record shall show the following:

For each skein:

- (a) The number of strands tested
- (b) The weight of the skein in deniers
- (c) The breaking force in grams
- (d) The tenacity, i. e., the grams per denier
- (e) The elasticity, i. e., the pulling force in grams per denier at the yield point
- (f) The elongation, in percentage.

For the entire test of ten skeins:

- (a) The average tenacity
- (b) The average elasticity
- (c) The average elongation.

NOTE—It has been found by experiment that the breaking force, in grams, of a number of threads tested together on the serigraph is approximately  $\frac{7}{8}$  of the sum of the breaking forces found by testing the same number of threads of the same silk singly on the serimeter.

## LABORATORY RECORD

*Serigraph Test*

Test Number.... Order Number.... Date.... Kind....

Marks..... Bale Number..... Chop.....

*TEST*

Length of Specimen (L) ..... centimeters

Number of Strands (N) .....

Skein No.	Weight (W) Deniers	Breaking Force Grams(G)	Tenacity $\frac{G}{WN}$ g.per d.	Yield Point (Y) Grams	Elasticity $\frac{Y}{W \times N}$ g.per d.	Elongation	
						MM	$\frac{MM}{L} \times 100$
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
Total							
Average per Skein (A)							
Average per Strand = $\frac{A}{N}$							

Tested by .....

Computed by .....

Checked by .....

---

## ARTICLE IV.—COHESION TEST

(BY SEEM'S COHESION MACHINE)

---

### SECTION 1.—OBJECT

The Cohesion Test is intended to determine the compactness of the raw silk thread and the thoroughness with which the cocoon filaments forming the thread have been agglutinated. It is based upon the amount of rolling and rubbing under constant pressure which the thread will withstand before splitting into its individual cocoon filaments.

### SECTION 2.—APPARATUS

The Seem Cohesion Machine (Figure 26) consists of a hardened steel roller accurately ground and polished, approximately six and one-half millimeters [one-quarter inch] in diameter, mounted on a steel arm which is hinged at one end and which acts as the weight to produce pressure on the roller. Under the roller a steel carriage mounted between guides moves back and forth a distance of about fifty millimeters (two inches.) The carriage is fitted with two clamps for holding the specimens and a counter indicates the number of strokes which the carriage makes during the test. The roller is set at an angle of two and one-half degrees to the path of movement of the carriage, so that the thread is submitted to a rolling and rubbing action.

NOTE—Great care should be exercised to keep the roller smooth, free from rust or dirt, and to see that it is properly lubricated and adjusted to turn freely but with only slight endwise motion. When not in use, the roller should be covered with a film of vaseline or oil to prevent rusting, but the film must be thoroughly removed with alcohol or gasoline before beginning a test.

### SECTION 3.—SAMPLE

The sample for the test shall consist of five skeins and the sampling of the lot is as specified in Part I, Article I, Section 3. The test specimen consists of fifty strands taken at intervals of not more than two meters (two yards) along



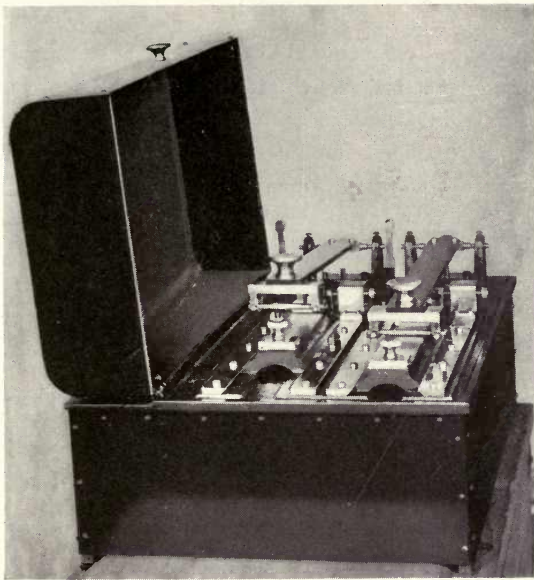


Fig. 26. SEEM COHESION MACHINE

the thread from a single skein, laid taut, twenty threads per centimeter (fifty threads per inch) on a sheet of firm, unglazed, black cardboard, to which they are secured by means of gummed paper tape. One test specimen shall be prepared from each of five sample skeins and may be taken from the bobbins of the winding test or direct from the sample skein. Raw silk which has been used for a Conditioned Sizing, a Serimeter Test, a Serigraph Test, or any test which affects its physical qualities, shall not be used for the Cohesion Test. Before being used for the test the card should be inspected to determine if the threads have any cleanness defects or pronounced unevenness in the portion which is to be tested. Imperfect threads should be removed before starting the test and in case the strands are noticeably uneven the card should be rejected and another card made.

#### SECTION 4.— T E S T

The sample cards should be kept in a standard atmosphere for at least one hour after preparation to insure that the thread is in standard condition. The testing machine should be operated in a room where the relative humidity and temperature can be maintained at standard condition during the test. The test cards should be clamped in the machine in such a manner as to lie flat and smooth and the threads parallel with the direction of movement of the carriage. The machine should run at a uniform speed of 120 strokes per minute and there should be no evidence of jumping or jerking at the end of the stroke. As the test proceeds, the threads should be inspected occasionally. As they begin to open, frequent examinations, at least every fifty strokes, should be made to determine when all are completely open.

NOTE—The openness of the thread can be conveniently determined by removing the card from the machine, inserting a thin piece of metal between the thread and the card and slightly raising the thread off the card.

#### SECTION 5.— R E C O R D

The record of the test should show (Figure 27) the number of cards tested, the number of strokes necessary to open all of the threads on each card and the average number of strokes.

NOTE—In cases where the threads do not appear to be opening uniformly and a small number (five or less) indicate that they will require a much larger number of strokes to open them, the test may be considered complete when 90% of the threads are open.

Figure 27

LABORATORY RECORD

*Cohesion Test*

Test Number.... Order Number.... Date.... Kind....

Marks..... Bale Number..... Chop.....

*TEST*

Number of sample skeins..... Number of strands on card.....

Sample Skein	Number Strokes
1	
2	
3	
4	
5	
Total	
Average	

Extremes ..... to .....

Tested by .....



**PART THREE**

**Tentative Classification**



## TENTATIVE CLASSIFICATION

---

### ITALIAN, JAPANESE AND CHINESE STEAM FILATURE (SHANGHAI) RAW SILK BASED UPON TENTATIVE STANDARD TESTS

---

This Tentative Classification of Italian, Japanese and Chinese Steam Filature (Shanghai) Raw Silk is promulgated by The Silk Association of America to provide the means for interpreting the results of tests made by the methods and apparatus described in the Standard and Tentative Standard Tests for Raw Silk.

No attempt is made to establish any relation with the present market Classification and it is not intended that this Tentative Classification shall apply to sales contracts under the Raw Silk Rules and Regulations of The Silk Association of America, unless specifically included as special conditions of the sales contract.

Nothing in this Classification shall prevent, in individual cases, the designation of specific characteristics which are especially desired, provided such designation is made in advance of agreement of sale and is made a part of the sales contract.

The limits set in each grade are the minimum requirements which raw silk can show and fall within the grade.

	TESTS	GRADE			
		First	Second	Third	Fourth
<i>Scrigraph</i>	Average <i>Tenacity</i> , grams per denier (Note A) over	3.50	3.30	3.20	3.00
	Average <i>Elongation</i> percentage over	20%	18%	16%	16%
<i>Gage</i> (30,000 yards)	<b><i>Evenness Defects</i></b> Average 13 deniers to average 18 deniers not over	5	10	20	30
	Average 18 deniers to average 22 deniers not over	4	8	16	24
	<b><i>Cleanness Defects</i></b> Major Defects not over	5	25	50	75
	Minor Defects (Note B) not over	50	100	150	200
<i>American Sizing</i> (225 meter)	Average <i>Size</i> —Permissible limits are specified in Raw Silk Rules and Regulations of The Silk Association of America, Amended March 23, 1921, pages 7-10.				
	<i>Range</i> in denier, for the lot (not exceeding 10 bales) (Note C)				
	Average 13 deniers to average 18 deniers not over	3.5	4	5	5
	Average 18 deniers to average 22 deniers not over	4.5	5	6	6



NOTE A—It has been found by experience that tenacity in grams per denier by the serigraph is very approximately  $\frac{7}{8}$  of that found by the serimeter on the same silk.

NOTE B—If all other characteristics are satisfactory for a grade and the Minor Defects should exceed the limit of the grade, an additional allowance as high as 50% may be made in the Minor Defects.

NOTE C—Range for 450 meter sizing test should not be assumed as double these values.

The approximate equivalents for 450 meters are :—

	First	Second	Third	Fourth
Average 13 deniers to average 18 deniers not over	6	7	9	9
Average 18 deniers to average 22 deniers not over	8	9	11	11

## APPENDIX A

### COHESION

The Cohesion Test is especially important for raw silks which are to be used for raw weaving and it furnishes valuable information for all silks. It is not however included, at present, as one of the characteristics upon which the Tentative Classification is based.

The Test is recommended and for those who use it the following interpretation of the results is suggested:

TESTS	GRADE OF COHESION			
	Excellent	Good	Fair	Poor
Strokes: Average of five cards not less than	1500	1300	1100	1000
Strokes: Individual cards not less than	1200	1000	800	600

---

## APPENDIX B

---

### WINDING

Winding is the mill operation by which the raw silk skein is wound onto a bobbin. The winding quality of the silk depends upon the thread and skein formation and is measured by the number of breaks which will occur in winding a measured quantity by the method described in Standard and Tentative Standard Tests. It is not a part of the Tentative Classification of Raw Silk but is graded as an independent characteristic as follows:

TEST	WINDING QUALITY				
	Excellent	Good	Fair	Poor	Very Poor
Winding of 100,000 yards Breaks not over	5	10	20	30	over 30

**PART FOUR**

**Specifications for American Standard  
Silk Skein**



# **SPECIFICATIONS FOR AMERICAN STANDARD SILK SKEIN**

## **SECTION 1.— O B J E C T**

These specifications for the American Standard Silk Skein are promulgated by The Silk Association of America for the purpose of informing the producers of raw silks regarding the physical characteristics which the raw silk skein should possess, in order to be the most satisfactory to the American consumers. It is essential in American silk mills that the raw silk skeins be uniform in circumference, width and weight; that they be free from reel-arm gums; that the beginning of the raw silk thread be easily and quickly found and that the thread be unwound from the skein with the least possible number of breaks and the smallest possible amount of waste.

## **SECTION 2.— R E E L I N G   A N D   R E R E E L I N G**

The American manufacturers prefer reeled raw silk because of its superior winding characteristics, but raw silk may be reeled directly into American Standard Silk Skeins, provided the skein formation conforms to these specifications.

## **SECTION 3.— R E E L**

The reel for forming the American Standard Silk Skein shall be from 148 centimeters to 150 centimeters (fifty-eight inches to fifty-nine inches) in circumference and shall have six arms, uniformly spaced. The arms shall have the outside face upon which the skein rests, rounded in such a manner

that the thread touches it for a distance of from one and two-tenths centimeters to two centimeters (one-half inch to three-quarter inch). (Figure 28.)

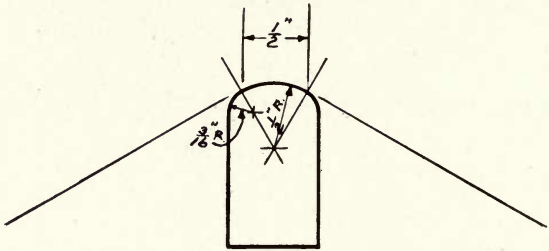


Fig. 28. CROSS SECTION OF REEL BAR

#### SECTION 4.—GUM SPOTS

Hard gum spots, even if they are small, are very objectionable and should be entirely avoided. The reel bar described in Section 3 will produce much softer gum spots, more easily removed, than the narrow or V-shaped bar which tends to produce small, hard places difficult to rub out without damaging the silk.

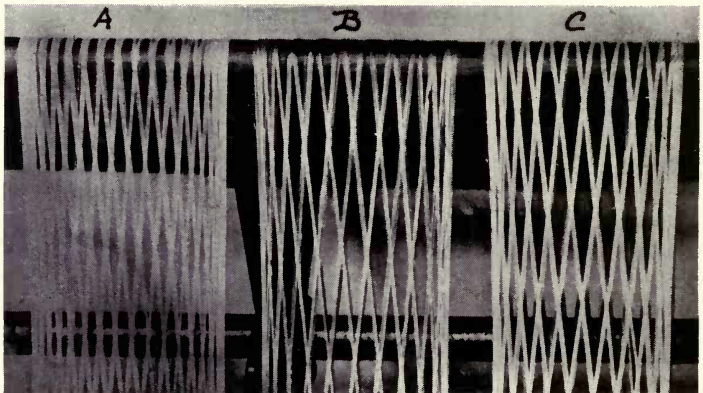


Fig. 29. GRANT REELED SKEINS

A has 12 diamonds; B has 8 diamonds; C has 10 diamonds.

SECTION 5.—TRAVERSE (Figure 29 and Figure 30, Diagram of Skein Formation)

The guide through which the thread passes onto the reel shall pass to and fro along the reel in such a manner that a definite ratio exists between the revolutions of the reel and the guide of the traverse, so that the thread forms clearly defined diamonds in the skeins. This diamond formation of skein is known as Grant Reeling. There may be from eight to twelve complete diamonds across the face of the skein.

Figure 30 is a diagrammatic sketch of a skein made by 13/24 gear ratio. In such a combination the reel revolves twenty-four times, while the traverse crank makes thirteen revolutions moving the guide of the traverse across the skein and back thirteen times, producing thirteen diamonds.

NOTE—Care should be exercised to keep all bearings of the gears and connecting rods which operate the traverse in good condition so as not to produce indistinct and imperfect diamonds.

SECTION 6.—SKEIN (Figure 31 and Figure 32)

The width of the finished skein on the reel shall be eight centimeters (three inches) and its weight shall be approximately as follows:

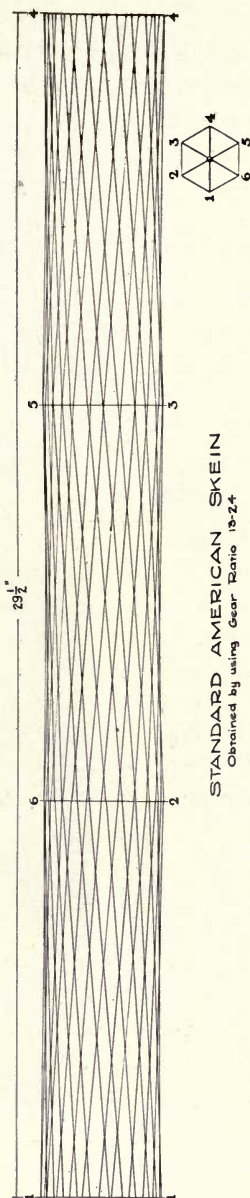


Fig. 30. DIAGRAMMATIC SKETCH OF GRANT REEL

### *Average Sizes*

Fine sizes up to 12 deniers—65 grams to 70 grams ( $2\frac{1}{4}$  ounces to  $2\frac{1}{2}$  ounces)

13 deniers to 15 deniers—70 grams to 85 grams ( $2\frac{1}{2}$  ounces to 3 ounces)

Above 15 deniers—85 grams to 100 grams (3 ounces to  $3\frac{1}{2}$  ounces)

The skein shall be one continuous thread made by tying all breaks with good, clean knots, with the loose ends cut not more than three millimeters (one-eighth inch) long. The outside end of the thread shall be tied around the skein in such a manner as to be easily found. The skein shall be laced at three places equally spaced with a fine, soft-twisted, cotton or spun silk yarn passed through at least five diamonds in the width of the skein, tied so that the knot is about one

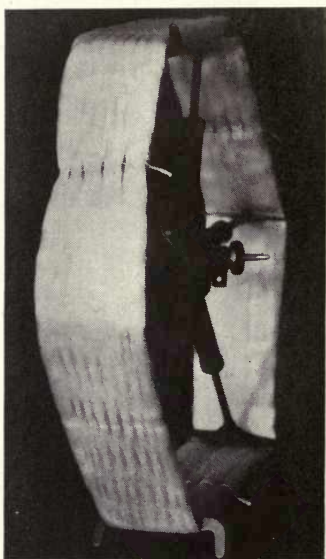


Fig. 31. GRANT REELED SKEIN  
LACED IN THREE PLACES



centimeter (one-half inch) from the edge of the skein, and the loose ends cut not to exceed one centimeter (one-half inch) in length from the knot (Figure 31 and Figure 32).

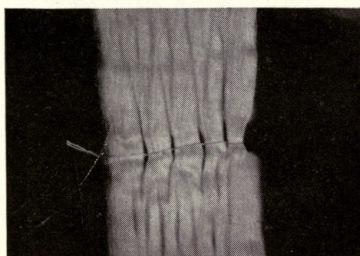


Fig. 32. DETAILED LACING OF  
A GRANT-REELED SKEIN

---

## APPENDIX A

---

### *WINDING OF THE AMERICAN STANDARD SILK SKEIN*

#### SECTION I.—OBJECT

The winding test is intended to show the manner in which the raw silk thread will pass through the winding operation.

(For other specifications see Standard Tests, Sections 2-5 and Appendix A to Tentative Classification)

---

## APPENDIX B

---

### *SUGGESTIONS ON REELING MACHINE CONSTRUCTION AND USE*

#### SECTION I.—OBJECT

The construction of the reeling machine for reeling the American Standard Silk Skein is, as a whole, very simple. The frame and reel box can easily be constructed of wood,

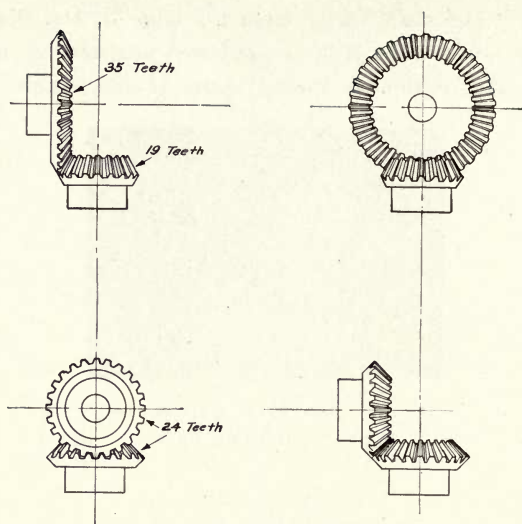


Fig. 33. SET OF GEARS

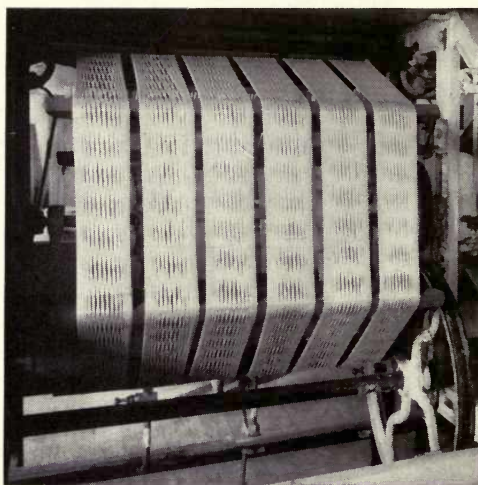


Fig. 34. SKEINS MADE BY DIRECT REELING

although cast iron frames make a more rigid and stronger machine. The only portion requiring careful attention to design and construction is the traverse, i. e., the guide which directs the back and forth motion of the thread as it is wound onto the reel. These suggestions are intended to call attention especially to the traverse and to show a simple construction which will be cheap, easily built, and effective in operation.

## SECTION 2.— T R A V E R S E

The diamond in the skein is formed by having the traverse guide move back and forth with a definite number of complete crossings to a definite number of revolutions so that the thread repeats its course on the reel and forms a skein showing well defined diamonds. The traverse mechanism must be positively connected with the axis of the reel and must be driven by it. The essential parts are a reel with a given number of arms, a set of gears with a fixed ratio between the teeth (Figure 33) determined by the number of arms and the number of diamonds it is desired to produce, and a connecting mechanism to drive the traverse. Each reel must drive its own traverse (Figure 33).

## SECTION 3.— D I R E C T R E E L I N G

Raw silk can be reeled from the cocoon directly into American Standard Silk Skeins (Figure 34) but the skeins produced in this way are generally inferior in formation and winding quality to American Standard Silk Skeins produced by rereeling. The quality of the silk is also improved by rereeling, provided it is properly done with sufficient tension, because it reduces the number of fine ends and some of the other defects.

*The apparatus* (Figure 35) consists of a reel, traverse and set of gears which will produce a nine diamond skein, three inches wide. The reel bars AA are six in number, the cir-

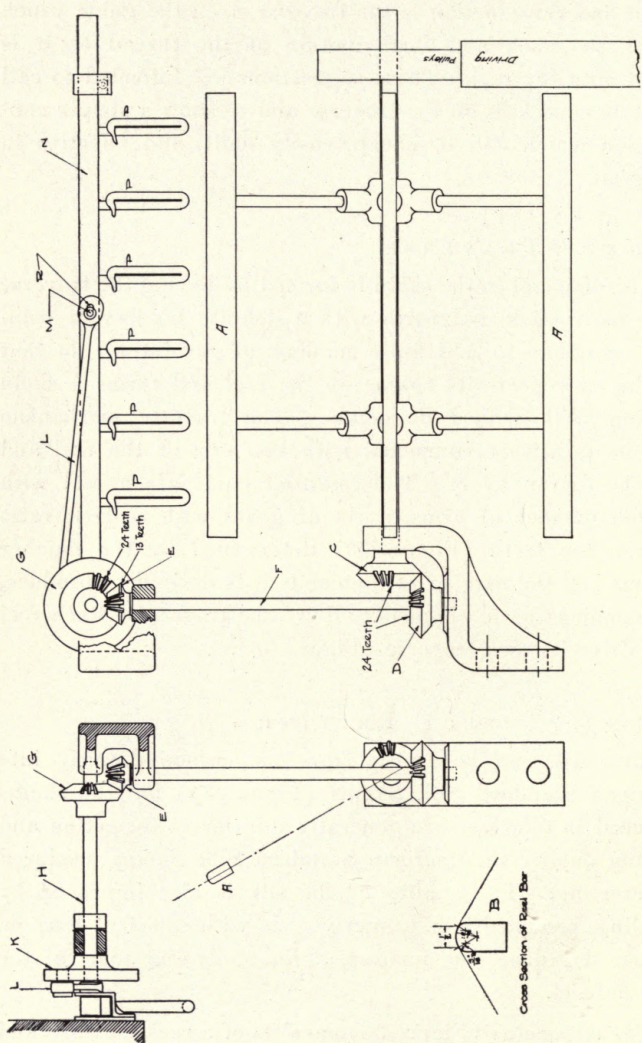


FIG. 35. METHOD OF GEARING TRAVERSE AND REEL FOR DIRECT REELING INTO A STANDARD AMERICAN SKIN

cumference of the reel is one and a half meters (fifty-nine inches) and the reel bars have a cross section as shown at B.

*The axle of the reel* is fitted on one end with a small pulley which rests on a larger pulley on the power shaft and drives the reel. On the other end is fastened one beveled gear C having twenty-four teeth. The beveled gear D also having twenty-four teeth, engages C and is connected to beveled gear E by the rod F. Beveled gear E has thirteen teeth and engages beveled gear G which has twenty-four teeth. The set of gears C and D are only for the purpose of changing the direction of rotation at right angles to the axis of the reel.

The rod H leads from gear G to the front of the reel box and has on its outer end a crank K with a connecting rod L attached to a pin M in the bar N which carries the guides P which lead the thread on the reel. The connecting rod L should be thirty and one-half centimeters (twelve inches) from center to center of pin holes.

The hole in the connecting rod L through which the wrist pin M passes should be in the form of a slot approximately six millimeters (one quarter inch) greater in length than the diameter of the wrist pin, as shown at R.

It is necessary to keep this entire system in good order and replace parts when they become so worn or loose as to produce imperfect diamonds.

*The reel box* should be as completely enclosed as possible and maintained at a sufficiently high temperature to dry the thread rapidly. Steam pipes for drying should be placed in the bottom of the reel box and it is considered by some desirable to place a steam pipe in the top of the box near the front and near the thread as it enters the box.

Some raw silk skeins show a tendency in the winding in America to separate into rings after a portion of the skein has been wound. It has been suggested that this might be due to incomplete skeins being allowed to stand on the reel and become dry over night.

APPENDIX C

SUGGESTIONS ON REREELING MACHINE  
CONSTRUCTION AND USE

The machine for rereeling may be made the same as the direct reeling machine but it is possible to simplify it and get the same results.

The drawing (Figure 36) shows a rereeling machine in the simplified form.

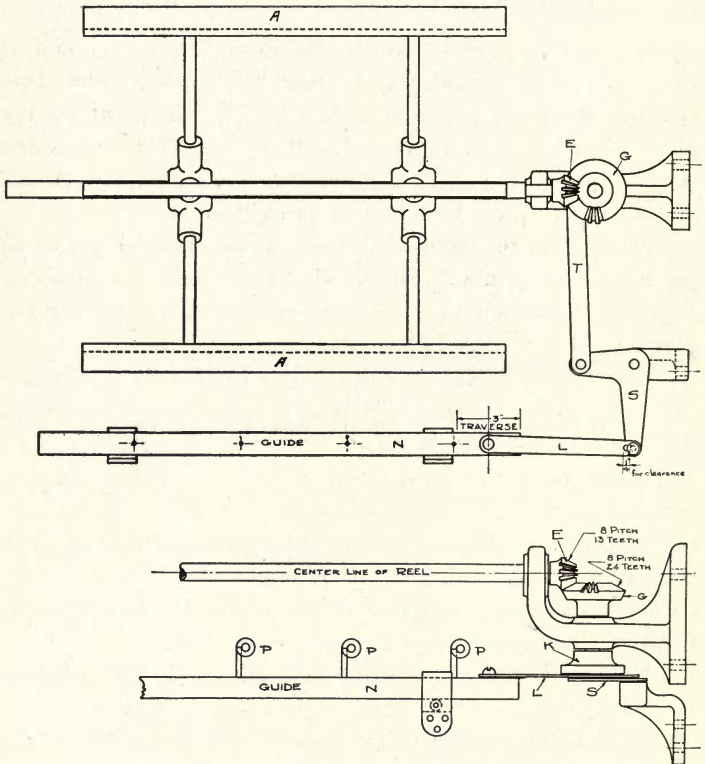


Fig. 36. METHOD OF GEARING TRAVERSE AND REEL FOR  
REREELING INTO STANDARD AMERICAN SKEIN

The axle of the reel is fitted on one end with a small pulley on the power shaft and drives the reel. On the other end is fastened the beveled gear E having thirteen teeth, which engages beveled gear G having twenty-four teeth and connected to crank K.

The rod T is connected with bell crank S which engages with the traverse bar N by rod L.

The rereeling machine should have some means for preventing the formation of double ends in rereeling caused by the broken thread from one small reel becoming attached to that of another small reel and being rereeled with it (Figure 37).

One device suggested in connection with a rereeling machine consists of partitions of thin boards separating the bobbins so that if the thread breaks either as it leaves the small reel or after it passes the tension bar R, the loose end cannot fly against the other threads. Any device which will accomplish the same result will be satisfactory.

The rereeling should be done at sufficient tension to break the fine places in the thread and to form a compact skein. (See last two paragraphs of Appendix B.)

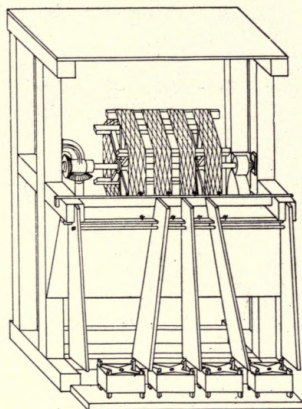


Fig. 37. REREELING MACHINE WITH  
SMALL REELS SEPARATED

PERSONNEL  
of  
Raw Silk Classification Committee  
1915-1921

D. E. DOUTY, Chairman

ALBERT BOSSHARD

W. F. EDWARDS

J. E. HUG \*

JOHN H. JEWETT

CHARLES MULLER

GEORGE A. POST

J. A. SCHEIBLI \*

FREDERICK SCHMUTZ

WARREN P. SEEM

CHARLES CHENEY, *ex officio*

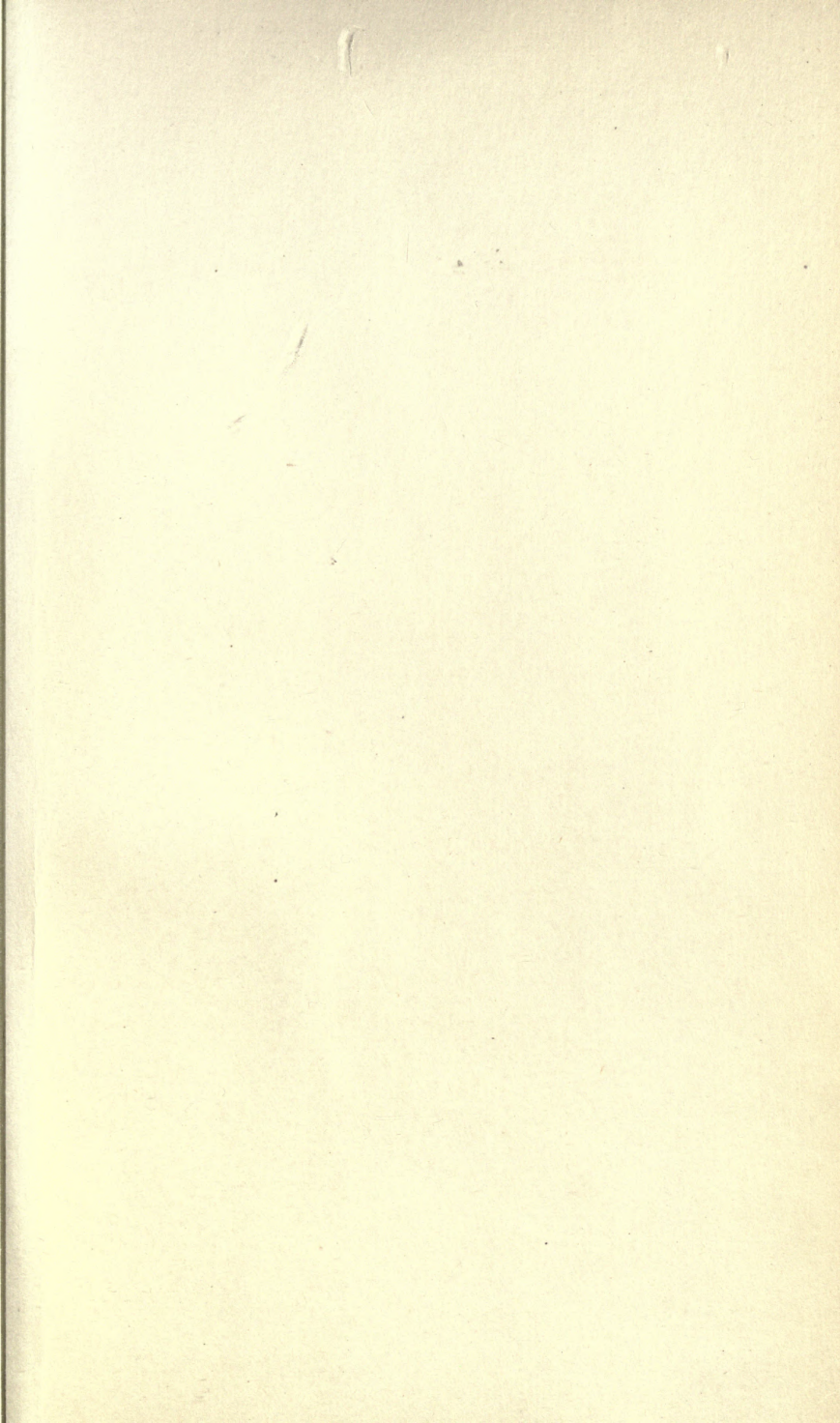
RAMSAY PEUGNET, Secretary

\*Members of Committee, 1915-1920.



The Saratogian Printing Service  
Saratoga Springs, N. Y.





THIS BOOK IS DUE ON THE LAST DATE  
STAMPED BELOW

**AN INITIAL FINE OF 25 CENTS**  
WILL BE ASSESSED FOR FAILURE TO RETURN  
THIS BOOK ON THE DATE DUE. THE PENALTY  
WILL INCREASE TO 50 CENTS ON THE FOURTH  
DAY AND TO \$1.00 ON THE SEVENTH DAY  
OVERDUE.

OCT 11 1934

MAY 3 1935

8 Jan 5 4 J B

JAN 4 1954 LU

LD 21-100m-7,'33



**HOME USE  
CIRCULATION DEPARTMENT  
MAIN LIBRARY**

This book is due on the last date stamped below.  
1-month loans may be renewed by calling 642-3405.  
6-month loans may be recharged by bringing books  
to Circulation Desk.

Renewals and recharges may be made 4 days prior  
to due date.

**ALL BOOKS ARE SUBJECT TO RECALL 7 DAYS  
AFTER DATE CHECKED OUT.**

APR 9 1992  
REC. DESK

**LIBRARY USE**

**JAN 17 1992**

**AUTO DISC.**

**JAN 17 1992**

**CIRCULATION**

LD21—A—40m—12,'74  
(S2700L)

**General Library  
University of California  
Berkeley**

U.C. BERKELEY LIBRARIES



C022724191

