THE THEORY AND PRACTICE

OF THE

ART OF DESIGNING

FANCY COTTON & WOOLLEN CLOTHS

FREDERICK T. ASHTON.

ILLUSTRATED.

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THE

THEORY AND PRACTICE

OF THE

ART OF DESIGNING

FANCY COTTON AND WOOLLEN CLOTHS

FROM SAMPLE.

GIVING FULL INSTRUCTIONS FOR REDUCING DRAFTS; AS WELL AS THE
METHODS OF SPOOLING AND MAKING OUT HARNESS FOR CROSS
DRAFTS AND FINDING ANY REQUIRED REED; WITH CAL-
CULATIONS AND TABLES OF YARN.

By FREDERICK T. ASHTON, DESIGNER,

WEST PITTSFIELD, MASS.

WITH FIFTY-TWO ILLUSTRATIONS.

_____

PREFACE.

THE author, feeling a full sense of his want of ability in book making, offers, as his apology for this effort, his earnest conviction of the necessity for such a work, and his belief in the fact that the books already issued as guides to the art of designing are generally of little or no value. He trusts that the present volume will be found of practical use to all weavers and manufacturers.

FREDERICK T. ASHTON.

WEST PITTSFIELD,
   Feb. 15, 1874.

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DESCRIPTIONS OF ILLUSTRATIONS.

CONTENTS.

DESIGNING

FANCY COTTON AND WOOLLEN CLOTHS.

IT is not within the scope of this work to give a history of the art of weaving, nor to descant upon its practice, as that can only be acquired at the loom. The author designs solely to teach the art of Preparing the Work for the Loom.

The first thing to consider will be what is called a

PICK OUT OR DRAFT.

When a draft is required, examine the cloth to see if there is any nap on the back of it; if there is, it should be burned off by means of a lighted match, care being taken not to burn the threads. If the sample should be a cotton pattern, a magnifying glass must be used. Next, remove as many of the filling threads as will leave about one-eighth of an inch of fringe. If there are any double and twist threads in the warp or filling, always commence with them. Remove as many of the warp threads as of the filling. When raising the threads, be careful not to split those of the warp. Now, having the sample prepared, take it in the left hand between the forefinger and thumb, holding it so that the second finger may secure the threads as they are picked out.

Commence at the right-hand side of the sample. Note down on

3 (9)

the designing paper all the threads on the filling, and call them so many threads *on ;* and all the threads under the filling, call them so many threads *off.* Leave as many blank checks as there are threads under the filling. Continue to work thus, until the pattern repeats itself in both warp and filling, and the draft is complete.

Sometimes, however, there are repeats in samples; these can be found by taking out two threads more than the pattern so called, and if both repeat, then the draft is correct, but if only one repeats, trace the draft until both warp and filling repeat.

The next thing is to reduce the draft. At this point, do not forget that it is the filling that has been picked out, therefore, after the draft is complete, turn it round one square from right to left, and let the reduction begin at those lines representing the warp. This will be better understood by a reference to Diagrams 1st and 2d. This is a fine stripe and is got out on twelve bars or threads in the warp, and four in the filling; the warp is eight of black and four of white, the filling is pick and pick, black and white. The draft is reduced to its lowest term, four harnesses; the first eight threads are reduced to two harnesses, the ninth is called three; the tenth, four; the eleventh, three; and the twelfth, four.

Sometimes harnesses are brought forward, and again they are carried back, as will be shown by example in a future page. Strict care must be taken that the threads are drawn into the heddles as indicated in each harness, otherwise the work will be a failure.

The next thing is to make the chain draft for the loom. To do this, bring down the line of dots called one, just as they are, then that called two, then three, then four, and the chain is formed to weave the pattern.

The reader must understand, in studying these drafts, that no attention has been given to that part of the cloth known as the selvedge or listing, as every designer consults his own taste in these things.

DIAGRAM 1.

		12
		11
		10
		9
		8
		7
		6
		5
		4
		3
		2
		1

1 2 3 4   Filling Threads.

Front towards you when picking out. Turn one square from right to left to reduce.

DIAGRAM 2.

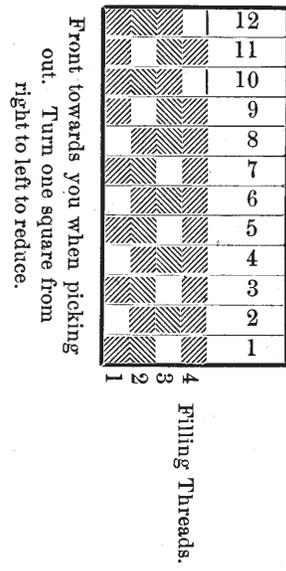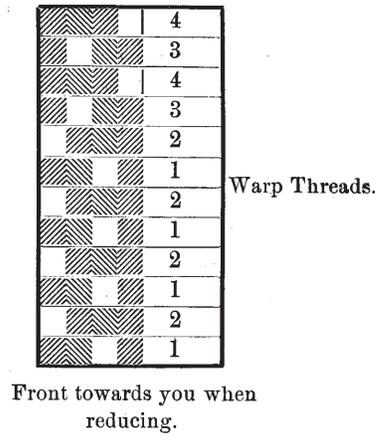| | | 4 |
		3
		4
		3
		2
		1
		2
		1
		2
		1
		2
		1

Warp Threads.

Front towards you when reducing.

To Find the Quantity of Wool Required to Make a Certain Number of Yards of Cloth.

Suppose it is required to make five warps, each three hundred yards in length; the yarn to be spun six runs to the pound, the filling to be as fine as the warp, and to be woven according to draft No. 1.

First, ascertain how many threads there are to the inch in the warp. Multiply this by 27, that being the standard width for narrow cassimeres when finished. Suppose the sample contains 80 threads to the inch—

then $80 \times 27 = 2160$ threads in the warp.

300 yards length of warp.
_____

648,000 length of one warp reduced to one thread.
5 number of warps.
_____

3,240,000 five warps reduced to one thread.

Divide this by 1600, that being the number of yards of yarn in one run.   1600)3,240,000(2025 runs of yarn to make five warps.

3,200
_____

4000
3200
_____

8000
8000
_____

To find the number of pounds of wool to make these warps: Divide the number of runs by six, that being the size of yarn required.   6)2025
_____

$337\frac{1}{2}$ pounds of wool required.

Add to this from 10 to 12 per cent. for loss and waste.

Next, to ascertain the quantity of wool required for the filling. Find how many picks there are to the inch, which may be done by counting the threads in one inch; then multiply this by 36.

Say 72 picks in one inch.
      36 inches in one yard.
      ———
     432
     216
     ———
    2592 picks in a yard.
     300 length of warp.
    ———
 777,600 picks in a warp.
       5 warps.
 ———
3,888,000 number of picks in all.

Now, as each pick is one yard, this gives the number of yards of yarn required to fill the warps.

To find the amount of wool, reduce it to runs by dividing by

1600)3,888,000(2430 number of runs.
    3,200
    ———
     6880
     6400
     ———
      4800
      4800
      ———

Divide this by 6 to reduce it to pounds.   6)2430

                                        405 pounds of wool.

Add the same percentage for loss and waste.

    $337\frac{1}{2}$ pounds for warps.
    405   pounds for filling.
    ———
    $742\frac{1}{2}$
     $74\frac{1}{4}$ add 10 per cent.
    ———
    $816\frac{3}{4}$ total lbs. clean wool required.

After the yarn is spun, the next thing to be done is spooling it for the dressing frame. Spoolers are so adjusted as to wind sixty yards to each hole on the clock, and thirty yards to each cog or tooth on the wheel. Hence, it will be seen how to calculate the length of warps.

Suppose one warp containing 2160 threads is required, to be dressed on six sections from nine spools of forty threads each.

6)2160 threads in the warp.

9)360 threads in each section.

40 threads on each spool.

Suppose the warp to be three hundred yards long, then multiply the length of the warp by the number of sections in the warp, divide the product by 60, and the result will be the number of holes of yarn on each spool.

Example: 300 length of warp.

6 number of sections.

Yards of yarn to each hole 60)1800

30 number of holes of yarn on each spool.

As patterns differ, it will be necessary to explain the methods of spooling as we proceed. We will suppose the above warp ready for the threads to be drawn into the heddles.

Next, it will be necessary to see how many harnesses we shall want, and how many heddles on each harness. As this warp is calculated for the first draft, we shall commence with that. Observe that the straight draft is 48 bars in length, or there are 48 threads in the warp, and 24 in the filling, to make the pattern. It is generally called so many bars warp and filling. The draft, it will be seen, is reduced to eight harnesses. The method of reduction should now be explained. The first bar (see the draft) is called one; the

4

next two; the third one, because it is like the first in all its dots; the fourth two, being like the second; the fifth three; the sixth four; the seventh three; the eighth four. Continue thus to the end.

We shall see, however, that it is not always best to reduce all drafts to their lowest terms.

After the draft is numbered, it becomes necessary to take a draft for the loom; this is called the reduced draft.

Mark on the designing paper, the lines called one, then those called two, then three, without regard to any that are between them; then four, five, six, seven, and eight. This makes the draft for the person who is to make the chain.

Now we must make up a set of harnesses for this draft. On reference to the straight draft, it will be observed that there are six bars marked one, six marked two, six marked three, six marked four, eight marked five, eight marked six, four marked seven, and four marked eight. Divide the number of threads in the warp by the number of threads in the pattern. Example:—

<div align="center">

Threads in warp.

Threads in the pattern 48)2160(45 patterns in the piece.

192
———
240
240

</div>

Now as the first bar or harness has 6 threads to the pattern, therefore the number of heddles for this harness must be 6 times 45, or 270.

The second, third, and fourth harnesses have each the same number, therefore, multiply 270 by 4, equals 1080, number of heddles on the four front harnesses. The fifth has eight threads, which multiplied by 45, gives 360, number of heddles for that harness, and as the sixth has the same, multiply this by two, and we have 720 heddles for these two harnesses. The seventh and eighth have four each. 45 multiplied by 4 makes 180; multiply this by 2 gives 360 heddles for these two. Adding them together—

360
720
1080
———

we have 2160, thus proving that the harnesses are correct.

In order to draw the threads into the heddles, by referring to the reduced draft, it will be found like the straight draft, merely reduced; and the threads must be drawn in as indicated by the draft.

If this warp is reeded six threads in a dent and woven 36 inches wide, a No. 10 reed will be required.

Example: Threads in a dent 6)2160 threads in the warp.
———

Width of cloth 36)360 dents in the reed.
———

10 No. of reed.

If reeded four threads in a dent, a No. 15 reed will be required.

Example: Threads in a dent 4)2160 threads in the warp.
———

Width of cloth 36)540 dents in the reed.
———

15 No. of reed.

DRAFT No. 2.

This draft is got out on thirty-two bars or threads in the warp, and thirty-two in the filling. It is a beautiful style of goods for spring. This draft can be reduced to seven harnesses, but as it is not always best to reduce all drafts to their lowest terms, this one is reduced to ten harnesses. It will be observed that the first bar would have eight threads on it, or, in other words, there would be one-fourth of the whole warp on the first harness; consequently, it would be crowded, which is one objection to the reduction of all drafts to their lowest terms. But other reasons are to be considered. Sometimes the warp is not so smooth as it might or ought to be, and if the harness were crowded, the warp would chafe and break, making trouble all the time that warp is in the loom. On reference

to the straight draft, it will be noticed that I call the second, third, and fourth bars three, and the fifth bar two, for the reason that the first and fifth are alike all the way through the draft. Therefore it is in order to have those two bars together, that we reduce the draft in this way. Care should, however, be taken that the warp is drawn into the harnesses, just as the draft is reduced, otherwise the work will be a failure. Suppose the warp contains fourteen hundred and forty threads dressed on four sections, how many threads will there be in a section, and how many spools must there be of forty threads each to dress this warp?

Example: No. of sections 4)1440 threads in a warp.

Threads on a spool 40)360 threads on a section.

9 spools.

Then, according to the dressing draft, it appears that there are nine threads to the pattern, five of gray and four of white; hence the white will be in proportion as four is to nine.

Example: 360 threads on a section.

4 white threads to the pattern.

9)1440

160 white threads in each section.

Subtract this number from 360, and the remainder will be the number of gray threads.   360

160

200 gray threads.

Divide these two numbers by 40, the number of threads required on each spool, and the result is the number of spools necessary to make the warp.

40)160 white threads.   40)200 gray threads.

4 spools of white.   5 spools of gray.

The next thing will be to make out a set of harnesses for this draft. You will see that there are 32 threads in the warp to the pattern. The first two harnesses contain four threads each. The other eight have but three to the pattern. Therefore, the first two harnesses must each have $\frac{4}{32}$ of 1440, which is 180 heddles on each of the two front harnesses. The other eight will have each $\frac{3}{32}$ of 1440, which will be 135 heddles. To find if this is correct, divide the number of threads in the warp by the number of threads in the pattern.

<div align="center">Threads in the warp.</div>

Example: Threads in pattern 32)1440(45 number of patterns in

<div align="center">

128

———

160

160

</div>
the piece.

Therefore 45 is $\frac{1}{32}$d of 1440, and as the draft is reduced to ten harnesses, and as the two front harnesses each have four threads, and the other eight have each three threads to the pattern, the heddles on each harness will be as follows:—

Example: 45 patterns in the piece.

  4 threads to the pattern on first harness.

  ———

 180 heddles on first harness.

  2 harnesses.

  ———

 360 heddles on the two front harnesses.

The eight back harnesses have each $\frac{3}{32}$ds of 1440; therefore—

Example: 45 patterns in piece.

  3 threads to the pattern.

  ———

 135 heddles on each back harness.

  8 harnesses.

  ———

1080 heddles on the eight back harnesses.

5

Recapitulation: On two front harnesses 360 heddles.
On eight back   do.   1080   do.
_____
Proof   1440

After the warp is drawn into the harnesses, the next thing is to reed the warp, and as this is a plain warp, or, in other words, it is all single yarn, we will suppose the warp to be woven 36 inches wide, and to be reeded four threads in a dent. Divide the number of threads in the warp by 36; divide that by 4, and the result will be the reed required.

Threads in warp.

Example: Width 36)1440(40 threads to the inch.
144
_____

Threads to the dent 4)40
___

10 number of reed required.

The method of drawing the warp into the harnesses is very simple. By referring to the draft, it will be seen that there is one thread on the first harness, then three on the third; then one on the second and three on the fourth; then one on the first and three on the fifth; one on the second and three on the sixth; one on the first, three on the seventh; one on the second, three on the eighth; one on the first, three on the ninth; one on the second, three on the tenth. Repeat this all through the warp, and when completed, it is ready for the loom.

Dressing Draft.	Weaving Draft.
2 threads of gray, 5 runs.	1 thread double and twist 3-ply, 1 red, 1 black, 1 white, 7 runs.
1 thread of white, 5 "	1 thread single white, $5\frac{1}{2}$ runs.
2 threads of gray, 5 "	1 3-ply, 1 red, 1 purple, 1 black, each 7 runs.
4 threads of white, 5 "	5 white single, $5\frac{1}{2}$ runs.
9 threads to the pattern.	8 threads to the pattern.

The double and twisted threads are twisted together at one twisting, eight turns to the inch. By referring to the reduced draft, you will find the chain to weave the above sample.

No. 3 is a splendid pattern. It is gotten out on 28 bars in the warp, and 24 in the filling, and can be reduced so as to weave it on eight harnesses. A reference to the draft will show that there are two chains, and also the method of reducing to make these two chains. Be sure to draw the warp into the harnesses according to the draft selected, or the work will be a failure.

The warp contains 1260 threads, dressed on five sections, from seven spools, each containing 36 threads.

Example: Number of sections 5)1260 threads in warp.

252 threads on each section.

Divide by 7.

Number of spools 7)252

36 threads on each spool.

It must be remembered that there are four double and twist threads in the pattern, and as there are 28 threads in the pattern, it will be seen that 4 is one-seventh of 28, therefore the dresser will want six spools of single, and one double and twist; the single to be white, four runs to the pound; the twist to be two-ply, one red and one white, each five runs to the pound. It is not necessary that all the twist should be of the same colors; there might be four different colors on the same spool, as there are in the pattern. The reader will observe the two methods of reducing this draft. The first is the straight draft. No. 2 is the straight draft reduced to eight harnesses. No. 3 is the straight draft reduced to ten harnesses. This pattern can be woven on either of these drafts, but it will be seen that No. 3 is the better of the two, for the reason that it is not crossed up so much as No. 2, and is better for the weaver in every way. We will therefore take the ten harness draft, and make up

a set of harnesses for it.   Remember that it is dressed from seven spools, six of single, and one double and twist.   According to this, the dressing draft is seven threads to the pattern, but the loom draft is 28 threads to the pattern.   Be careful not to take one for the other.

Threads in warp.

Example: Threads in pattern 28)1260(45 is $\frac{1}{28}$ of 1260;

$$\frac{112}{}$$

140
___
140

hence, as there are 4 threads on each of the six front harnesses, and but one on each of the four back harnesses, it follows that the first six will each have 6 times 45, and the other four will have but 45 heddles on each harness.

Example: 45 patterns in the piece.
Number of threads in each 4 of the 6 front harnesses.
___

180 heddles on each harness.
6 number of harnesses.
___

1080 total on the 6 front harnesses.

Number of threads on each of the back harnesses is 45, which are all double and twist; therefore, multiply this by 4, and the result will be the number of heddles required.

Example: 45
4
___

180 heddles for back harnesses.
1080 heddles for front harnesses.
___
1260 proof.

We will next proceed to reed this warp.   In order to have the pattern come out of an equal width in the reed, there being seven threads to the pattern, and 1260 threads in the warp, dressed six of

single, and one double and twist, divide 1260 by 7; this will give the number of patterns in the warp. Multiply this by the number of dents to the pattern, which will give the number of dents required. Next divide by 36, the width of the cloth, and we obtain the number of the reed required.

Threads in warp.

Example: Threads in pattern 7)1260

180 patterns in the piece.

Now, as there are seven threads to the pattern, reed it four single in one dent, and two single and one double and twist in the next.

180 patterns in the piece.
2 dents to the pattern.

Width 36)360 dents required in the reed.

10 number of reed required.

No. 4 is a basket check, and is gotten out on 28 bars, both in warp and filling. It is a very good pattern. The sample is light gray, 24 single threads, 4 runs to the pound, and 4 double and twist threads in the pattern. The twist is two-ply, one white and one black, each five runs to the pound, twisted eight turns to the inch. The straight draft is reduced to its lowest term, which is sixteen harnesses, with two pick in a shed, except when the checking comes in, and then but one pick in a shed, as may be seen by reference to the draft. This warp contains 1680 threads, dressed on six sections from seven spools of 40 threads each.

Threads in warp.

Example: Sections in warp 6)1680

280 threads in each section.

Divide by 40 to ascertain the number of spools required.

40)280

7 spools.

6

Hence it will be seen that the dresser will want seven spools, as before stated, to dress this warp. Now, as there are four double and twist threads in the pattern, and 24 single, it will be seen that the dresser will require six spools of single yarn and one double and twist in order to bring it out correctly. It will be seen on the draft that there are two bars alike all the way through, except where the checking comes in; that is, where the double and twist is, and by referring to the reduced draft, it will be seen that I have but one of each all the way through. I think this will give a better idea of the method of reducing drafts than any other, hence I call the attention of the learner to the method of drawing the warp into the heddles. There are two threads drawn into each of the first twelve harnesses, just as the straight draft is reduced. Then one on each of the other four, which makes the 28 threads in the pattern. We will make out a set of harnesses for this pattern. There are 1680 threads in the warp, and 28 in the pattern; divide the threads in the warp by the threads in the pattern, the result will be the number of patterns in the piece.

<div align="center">Threads in warp.</div>

Example: Threads in pattern 28)1680(60 patterns in piece.

<div align="center">168</div>

Multiply this by 2, because there are two threads on each harness.

<div align="center">60

2

————

120 number of heddles on each of the 12 front harnesses.

12

————

1440 number of heddles on 12 harnesses.</div>

On the four back harnesses there is but one thread each to the pattern. There will be but 60 heddles on each of the four back harnesses.

Example: 60

        4 number of back harnesses.
        ———

     240 heddles on 4 back harnesses.
   1440 heddles on 12 front   "
       ———

   1680 proof.

The next thing is to find the reed for this pattern. Divide the number of threads in the warp by the threads in the pattern, multiply that by the number of dents in the pattern, divide that by the width of the cloth, and we have the reed required.

<div align="center">Threads in warp.</div>

Example: Threads in pattern 28)1680(60 patterns in piece.

<div align="center">168</div>

Now, if it is to be reeded 4 threads in a dent, that will give seven dents to the pattern; multiply 60 by 7, which will give the number of dents in the reed.

Example: 60 patterns in piece.
        7 dents in pattern.
        ———

Width 36)420 dents in reed.
        ———

$11\frac{2}{3}$ reed;

but as reeds are made so as to come even, it will be right to take a number 12, or a number $11\frac{1}{2}$.

No. 5 is gotten out on 22 bars in the warp and 36 in the filling; the warp and filling are made of single yarn: there are six white threads, two in an eye; then one black, one white, one black, one white, one black; then six white, two in an eye, then one black, one white, one black, one white, one black. The yarn is six runs to the pound, both warp and filling. Cloth made after this draft is intended for ladies' cloaking, and is a splendid pattern. The draft is reduced to ten harnesses, but can be reduced to eight; but there would be so much yarn crowded on the two front harnesses that it would be

hard on the warp; therefore it is better, both for the weaver and the yarn, to weave it on ten harnesses. The four front harnesses will have all the white threads, and the six back harnesses will have the six black threads. The warp contains 1320 threads, dressed on six sections from six spools, five containing 40 threads each, and one of 20 threads.

Example: Section 6)1320 threads in warp.
                         ———
                         220 threads in each section.

It will be remembered that there are 22 threads in the pattern; six are black, sixteen are white; therefore there will be 160 white threads and 60 black ones in each section. Divide 160 by 40, and we have four spools of white; then divide 60 by 40, and we have one spool of black and 20 over, which must be spooled separately in order to make the draft come out correctly.

Threads in a section.
Example: White 22 : 220 : : 6 black.
                         6
                         ———
                 22)1320(60 black threads to a section.
                    132
Subtract 60 from 220
                    60
                    ———

and we have 160 the number of white threads to a section.

To make up a set of harnesses for this draft, divide the number of threads in the warp by the number of threads in the pattern.

Threads in warp.
Example: Threads in pattern 22)1320(60 patterns in the piece.
                         132

According to the cross draft, there are four threads on each of the four front harnesses, and one on each of the six back harnesses.

Example: 60 patterns in piece.
　　　　　4 threads on each front harness.
　　　　　────
　　　240 heddles on each front harness.
　　　　　4 number of harnesses.
　　　　────
　　　960 number of heddles on four front harnesses.
Now, as the six back harnesses have but one thread each, multiply
60 by 6.　　　60 heddles on each back harness.
　　　　　　　6 back harnesses.
　　　　　────
　　　360 heddles on six back harnesses.
　　　960 heddles on four front harnesses.
　　　────
　　1320 proof.

The reeding of this draft will be different from those preceding
it; for, as there are 22 threads to the pattern, there cannot be an
equal number of threads in each dent. We will therefore reed it
thus: 4, 4, 4, 4, 3, 3, which will give the 22 threads to the pattern,
and six dents to the pattern. Then divide the number of threads
in the warp by the number of threads in the pattern, multiply that
by the number of dents, divide by the width of the cloth, and the
result will be the reed required.

　　　　　　　　　　　Threads in warp.
Example: Threads in pattern 22)1320(60 patterns in warp.
　　　　　　　　　　　　　132　　6 dents in pattern.
　　　　　　　　　　　　　────
　　　　　　　　Width 36)360 dents in reed.
　　　　　　　　　　　　　────
　　　　　　　　　　　　　10 reed required.

No. 6 is gotten out on 22 bars warp and filling. This is also
designed for ladies' cloaking. There are ten white single threads,
six runs to the pound, and one double and twist, three-ply, one white
and one black twisted, eighteen turns to the inch, and then twisted
with one white, six turns to the inch. Each thread is to be six

7

runs to the pound.   Then there are ten white single, and one twist like the others, which completes the pattern.   There are five picks in a shed of single white, and one pick in a shed of twist.   The draft is reduced to 12 harnesses, the double and twist on the back harnesses. This draft can be reduced to four, but it is better in 12 harnesses.

The warp contains 1760 threads, dressed on four sections from eleven spools of forty threads each.

Example: Sections 4)1760 threads in warp.

440 threads in each section.

As there are two threads of twist, and twenty of single white, one-eleventh is double and twist.   Now divide by 40 to get the number of spools.

Example: Threads on a spool 40)440 threads on a section.

11 number of spools.

Now, as one-eleventh is twist, it will take ten spools of white single, six runs to the pound, and one spool of double and twist, three-ply, six runs to the pound.   The back chain will give ten picks of single, five in a shed, then one of twist, then ten of single, five in a shed, then one of twist, which completes the pattern.

We will next make out a set of harnesses for this draft.   Divide the number of threads in the warp by the number in the pattern; multiply by the number of threads to be drawn into the harnesses, as indicated on the drawing-in draft.   It will be seen that the first ten harnesses have each two threads, and the two back harnesses have but one thread each to the pattern.

Threads in warp.

Example: Threads to pattern 22)1760(80 patterns.

176   2 threads on front harnesses.

160 heddles on   "   "

10 front harnesses.

1600 heddles required.

The two back harnesses having each one thread, will give 80 heddles on each, or 160 heddles on both back harnesses.

1600 heddles on ten front harnesses.

160 heddles on two back harnesses.

1760 proof.

The method of reeding this draft is somewhat different from the other. It must be reeded 4, 4, 3, 4, 4, 3. That is, two dents of four threads each, one of three, two of four, one of three, giving six dents to the pattern.

Threads in warp.

Example: Threads in pattern 22)1760(80 patterns.

176

Multiply by the number of dents, divide by the width of the cloth, and you will have the reed required.

80 patterns.

6 dents.

Width 36)480(13$\frac{1}{3}$ or say 13$\frac{1}{2}$ reed.

36

120
108

12
—— = $\frac{1}{3}$
36

No. 7 is gotten out on 36 bars warp and filling, and is reduced to 12 harnesses. There are sixteen threads of white, two of pink, four of white, eight of pearl drab, four white, two pink, all single. The filling is four white, two pink, sixteen white, two pink, four white, and eight pearl drab, all single. The yarn is six runs to the pound. The warp contains 1800 threads dressed on five sections from nine spools of forty threads each.

Example: Sections 5)1800 threads in warp.

$\overline{}$

360 threads in a section.

Divide this by the number of threads on each spool, and we have the number of spools.

40)360

$\overline{}$

9 spools.

It will be remembered that there are twenty-four threads of white, which is two-thirds of the pattern; two-thirds of nine is six, hence you want six spools of white. There are eight pearl drab and but four of pink, and as eight is two-thirds of twelve, it will require two spools of pearl drab, and one of pink.

Example: 6 spools white, 40 threads each, = 240

2   "   pearl drab, 40 "   "   80

1 spool pink, 40   "   40

$\overline{}$

Proof   360

In making out the harnesses for this pattern, by reference to the draft it will be·observed that there is but one thread on each of the second, third, eighth, and ninth harnesses, and on the others there are four threads each; therefore, the first, fourth, fifth, sixth, seventh, tenth, eleventh, and twelfth will each have $\frac{4}{36}$ of 1800, and the second, third, eighth, and ninth will each have $\frac{1}{36}$ of 1800.

Threads in warp.

Example: Threads in pattern 36)1800(50 patterns in piece.

180

Multiply this by the threads on each harness.

50 patterns.

4 threads.

$\overline{}$

200 threads on each of the eight harnesses.

8 harnesses.

$\overline{}$

1600 heddles on eight harnesses.

Multiply 50 by four for the other harnesses having but one thread each.

$$50$$
$$\underline{4}$$

200 heddles on four harnesses.
1600 heddles on eight harnesses.
$$\overline{}$$
1800 proof.

Reed this pattern four threads in a dent. As there are 36 threads to the pattern, divide the number of threads in the warp by the number in the pattern.

<div align="center">Threads in warp.</div>

Example: Threads in pattern 36)1800(50 patterns.
$$180$$

Multiply by nine, as there are nine dents to the pattern, divide by 36, the width, and the result will be the reed.

50 patterns.
9 dents.
$$\overline{}$$

Width 36)450($12\frac{1}{2}$ reed required.
$$36$$
$$\overline{}$$
$$90$$
$$72$$
$$\overline{}$$
$$18$$
$$\frac{}{36} = \frac{1}{2}$$

No. 8 is gotten out on sixteen bars warp and filling, and resembles No. 1. But it will be seen that No. 1 is gotten out on forty-eight bars. This pattern looks well in any colors, but looks best when made of double and twist, say eight runs to the pound single, twisted two-ply, eighteen turns to\the inch. Color, pearl drab.

The sample from which this is copied is single yarn, three runs

8

to the pound, warp and filling.   The warp contains 1600 threads, dressed on four sections, from ten spools of 40 threads each.

Sections 4)1600 threads in warp.

Spools 10)400 threads in section.

40 threads on each spool.

The draft is reduced to its lowest terms, and the harnesses will have an equal number of heddles, as there is an equal number of threads in each harness.

It will be seen that the draft is reduced to eight harnesses, with two threads on each.   Now divide the number of threads in the warp by the number of harnesses, the result will be the number of heddles on each harness.

Harnesses 8)1600 threads in warp.

200 heddles on each harness.

Reed this draft four threads in a dent.   Now divide the number of threads in the warp by the number in the pattern; multiply by the number of dents, divide by the width, and the result will be the reed.

Threads in pattern 16)1600 threads in warp.

100 patterns.
4 dents.

Width 36)400(11$\frac{1}{9}$, say reed 11.
36

40
36

4
—— $= \frac{1}{9}$.
36

No. 9 is woven on sixteen harnesses, if woven on a straight draft. There are two distinct styles of weaving, a rib and a diagonal. It is reduced to its lowest terms. The rib is woven on four harnesses, and the diagonal on eight. The warp and filling are single yarn, the warp black, five runs to the pound; the filling is three picks black, single, four runs to the pound, and one pick crimson same size as the black. The diagonal has four repeats. The warp contains 1680 threads, dressed on six sections from seven spools of forty threads each.

Example: Sections 6)1680 threads in warp.

Spools　　7)280 threads on each section.

40 threads on each spool.

In making out the harnesses, we must observe that the four front ones have but two threads each, and the eight back ones have four threads each. Divide the number of threads in the warp by the threads in the pattern.

Threads in pattern 40)1680

42 patterns in the piece.

Therefore 42 is $\frac{1}{40}$ of 1680, and as the four front harnesses have two threads each to the pattern, these four harnesses will have $\frac{2}{40}$ of 1680, or 84 heddles on each, making 336 heddles on the four front harnesses. The eight back harnesses will have $\frac{4}{40}$ of 1680, or 168 heddles on each, giving for the eight, 1344 heddles, and the total number of heddles, adding the two amounts, will be 1680.

Reed this warp four in a dent. Multiply the number of patterns in the piece, as already found, by the number of dents to the pattern, divide by the width, which will give the reed required.

42 patterns.

10 dents.

———

Width 36)420(11⅔, or a No. 12 reed.

36

———

60

36

———

24

—— = ⅔

36

No. 10 is gotten out on twenty bars warp and filling. It is a basket weave. The warp is black, five runs to the pound. It is woven with a back; the yarn is two and a half runs to the pound. The filling for the face is twist, two-ply, each seven runs, one black and one indigo blue. The draft shows that it has been reduced to its lowest term. The warp contains 2160 threads, dressed on six sections from nine spools of forty threads each.

Example: Sections 6)2160 threads in warp.

———

Spools 9)360 threads in each section.

———

40 threads in each spool.

To make out a set of harness for this draft, as there is an equal number of threads on each harness, we need only divide the number of threads by the number of harnesses, and the result is the number of heddles on each.

Thus we have 432 heddles on each harness.

But it would be better to weave this on ten rather than on five harnesses.

To reed this pattern, divide the number of threads in the warp by the number in the pattern, multiply by the number of dents, divide by the width of the cloth, and we obtain the reed.

Example: Threads in pattern 20)2160 threads in warp.

108 patterns.

4 dents.

Width 36)432(12 No. of reed.

36

72
72

No. 11 is gotten out on twelve bars in the warp and twenty-four in the filling. It is a diamond pattern; the warp and filling are the same both in size and color. The yarn is six runs to the pound, pearl drab color. The warp contains 1680 threads on six sections from seven spools of forty threads each.

Example: Sections 6)1680 warp.

Spools 7)280 threads in a section.

40 threads on a spool.

To make the harness for this draft, follow the rule as already so frequently given.

Example: Threads in pattern 12)1680 threads in warp.

140 patterns.

Now 140 is $\frac{1}{12}$ of 1680, and as the draft is reduced to its lowest term, which is seven harnesses, we find the first and seventh have each one thread to the pattern, while the others have each two threads; therefore, the first and seventh will each have 140 heddles, and the others each 280 heddles.

To reed this draft, divide the number of threads in the warp by the number in the pattern, multiply by the dents, divide by the width of the cloth, and we have the reed.

Example: 12)1680 threads in the warp.

140

9

Suppose we wish to reed this, four threads in a dent, that will give three dents to the pattern.

$$140$$
$$3$$
$$\overline{}$$

$36)420(11\tfrac{2}{3}$, or say reed $11\tfrac{1}{2}$
$$36$$
$$\overline{}$$
$$60$$
$$36$$
$$\overline{}$$
$$24$$
$$\frac{24}{36} = \tfrac{2}{3}$$

No. 12 is gotten out on sixteen bars in the warp and twenty-four in the filling, and is reduced to eight harnesses. The warp contains 1560 single threads, four runs to the pound, dressed two of brown and two of olive, all through the warp. The filling is two of brown four runs to the pound, then one of olive on the back two runs to the pound, two of olive four runs to the pound for the face. It is dressed on six sections from six spools of forty threads each, and one of twenty threads.

Example: Sections $6)1560$ threads in warp.

$40)260(6$ spools of 40
$$24$$
$$\overline{}$$
20 1 spool of 20

To make up the harness, proceed as before.

Example: Number of harnesses $8)1560$ threads in warp.

195 heddles on each harness.

Reed this four in a dent; and as there are sixteen threads to the pattern, there will be four dents. Now, find the number of patterns, multiply by the dents, divide by the width, and we have the reed.

Threads in pattern 16)1560(97½ patterns.

$$\begin{array}{r} 144 \\ \hline 120 \\ 112 \\ \hline \end{array}$$

$$\frac{8}{16} = \tfrac{1}{2}$$

97½

4 dents.

Width 36)390(10⅚, or No. 11 reed.

$$\begin{array}{r} 36 \\ \hline 30 \end{array}$$

$$\frac{30}{36} = \tfrac{5}{6}$$

No. 13 is gotten out in sixteen bars warp and filling, and is reduced to its lowest term, eight harnesses. It is a double cloth weave. The warp is one and one, black and white, and is alike on both sides, except that where the check is white on the face, it is black on the back. The check can be made any size according to taste. Many different styles may be woven from this weave. The filling is also one and one, black and white, five runs to the pound. The warp contains 1680 threads dressed on six sections from seven spools of forty threads each.

To make up a set of harnesses we proceed as before, and find there are 210 heddles on each harness.

To reed it, we follow the usual rule, and find that a No. 11½ or a No. 12 will do the work.

No. 14 is gotten out on twenty-eight bars in the warp and eight bars in the filling. It is a double cloth like the last, only that this is a stripe. Of the 28 threads to the pattern, 16 are dark brown, and 12 are black. The warp contains 1680 threads dressed on six sections from seven spools of forty threads.

We make out the harnesses as usual, and find that there are 210 heddles on each.

Reed it as before, giving a No. 11½ reed.

No. 15 is gotten out on sixteen bars warp and filling; it is also a double cloth. The warp is one of twist two-ply, white and black, twelve turns to the inch, then one single white, three and a half runs to the pound. The single goes on the back, and the twist on the face. The twist is seven runs single to the pound; the filling is the same as the warp. The draft shows that it is reduced to its lowest term, and again reduced to ten harnesses. The warp contains 1920 threads dressed on six sections from eight spools of forty threads each.

In making out the harnesses, we find there are 120 patterns in the piece, by the rule. Next, the draft shows that the fourth, eighth, ninth, and tenth have each one thread, while the other six have each two; then

$$
\begin{array}{r}
120 \text{ patterns.} \\
6 \text{ harnesses, each two threads.} \\
\hline
720 \\
2 \\
\hline
\end{array}
$$

1440 heddles on six harnesses.

Four harnesses have one thread each; hence 120 heddles on each, or 480 on the four.

$$
\begin{array}{r}
\text{Then } 480 \text{ heddles.} \\
1440 \quad \text{``} \\
\hline
1920 \text{ proof.}
\end{array}
$$

To make a set for the seven harness draft, we find the number of patterns, 120, is $\frac{1}{16}$ of 1920, and as the first three harnesses have each four threads, and the four back ones have but one, the result will be

$$\begin{array}{r}
120 \text{ patterns.} \\
4 \text{ threads.} \\
\hline
480 \text{ heddles.} \\
3 \text{ harnesses.} \\
\hline
1440 \text{ heddles on three front harnesses.}
\end{array}$$

Again : 120
4 harnesses.
———
480 heddles on four back harnesses.
1440
———
1920 proof.

Reed this four in a dent, and by the rule, we find that we require a $13\frac{1}{2}$ reed.

No. 16 is gotten out on forty-two bars in the warp and sixteen in the filling. It is all single yarn, six runs to the pound, of a pearl drab. There are two kinds of weaving in this pattern. It has a rib and a diagonal. There are four repeats in the diagonal to bring the chain out correctly. The warp contains 1932 threads, on six sections from eight spools of forty threads each. Here we see that there are two threads over, but they can be dressed off the bobbins, which is often done.

In making out the harnesses, we find there are 46 patterns, which is $\frac{1}{42}$ of 1932. Now, the first and sixth harnesses have but one thread each, and the second, third, fourth, and fifth have each two, while the eight back harnesses have four each; hence the heddles will be—

First and sixth 46 each.
2
—
92 heddles.

10

Second, third, fourth, and fifth each two threads, gives

$$46$$
$$2$$
$$\overline{}$$

92 heddles on each, or

$$4$$
$$\overline{}$$

368 harnesses on the four.

Again, the eight back harnesses have each four; this gives

$$46$$
$$4$$
$$\overline{}$$
$$184$$

8 harnesses.

$$\overline{}$$

1472 heddles on eight.
368   "   on four.
92   "   on two.

$$\overline{}$$

1932 proof.

This draft is reduced to its lowest term, fourteen harnesses.

Reed it six threads in a dent, which gives seven dents to the pattern.   Then, by the usual rule, we find it will require a No. 9 reed.

No. 17 is gotten out on 24 bars warp and filling.   The draft is reduced to twenty harnesses.   It will be seen by the reduced draft or loom chain, that the bars that ought to be called five are called seventeen; this is done in order to get the double and twist threads all together on the back harnesses.   The tenth and fifteenth threads are called eighteenth and nineteenth.   It is thought best to have these threads by themselves, as they are all twist threads, rather than to have them mixed up with the others.

The warp contains 2160 threads, one-third double and twist.   It is dressed four single, five runs to the pound, tan color, and two double and twist two-ply, fourteen turns to the inch, one brown and

one white, each seven runs to the pound. The filling is the same as the warp, 66 picks to the inch. The warp is dressed on six sections from nine spools of forty threads each.

To make out the harnesses, we proceed as before, and find there are 90 patterns in the piece, which is $\frac{1}{24}$ of 2160. Now, as the first sixteen harnesses have but one thread each, and the four back ones have two threads each, we find the heddles

<div align="center">

90 heddles on each.

16 harnesses.

———

1440 on 16 front harnesses.

</div>

Then four harnesses, each two threads, give

<div align="center">

90

2

———

180

4

———

720 heddles on 4 back harnesses.

1440 " on 16 front "

———

2160 proof.

</div>

Reed this four dents, five threads each, and one of four threads, which will give five dents. Then, by the rule, we ascertain that we require a reed No. $12\frac{1}{2}$.

No. 18 is gotten out on sixty bars in the warp and twenty in the filling. It is a ten-harness doeskin, with a stripe. The doeskin part of the draft is woven on ten harnesses, and the stripe is reduced so as to weave on five harnesses, which makes fifteen harnesses in all. The warp contains 1920 threads, and is dressed on six sections from eight spools of forty threads each. The warp is black, five runs to the pound single, with the exception of eight threads that are twisted with white silk, and two of orange color to dot the stripe.

Now we find there are 320 threads in a section, but we must

remember that there are eight double and twist threads, and as there are eight spools of forty threads each, one would have to be double and twist, and seven single, including the two colored ones which must be spooled on one spool, and one spool of silk twist.

To make out the harnesses, we will observe that the ten front harnesses have each five threads, and the five back ones have each two threads to the pattern.

Patterns in the piece.

Threads in pattern 60)1920(32, or $\frac{1}{60}$ of 1920.

$$180$$

$$\overline{}$$

$$120$$

$$120$$

Then as the ten front harnesses have five threads, this will be $\frac{5}{60}$, or 160 heddles, or 1600 to the ten.   The five back harnesses have but two threads each to the pattern; therefore, multiply thirty-two by two, and we obtain sixty-four, the number of heddles on each; then by five, giving 320 heddles on the back harnesses.

Reed this five in a dent, with twelve dents to the pattern.   Following the rule as before, we find a No. $10\frac{1}{2}$ reed will do.

No. 19 is gotten out on eighteen bars in the warp, and twenty-four in the filling.   It is reduced to twelve harnesses.   It is of single yarn, six runs to the pound, dark blue, the filling the same as the warp, except that every fourth pick is a light olive.   The warp contains 1440 threads dressed on six sections from six spools of forty threads each.

To make out the harnesses, it must be noticed that the third, fifth, seventh, tenth, eleventh, and twelfth bars have each one thread, while the first, second, fourth, sixth, eighth, and ninth have two threads each to the pattern.   By the rule, we find the number of patterns to be 80.   Then each of the first set as enumerated, having but one thread, will have 80 heddles, while the second set having

two threads will require 160 heddles, together making 480 for the six of the one set, and 960 for the six of the second set.

Reed this four in a dent, making four and a half dents to the pattern, requiring a No. 10 reed.

No. 20 is gotten out on thirty-two bars in the warp and twelve in the filling. The groundwork is single black, six runs to the pound, and the raised work is double and twist, two-ply black, seven runs to the pound. The raised work can be made of single yarn, but it would not have the lustre of that made of double and twist. The draft is reduced to its lowest term, eleven harnesses. The warp contains 1920 threads dressed on six sections from eight spools of forty threads each. The draft, however, calls for six spools of single, and two of double and twist. There are also two threads of red single to the pattern, drawn in on the fifth harness. To bring them in properly, dress them thus:—

> 4 threads black, single.
> 1 thread red,   "
> 14 threads black,   "
> 1 thread red,   "
> 4 threads black,   "
> 8   "   "   double and twist.
> ──
> 32

Now there are 320 threads in a section, and 32 in each pattern; this will give 10 patterns, and to find the number of red threads, as there are two to each pattern, we multiply 10 by 2, giving 20 red threads to each section. As the yarn is all of one size, the threads can be spooled together, one red, one black, all the way through.

The harnesses are made out as usual. There are 60 patterns in the piece, and as the first harness has two threads, that will give 120 heddles; the second with six will give 360 heddles; the third with seven will make 420 heddles; the fourth will be the same; the

11

fifth, sixth, and ninth will each have 120; the seventh, eighth, tenth, and eleventh will each have 60 heddles.

Recapitulation: No. of heddles		No. of harnesses	
No. of heddles	120	No. of harnesses	1
"	360	"	2
"	420	"	3
"	420	"	4
"	120	"	5
"	120	"	6
"	60	"	7
"	60	"	8
"	120	"	9
"	60	"	10
"	60	"	11

Proof   1920

Reed this thus: 6, 6, 6, 6, 4, 4; that is, six threads in a dent for four dents, then four in a dent for two dents, giving six dents.

By the rule, we find that a No. 10 reed is required.

No. 21 is a straight draft—that is, the draft cannot be reduced. It is called the star pattern. The star will be large or small, according to the size of the yarn. It is gotten out on twelve bars warp and filling, and is dressed six white and six black, seven runs to the pound, single. The warp contains 1920 threads; the filling is put in from 68 to 72 picks per inch. The warp is dressed on six sections from eight spools of forty threads each. To make out the harnesses, we follow the usual rule, and find that we want 160 heddles on each.

Reed it six threads in a dent, and we find as before, that a No. 9 reed will be necessary. Should a finer reed be required, it may be reeded four threads in a dent.

No. 22 is gotten out on thirty bars in the warp, and twelve in the filling. It is a raised figure. The rib is of single yarn, five runs to the pound. The raised figure is double and twist two-ply, seven runs to the pound, black. The draft is reduced to twelve harnesses.

The filling is single black, four runs to the pound, 65 to 70 picks per inch. The warp contains 1500 threads dressed on five sections from eight spools; seven with forty threads each, and one with twenty.

Example: Sections 5)1500 threads.

300 threads in a section.

It will be seen that there are twelve single threads to the pattern, and eighteen double and twist; therefore, as 12 is $\frac{2}{5}$ of 30, multiply 300 by 2 and divide by 5, and we obtain the number of single threads to the section, 120. Divide by 40, and we have 3, the number of spools of single yarn. Then subtract 120 from 300, and we have 180, the number of double and twist threads in each section. Again, divide by 40 and we have 4 spools and one of 20 threads, as called for by the draft.

We proceed as before, to make out the harnesses. We see that there are 50 patterns in the piece. The first, second, third, fourth, and ninth have each two threads to the pattern, which will be two-thirtieths of 1500, or 100 heddles. The fifth, eighth, tenth, eleventh, and twelfth have each three threads, making $\frac{3}{30}$, or 150 heddles. The sixth has but one, which gives 50 heddles, while the seventh has four, making 200 heddles.

Recapitulation: Harness No. 1 100 heddles.
" 2 100 "
" 3 100 "
" 4 100 "
" 5 150 "
" 6 50 "
" 7 200 "
" 8 150 "
" 9 100 "
" 10 150 "
" 11 150 "
" 12 150 "

Proof 1500

Reed this four threads in a dent, and, proceeding as before, we find a No. $10\frac{1}{2}$ reed to be required.

No. 23 is calculated for suitings. It is made of fine yarn, and will carry a very good lustre if made of twist. The figure will be large or small as the yarn is fine or coarse. It is gotten out on thirty-six bars warp and filling. The warp contains 1800 threads, single, black, six runs to the pound. The filling is the same in size and color. The warp is dressed on five sections from nine spools. The draft is reduced to its lowest term. In referring to the loom chain, it will be found to contain six bars for the harnesses, and thirty-six bars long. The harnesses will have an equal number of heddles, as there are an equal number of threads to each.

We make up the harnesses by the rule, and find that the number of heddles on each will be 300. It is reeded 6 threads in a dent, giving a No. $8\frac{1}{3}$ reed.

If reeded five threads in a dent, we require a No. 10 reed.

If four threads in a dent, we shall want a No. $12\frac{1}{2}$ reed.

No. 24 is a rib and a diagonal; it is gotten out on 38 bars in the warp, and 12 in the filling. The warp is double and twist two-ply, four and a half runs to the pound. The warp and filling are of one color, pearl drab. The draft is reduced to ten harnesses. The rib is reduced to four harnesses, and the diagonal is woven on six, making the ten. The warp contains 1140 threads, dressed on four sections from seven spools of 40 threads each. It will be seen that there are five threads over; these may be dressed off the bobbins placed on spindles on the spool frame for that purpose.

To make out the harnesses, we find the patterns in the piece, which amount to 30. It will be seen by the draft that the first four harnesses have each two threads, and the other six have each five threads to the pattern. Therefore, the first, second, third, and fourth harnesses will each have $\frac{2}{38}$ of 1140, which is 60, and the other six will have $\frac{5}{38}$, or 150 heddles.

Recapitulation: Harness No. 1   60 heddles.
	"	2	60	"
	"	3	60	"
	"	4	60	"
	"	5	150	"
	"	6	150	"
	"	7	150	"
	"	8	150	"
	"	9	150	"
	"	10	150	"

Proof   1140

Reed it three threads in a dent. Divide the number of threads in the warp by the width of the cloth, then by three, which gives a No. 10½ reed. This method is given to show the different ways to obtain the same result.

No. 25 is a diagonal stripe. It is gotten out on thirty-two bars in the warp and eight in the filling. The fine stripe is a kind of doeskin weave; the other is an eight harness diagonal. The fine stripe is double and twist two-ply, seven runs to the pound, olive and brown; the other is also double and twist two-ply, seven runs to the pound, dark brown. The filling is dark brown, single, three runs to the pound. The draft is reduced to its lowest term, sixteen harnesses. The warp contains 1440 threads dressed on six sections from six spools of forty threads each.

We make out the harnesses as before indicated, as the harnesses have an equal number of threads, and find 90 heddles on each.

Reed it four threads in a dent, which will give a No. 10 reed.

No. 26 is gotten out on sixteen bars in the warp and eight in the filling. The figure is woven on four harnesses, and the ground on four, making eight in all. The yarn for the figure is double and twist, and in order to make the pattern correctly, one-half of the twist must be twisted to the right, the other half twisted to the left.

12

It is two-ply, each seven runs to the pound; color stone drab. The yarn for the ground is single, five runs to the pound, of a slate color.

The draft is reduced to its lowest term, eight harnesses. The warp contains 1600 threads, dressed on five sections, from eight spools of forty threads each. Now, as there are eight double and twist threads and eight single, to the pattern, it will take four spools of single, and two spools of twist twisted to the right, and two twisted to the left.

Make out the harnesses as usual. We find the number of heddles on each is 200.

Reed it four in a dent, and we find a No. 11 reed will answer.

No. 27 is gotten out on nineteen bars in the warp and eighteen in the filling. It is a double cloth weave, with the appearance of having a raised rib. The draft shows that the weaving changes from the back to the face, and the face threads change to the back, thus forming a handsome stripe.

The warp has 1805 threads dressed on five sections from nine spools. One thread is left over, which can be dressed off a bobbin. This often occurs. The warp is dressed two of single pearl drab, five runs to the pound, and one double and twist two-ply, seven runs to the pound, slate color, all through the warp. The filling is the same as the warp, two of single and one of twist. As there are two single, and one double and twist, it will be necessary to have six spools of single, and three double and twist. The drafts show that there are two loom chains, one of fourteen harnesses, the other of ten. Take the draft of fourteen harnesses. We find there are 95 patterns in the piece, which is $\frac{1}{19}$ of 1805. Then the first, second, third, fifth, and sixth have each two threads; hence, the number of heddles for each will be 190, or 950 in all. The other nine having but one thread each, gives 95 heddles, or 855 in all; making together 1805.

Reed this as follows: There being nineteen threads to the pat-

tern, 5, 5, 5, 4, that is, five threads to three dents and four to the fourth. This, by the usual rule, gives a No. 10½ reed.

The other draft is crossed up so much that it would not be advisable to use it.

No. 28 is gotten out on sixteen bars warp and filling. The warp is single, black, five runs to the pound. The filling is one of single, and one of double and twist, two-ply. The single is five runs to the pound; the twist is one of black, five runs, and one of silk twisted, sixteen turns to the inch.

The draft is reduced to eight harnesses, its lowest term. The warp contains 1600 threads, dressed in five sections from eight spools of forty threads each.

In making out the set of harnesses, we see by the draft that each harness has an equal number of threads, giving 200 heddles to each.

Reed it four threads in a dent, and we find a No. 11 reed requisite.

No. 29 is a check, and is gotten out on sixteen bars warp and filling. The warp is one of double and twist two-ply, one black, one white, each seven runs to the pound; then one of white single, five runs to the pound, one of double and twist, one of white single, one of double and twist, one of white, one of double and twist, one of white. Repeat this; but in place of single white, take single black five runs to the pound. The filling is one of double and twist like the warp, then one of single white, one of double and twist, one single, one double and twist, one white, one double and twist, one white, then one of black single, one double and twist, one black, one twist, one black, one twist, one black, one twist; from which it will be seen that at every other check, there are two picks of double and twist, and at every other check, two picks of single, which gives a good check, and a diagonal at the same time.

The warp contains 1600 threads dressed on five sections from eight spools of forty threads each.

It must be remembered that the twist is one-half of the warp;

hence four of the spools must be double and twist, and two of single white, and two of single black.

The draft is reduced to eight harnesses, its lowest term. Now, by the rule, we have 200 heddles to each harness.

Reed it four threads in a dent, and we find a No. 11 reed is required.

No. 30 is a sixteen harness diagonal. The diagonal is large, and shows finely. The warp is black, four runs to the pound single. The filling is all twist, two-ply, one of black two runs to the pound twisted, with one of red four runs to the pound; thirty to thirty-four picks to the inch.

The warp contains 1440 threads, and is dressed on six sections from six spools of forty threads each.

To make out a set of harnesses for a straight draft, or one that cannot be reduced, we simply divide the number of threads by the number of harnesses, which gives 90 heddles to each.

Reed it four in a dent, which will give us a No. 10 reed.

No. 31 is a double wail diagonal. It is gotten out on twelve bars in the warp, and twenty-four in the filling. The warp is black, four runs to the pound single, and contains 1440 threads dressed on four sections from nine spools of forty threads each. The filling is one of twist, two-ply, each seven runs to the pound, one of black, and one of indigo blue, twisted eight turns to the inch, and one of single black, three and a half runs to the pound.

The reed is four threads to a dent, which gives a No. 10 reed.

We make up the harnesses as before, and find that there are 120 heddles on each.

No. 32 is a diagonal. It is gotten out on twelve bars in the warp, and thirty-two in the filling. The warp is single black, five runs to the pound. The filling is five runs to the pound single, and is woven seven picks of black, and one of brown; then seven picks of black, and one of purple.

The warp contains 1680 threads, dressed on six sections from seven spools of forty threads each.

By the usual rule, we find there are 140 heddles on each harness.

Reed it four threads in a dent, which gives a No. 12 reed.

No. 33 is a twelve harness diagonal. The chain is twenty-four bars long. This is a good style to make either for summer or winter goods.

The warp is single white, five runs to the pound. The filling two single white, and one twist, three-ply, two of white and one of purple, each five runs to the pound, twisted together at one twisting.

The warp contains 1680 threads, dressed in six sections from seven spools of forty threads each.

In making up the harnesses, we find there are 140 heddles on each.

Reed it four threads in a dent, and, by the usual method, we find a No. 12 reed is required.

No. 34 is gotten out on twelve bars in the warp and twenty-four in the filling. Both are made of five-run yarn, and look well in any combination. This warp is black, and the filling is three picks of black and one of red. The warp contains 1920 threads, dressed on six sections from eight spools of forty threads each.

The harnesses are made up in the usual way, having 160 heddles on each.

Reed it five threads in a dent, which will require a No. 11 reed.

No. 35 is gotten out on twelve bars warp and filling. The warp is all twist, three-ply, two of black each four runs, one of red six runs to the pound, twisted together twelve turns to the inch. The filling is all twist, two-ply, one of black four runs fine, and one of purple six runs fine, twisted six turns to the inch.

The warp contains 720 threads, dressed on three sections from six spools of forty threads each.

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The harnesses are made up as usual, there being sixty heddles on each.

Reed it two in a dent, which will require a No. 10 reed.

No. 36 is a twelve harness diagonal. The chain is twenty-four bars long. The warp is single, black, five runs fine. The filling is single, two picks of black, then one of purple, then one of crimson, each four runs to the pound.

The warp contains 1440 threads, dressed on six sections from six spools of forty threads each.

We make up the harnesses as usual. There are 120 heddles on each.

Reed it four in a dent, which gives a No. 10 reed.

No. 37 is gotten out on twelve bars in the warp, and twenty-four in the filling.

It is a diagonal, and looks well if properly finished. The warp is single white, five runs to the pound. The filling is three picks of white single, and one double and twist, three-ply, two white and one crimson, each six runs to the pound, twisted at one twisting, eight turns to the inch.

The warp contains 1680 threads, dressed on six sections from seven spools of forty threads each.

The harnesses are made out as before, each having 140 heddles.

Reed it four in a dent, with a No. 11½ reed.

No. 38 is gotten out on twelve bars in the warp and twenty-four in the filling. It is a fine diagonal, and looks well if made of fine yarn. This sample is seven runs fine for the warp, and for the filling there is one of twist two-ply, crimson and black, each seven runs fine, eight turns to the inch, and one of single black four runs fine, pick and pick.

The warp contains 1920 threads dressed on six sections from eight spools of forty threads each.

The harnesses have each 160 heddles.

Reed it five in a dent, with a No. 10½ reed.

No. 39 is a sixteen harness diagonal. The loom chain is thirty-two bars in length. The warp is single black five runs to the pound. The filling is like the warp all single, four runs to the pound, one pick of black, then one of red, one of black, one of blue, and repeat.

The warp contains 1680 threads dressed on six sections from seven spools of forty threads each.

The harnesses have each 105 heddles.

Reed it four in a dent, with a No. 11½ reed.

No. 40 is also a diagonal. It is gotten out on seventeen bars in the warp and thirty-four in the filling. The warp is indigo blue or London blue, five runs to the pound. The filling is pick and pick, one of green four runs fine, one of black or brown two and a half runs fine for the back.

The warp contains 1700 threads dressed on five sections from eight spools of forty, and one of twenty threads.

The harnesses have 100 heddles each.

Reed four in a dent, requiring a No. 12 reed.

No. 41 is a twenty-four harness diagonal. It is very fine if woven one pick in a shed; by doubling the chain, two picks can be put in a shed, but it is not so light. It looks well either way. The warp is six runs fine. The filling is double and twist two-ply, one of white five runs to the pound, and one of black four runs, twisted eight turns to the inch.

The warp contains 1920 threads dressed on six sections from eight spools of forty threads each.

The harnesses have each 80 heddles.

Reed six in a dent with a No. 9 reed.

No. 42 has sixteen bars in the warp and thirty-two in the filling. It is a good style to make out of shoddy and cotton warp. It is a diagonal and looks well either as a cotton warp piece or all wool.

The warp contains 1600 threads five runs, black. The filling is

double and twist two-ply, one of orange six runs, and one black four runs, twisted sixteen turns to the inch for the face; and one of single black three runs for the back.

The warp is dressed on four sections from ten spools of forty threads each.

The harnesses have each 100 heddles.

Reed four in a dent in a No. 11 reed.

No. 43 is a diagonal stripe, on forty-nine bars warp, and twelve bars filling. It is good for cotton warp. The warp is single black with 1800 threads for cotton, or 1764 for the warp proper and 36 for selvage if for wool. The warp contains 1764 threads, on four sections from eleven spools, with one extra thread to be dressed off a bobbin.

In making out the harnesses, it will be noticed that the draft is not reduced to its lowest term, as there would be too many threads on the third harness; therefore we place two harnesses to do the work that one would have to do. It is reduced to eleven harnesses. Now, as 36 is $\frac{1}{49}$ of 1764, therefore, the first and second harnesses having each eight threads, gives 288 heddles for each. The third and fourth have six threads, or 216 heddles each. The other seven have three threads each, or 108 heddles each to the pattern.

Reed it five in a dent, making five for nine dents and four for the tenth. A No. 10 reed will be required.

The warp is five runs. The filling is double and twist, two-ply, one black four runs, one white eight runs, twisted fourteen turns to the inch for the face, and one of black single three runs for backing.

No. 44 has forty-eight bars warp and sixteen filling. It is a diagonal stripe. The warp has 1920 threads. Two-thirds are fawn drab, one-third is divided equally (say each one-sixth of the warp) between slate color and brown—all single.

It is five runs fine, dressed on four sections from twelve spools. The filling is dark-blue single, four runs fine.

It must be remembered that eight spools should be fawn drab, two of slate color, and two of brown.

In preparing the harnesses, we see by the straight draft that there are 48 threads to the pattern, that there are 16 harnesses, the eight front ones having each two threads, and the back ones four threads. This gives, by the rule, 80 heddles on the front, and 160 heddles to each of the back harnesses.

Reed it four in a dent, giving 12 dents to the pattern, and requiring a No. $13\frac{1}{2}$ reed.

No. 45 has forty-eight bars to the warp and sixteen to the filling. It is known as a doeskin stripe. The yarn for the doeskin is pearl drab single, and that for the stripe is stone drab single, both five runs to the pound. The warp contains 1920 threads dressed from twelve spools on four sections. As one-third of the warp is stone drab, it will be necessary to have eight spools of pearl drab and four of stone drab. The filling is four runs to the pound single, pearl drab.

We make out the harnesses in the usual way. The eight front harnesses, having two threads each, will have 80 heddles each. The back harnesses with four threads will require 160 heddles each.

Reed it four in a dent, and we find a No. 13 reed is wanted.

No. 46 is a herring-bone stripe, gotten out on thirty-two bars in the warp and sixteen in the filling. One-half of the warp is pearl drab, and the other is slate color, all single, six runs to the pound.

The filling is single, five runs, pearl drab. The warp contains 2400 threads dressed on six sections from ten spools of forty threads each.

The draft is reduced to twenty harnesses. Eighteen would be its lowest term; but as one-half of the warp would come on two harnesses, it is better to use twenty.

The harnesses are made out as usual, showing 300 heddles for each of the four front, and 75 for each of the sixteen back harnesses.

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Reed it seven dents to the pattern. Now, as there are 32 threads, reed it thus: 5, 5, 5, 5, 4, 4, 4—four dents with five threads, then three with four threads each. It will require a No. 14 reed.

No. 47 is a clouded stripe diagonal, with sixty bars in the warp, and twenty in the filling. Of the sixty threads in the pattern, ten are double and twist two-ply, one black and one orange, each seven runs twisted eighteen turns to the inch; there are twenty-five threads blue, and twenty-five olive, all single, six runs to the pound.

The filling is single, four runs, blue. To understand how it is clouded, the reader is referred to the dressing draft. The warp contains 1920 threads dressed on four sections from twelve spools of forty threads each.

As one-sixth of the whole warp is double and twist, it will require two spools of double and twist, and the balance will be equally divided into five of blue and five of olive.

The draft is reduced to its lowest term, twenty harnesses. The set is made up as usual; the ten front harnesses, with five threads each to the pattern, will have 160 heddles each, and the back ten with one thread each will have 32 heddles each.

Reed it four in a dent, which will give a No. 13 reed.

No. 48 is a twenty-four harness diagonal. The warp is one of twist two-ply four runs fine, both orange, then two single five runs, then one twist like the first, except that it is a pearl drab, then two single, fawn drab.

The warp contains 1440 threads dressed on four sections from nine spools of forty threads each. One-third of the warp is double and twist, hence three spools must be double and twist, and six must be single. But, as the twist is of two distinct colors, we shall want one of each. The other spool must be spooled an equal number of threads, one and one. The harnesses have an equal number of heddles, or 60 to each.

Reed it four in a dent, with a No. 10 reed.

No. 49 is a good pattern for ladies' cloaking or sacques. The draft is rather a long one. It is gotten out on sixty-four bars in the warp and seventy-two in the filling. The figure is made entirely from the warp, the filling being woven in so as to bring the twist in the warp on the face of the goods, and forms four crosses and a square in the middle.

The warp is dressed three of single, one of twist, forty-eight single, and sixteen double and twist to the pattern. The twist is one black and one white, each eight runs to the pound, twisted sixteen turns to the inch. The single yarn for the warp is eight runs fine. The filling is all single eight runs, white.

The warp contains 1920 threads on six sections from eight spools of forty threads each.

Reed it four in a dent, three of single and one of double and twist, with a No. 13½ reed.

This draft can be reduced to seventeen harnesses, its lowest term, but this is not best, as one-half of the warp or 960 threads would be on one harness. To avoid this, reduce it to eighteen harnesses.

By referring to the straight draft, it will be seen that every fourth thread is double and twist; now, in order to have these on their own harnesses, and all together, they are carried back, as will be seen on the draft. Though this may be questioned by some designers, yet many patterns are thus reduced.

In making the set of harnesses, we find that the first harness has but one thread, hence it will have 30 heddles; the second and third, having each sixteen threads, will have 480 heddles to each; the fourth has two threads and 60 heddles; the fifth, the same; the sixth, like the first; the seventh, four threads and 120 heddles; the eighth, like the first; the ninth, like the seventh; the tenth, like the first; the eleventh and twelfth, like the fourth, but the threads are all double and twist; the thirteenth, like the first; the fourteenth, like the seventh; the fifteenth, like the first; the sixteenth,

like the seventh; the seventeenth and eighteenth, like the first. All the threads, commencing at the eleventh harness, are double and twist.

Let us recapitulate :—

No. 1 harness	30 heddles.
" 2 "	480 "
" 3 "	480 "
" 4 "	60 "
" 5 "	60 "
" 6 "	30 "
" 7 "	120 "
" 8 "	30 "
" 9 "	120 "
" 10 "	30 "
" 11 "	60 "
" 12 "	60 "
" 13 "	30 "
" 14 "	120 "
" 15 "	30 "
" 16 "	120 "
" 17 "	30 "
" 18 "	30 "

Proof   1920

No. 50 can be made in many styles, simply by changing the combinations. It looks well whether made for spring or fall goods. For the latter, it can have a back woven on it.

This pattern is gotten out on eight bars in the warp and sixteen in the filling. By the draft it will be seen that there is a repeat on the face of the piece, the pattern having a back woven on it. If the backing bars are cast off, the pattern would be woven on four bars in the warp and four in the filling.

The warp contains 1600 threads dressed on five sections from eight spools.

The harnesses are made up as usual, each having 200 heddles.

Reed it four threads in a dent, with a No. 11 reed.

In getting out drafts, care must be taken with the threads, as some are twisted open, while others are twisted acrossband, or right and left twist. Also, ascertain their proper size; and if the operator is not a judge of yarn, let him procure a few yards of yarn, say from one run to fourteen to the pound, and use them as samples for comparison when getting out a pattern. This sample yarn should be washed and shrunken. In getting out twist threads, ascertain how many turns there are to the inch, and how many threads are twisted together, and whether twisted at one twisting or more, as is often done.

Spinner's Tables, from one run to twenty to the pound.

Runs.	Grains.	Runs.	Grains.	Runs.	Grains.	Runs.	Grains.
1	$437\frac{1}{2}$	6	$72\frac{11}{12}$	11	$39\frac{17}{22}$	16	$27\frac{11}{32}$
$1\frac{1}{8}$	0	$6\frac{1}{4}$	70	$11\frac{1}{4}$	$38\frac{8}{9}$	$16\frac{1}{4}$	$26\frac{12}{13}$
$1\frac{1}{2}$	$291\frac{2}{3}$	$6\frac{1}{2}$	$67\frac{4}{13}$	$11\frac{1}{2}$	$38\frac{1}{23}$	$16\frac{1}{2}$	$26\frac{17}{33}$
$1\frac{3}{4}$	250	$6\frac{3}{4}$	$64\frac{22}{27}$	$11\frac{3}{4}$	$37\frac{11}{47}$	$16\frac{3}{4}$	$26\frac{8}{67}$
2	$218\frac{3}{4}$	7	$62\frac{1}{2}$	12	$36\frac{11}{24}$	17	$25\frac{25}{34}$
$2\frac{1}{4}$	$194\frac{4}{9}$	$7\frac{1}{4}$	$60\frac{10}{29}$	$12\frac{1}{4}$	$35\frac{7}{9}$	$17\frac{1}{4}$	$25\frac{25}{69}$
$2\frac{1}{2}$	175	$7\frac{1}{2}$	$58\frac{1}{3}$	$12\frac{1}{2}$	35	$17\frac{1}{2}$	25
$2\frac{3}{4}$	$159\frac{1}{11}$	$7\frac{3}{4}$	$56\frac{14}{31}$	$12\frac{3}{4}$	$34\frac{16}{51}$	$17\frac{3}{4}$	$24\frac{66}{71}$
3	$145\frac{5}{6}$	8	$54\frac{11}{16}$	13	$33\frac{17}{26}$	18	$24\frac{11}{36}$
$3\frac{1}{4}$	$134\frac{8}{13}$	$8\frac{1}{4}$	$53\frac{1}{33}$	$13\frac{1}{4}$	$33\frac{1}{53}$	$18\frac{1}{4}$	$23\frac{71}{73}$
$3\frac{1}{2}$	125	$8\frac{1}{2}$	$51\frac{8}{17}$	$13\frac{1}{2}$	$32\frac{11}{27}$	$18\frac{1}{2}$	$23\frac{24}{37}$
$3\frac{3}{4}$	$116\frac{2}{3}$	$8\frac{3}{4}$	50	$13\frac{3}{4}$	$31\frac{9}{41}$	$18\frac{3}{4}$	$23\frac{1}{3}$
4	$109\frac{3}{8}$	9	$48\frac{11}{18}$	14	$31\frac{1}{4}$	19	$23\frac{1}{38}$
$4\frac{1}{4}$	$102\frac{16}{17}$	$9\frac{1}{4}$	$47\frac{11}{37}$	$14\frac{1}{4}$	$30\frac{40}{57}$	$19\frac{1}{4}$	$22\frac{8}{11}$
$4\frac{1}{2}$	$97\frac{2}{9}$	$9\frac{1}{2}$	$46\frac{1}{19}$	$14\frac{1}{2}$	$30\frac{5}{29}$	$19\frac{1}{2}$	$22\frac{17}{39}$
$4\frac{3}{4}$	$92\frac{2}{19}$	$9\frac{3}{4}$	$44\frac{34}{39}$	$14\frac{3}{4}$	$29\frac{39}{59}$	$19\frac{3}{4}$	$22\frac{12}{79}$
5	$87\frac{1}{2}$	10	$43\frac{3}{4}$	15	$29\frac{1}{6}$	20	$21\frac{7}{8}$
$5\frac{1}{4}$	$83\frac{1}{3}$	$10\frac{1}{4}$	$42\frac{28}{41}$	$15\frac{1}{4}$	$28\frac{42}{61}$		
$5\frac{1}{2}$	$79\frac{6}{11}$	$10\frac{1}{2}$	$41\frac{2}{3}$	$15\frac{1}{2}$	$28\frac{7}{31}$		
$5\frac{3}{4}$	$76\frac{2}{23}$	$10\frac{3}{4}$	$40\frac{30}{43}$	$15\frac{3}{4}$	$27\frac{7}{9}$		

The method of regulating the sizes of yarn for woollen goods is

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by runs; 1600 yards make one run, and if it is one run fine, it weighs one pound avoirdupois, or 7000 grs.

The table just given is calculated for weighing 100 yds. When it is desired to know the size of yarn, take ten bobbins and reel from each ten yds., making 100 yds. Place the yarn on the balance, and it will correspond with the table.

If it is desired to twist two or more threads together, and it is requisite to know the size of yarn represented by the threads before twisting, follow the rule as below.

Say, we desire to twist three threads together at one twisting, one of ten runs, one of $8\frac{3}{4}$, and one of $3\frac{1}{2}$. Look for the number of grains in the table, of these three numbers. We find 10 runs $43\frac{3}{4}$ grs., $8\frac{3}{4}$ runs 50 grs., $3\frac{1}{2}$ runs 125 grs. Add them together, and we have $218\frac{3}{4}$ grs. On the table, this represents two runs.

Again, take $8\frac{3}{4}$ runs and 4 runs. The first is 50 grs., the other $109\frac{3}{8}$ grs., equal to $159\frac{3}{8}$, or $2\frac{3}{4}$ runs.

Then allow for the twist, according to the amount wanted. Suppose, it is wanted to twist these two threads sixteen turns to the inch; allow that it takes up one-third. Divide $159\frac{3}{8}$ by three, which gives $53\frac{1}{8}$. Add it to the first, and we have $212\frac{1}{2}$ grs.—the nearest to this equal to two runs nearly.

To find the weight of one yard of woollen cloth: See how many threads are in the warp, divide by the size of the yarn, and the result will be the weight in ounces.

Example: Yarn, say runs 4)1800 threads in warp.

4.50, or $4\frac{1}{2}$ ounces.

This should be reversed when the weight of the yarn is known, and it is desired to know the size.

This rule will work also for the filling. Suppose, it is desired to know the weight of filling in one yard of cloth. See how many picks there are to the inch. Multiply this by the width of the cloth:

the answer will be the length of yarn in one yard of cloth. Divide by the size of the yarn, and we get the weight.

Example: Say 65 picks in an inch.
36 width of cloth.

———

390
195

———

Say, size of yarn, runs 4)2340

———

$5\frac{85}{100}$ ounces.

This holds good for woollen yarn. Cotton yarn is counted by hanks. A hank is seven leas of 120 yds. each. There are 80 threads in a lea, and each thread is one yard and a half long.

Example: Say for 60 yds. yarn one hank to the pound.
7000 grains.
60 yds.

———

Yds. 840)420000(500 grains.
4200

That is to say, 60 yards of one hank yarn weigh 500 grains. Divide this number by any size of yarn, and we have the number of grains for 60 yards. Or, divide by the weight of the yarn, and we have the size of the yarn in hanks.

Table of Yarn for Cotton.   Scale of 60 yards.   From 1 to 60 hanks to the pound.

Yds.	Grs.	Hks.	Yds.	Grs.	Hks.	Yds.	Grs.	Hks.
60	500	1	60	$23\frac{17}{21}$	21	60	$12\frac{8}{41}$	41
60	250	2	60	$22\frac{8}{11}$	22	60	$11\frac{19}{21}$	42
60	$166\frac{2}{3}$	3	60	$21\frac{17}{23}$	23	60	$11\frac{27}{43}$	43
60	125	4	60	$20\frac{5}{6}$	24	60	$11\frac{4}{11}$	44
60	100	5	60	20	25	60	$11\frac{1}{9}$	45
60	$83\frac{1}{3}$	6	60	$19\frac{3}{13}$	26	60	$10\frac{20}{23}$	46
60	$71\frac{3}{7}$	7	60	$18\frac{14}{27}$	27	60	$10\frac{30}{47}$	47
60	$62\frac{1}{2}$	8	60	$17\frac{6}{7}$	28	60	$10\frac{5}{12}$	48
60	$55\frac{5}{9}$	9	60	$17\frac{7}{29}$	29	60	$10\frac{10}{49}$	49
60	50	10	60	$16\frac{2}{3}$	30	60	10	50
60	$45\frac{5}{11}$	11	60	$16\frac{4}{31}$	31	60	$9\frac{41}{51}$	51
60	$41\frac{2}{3}$	12	60	$15\frac{5}{8}$	32	60	$9\frac{8}{13}$	52
60	$38\frac{6}{13}$	13	60	$15\frac{5}{33}$	33	60	$9\frac{23}{53}$	53
60	$35\frac{5}{7}$	14	60	$14\frac{12}{17}$	34	60	$9\frac{7}{27}$	54
60	$33\frac{1}{3}$	15	60	$14\frac{2}{7}$	35	60	$9\frac{1}{11}$	55
60	$31\frac{1}{4}$	16	60	$13\frac{8}{9}$	36	60	$8\frac{13}{14}$	56
60	$29\frac{7}{17}$	17	60	$13\frac{19}{37}$	37	60	$8\frac{44}{47}$	57
60	$27\frac{7}{9}$	18	60	$13\frac{3}{19}$	38	60	$8\frac{18}{29}$	58
60	$26\frac{6}{19}$	19	60	$12\frac{32}{39}$	39	60	$8\frac{28}{59}$	59
60	25	20	60	$12\frac{1}{2}$	40	60	$8\frac{1}{3}$	60

A Table of Yarn, on a scale of forty yards, from one to fourteen run to the pound.

Yds.	Runs.	Grains.	Yds.	Runs.	Grains.
40	1	175	40	8	$21\frac{7}{8}$
40	$1\frac{1}{2}$	$116\frac{2}{3}$	40	$8\frac{1}{2}$	$20\frac{10}{17}$
40	2	$87\frac{1}{2}$	40	9	$19\frac{4}{9}$
40	$2\frac{1}{2}$	70	40	$9\frac{1}{2}$	$18\frac{8}{19}$
40	3	$58\frac{1}{3}$	40	10	$17\frac{2}{4}$
40	$3\frac{1}{2}$	50	40	$10\frac{1}{2}$	$16\frac{2}{3}$
40	4	$43\frac{3}{4}$	40	11	$15\frac{10}{11}$
40	$4\frac{1}{2}$	$39\frac{8}{9}$	40	$11\frac{1}{2}$	$15\frac{5}{23}$
40	5	35	40	12	$14\frac{7}{12}$
40	$5\frac{1}{2}$	$31\frac{9}{11}$	40	$12\frac{1}{2}$	14
40	6	$29\frac{1}{6}$	40	13	$13\frac{6}{13}$
40	$6\frac{1}{2}$	$26\frac{12}{13}$	40	$13\frac{1}{2}$	$12\frac{26}{27}$
40	7	25	40	14	$12\frac{1}{2}$
40	$7\frac{1}{2}$	$23\frac{1}{3}$			

Woollen Yarn is calculated by the Run, and contains 1600 yards.

A Table of Yarn, on a scale of sixty yards, from one to fourteen run to the pound.

Yds.	Runs.	Grains.	Yds.	Runs.	Grains.
60	1	$262\frac{1}{2}$	60	8	$32\frac{13}{16}$
60	$1\frac{1}{2}$	175	60	$8\frac{1}{2}$	$30\frac{15}{17}$
60	2	$131\frac{1}{4}$	60	9	$29\frac{1}{6}$
60	$2\frac{1}{2}$	105	60	$9\frac{1}{2}$	$27\frac{12}{19}$
60	3	$87\frac{1}{2}$	60	10	$26\frac{1}{4}$
60	$3\frac{1}{2}$	75	60	$10\frac{1}{2}$	25
60	4	$65\frac{5}{8}$	60	11	$23\frac{19}{22}$
60	$4\frac{1}{2}$	$58\frac{1}{3}$	60	$11\frac{1}{2}$	$22\frac{19}{23}$
60	5	$52\frac{1}{2}$	60	12	$21\frac{7}{8}$
60	$5\frac{1}{2}$	$47\frac{8}{11}$	60	$12\frac{1}{2}$	21
60	6	$43\frac{3}{4}$	60	13	$20\frac{5}{26}$
60	$6\frac{1}{2}$	$40\frac{5}{13}$	60	$13\frac{1}{2}$	$19\frac{12}{27}$
60	7	$37\frac{1}{2}$	60	14	$18\frac{3}{4}$
60	$7\frac{1}{2}$	35			

A Table of Yarn, on a scale of one hundred and twenty yards for Cotton Yarn, from one to forty hanks to the pound.

Yds.	Hanks	Grains.	Yds.	Hanks	Grains.	Yds.	Hanks	Grains.
120	1	1000	120	15	$66\frac{2}{3}$	120	29	$34\frac{4}{9}$
120	2	500	120	16	$62\frac{1}{2}$	120	30	$33\frac{1}{3}$
120	3	$333\frac{1}{3}$	120	17	$58\frac{4}{17}$	120	31	$32\frac{8}{31}$
120	4	250	120	18	$55\frac{5}{9}$	120	32	$31\frac{1}{4}$
120	5	200	120	19	$52\frac{12}{19}$	120	33	$30\frac{10}{33}$
120	6	$166\frac{2}{3}$	120	20	50	120	34	$29\frac{7}{17}$
120	7	$142\frac{6}{7}$	120	21	$47\frac{13}{21}$	120	35	$28\frac{4}{7}$
120	8	125	120	22	$45\frac{5}{11}$	120	36	$27\frac{7}{9}$
120	9	$111\frac{1}{9}$	120	23	$43\frac{11}{23}$	120	37	$27\frac{1}{37}$
120	10	100	120	24	$41\frac{2}{3}$	120	38	$26\frac{6}{19}$
120	11	$90\frac{10}{11}$	120	25	40	120	39	$25\frac{25}{39}$
120	12	$83\frac{1}{3}$	120	26	$38\frac{6}{13}$	120	40	25
120	13	$76\frac{12}{13}$	120	27	$37\frac{1}{27}$			
120	14	$71\frac{3}{7}$	120	28	$35\frac{5}{7}$			

Cotton Yarn is calculated by the Hank, and contains 840 yards.