MASTER
WEAVER

BI-MONTHLY BULLETIN
FOR HANDWEAVERS

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Z-HANDICRAFTS
FULFORD, QUE., CANADA

May, 1957   No.33

DESIGNING MADE EASIER

PROPORTIONS.

When one tries to write just a few articles about a subject
as complicated as Designing, one is at aloss as to which elements
and principles of designing are the most important ones. To discuss
all of them would require more space than is available in a perio-
dical. Therefore we shall limit ourselves to the problems which are
likely to interest a handweaver. This and nothing more.

For the same reason we shall not speak too much about desig-
ning tapestries where the weaver has a complete freedom of expres-
sion, and where the same rules or lack of rules apllies as in pain-
ting.

We shall start with the easiest subject viz. proportions,
or mathematical relationship between different dimensions of the
project, or of its part.

When only two elements of different length are in question,
as for instance two sides of a rectangle, the ratio which is "best
liked" by everybody seems to be around 1.5 (3 to 2). This number is
purely statistical i.e. obtained by a sort of Gallup poll, and so
far cannot be explained in any way. There are also other, more pre-
cise numbers, which have some sort of a theoretical background. For
instance the famous "golden mean" - 1.62, or a square root of two
- 1.41. What is so peculiar about them?

Let us take first the golden mean. When we have two numbers
"a" and "b" which give us the ratio 1.62 (really it is 1.61803 etc.)
then also the ratio: a+b to b will be 1.62.

If we build a rectangle with sides in ratio 1.62 as in fig.
1 and divide its longer side in the same way, we shall get inside
of our rectangle two figures: one square (ABCD), and one rectangle
(BEFC) exactly similar to the large rectangle (AEFD). By "similar"
we mean that the ratio of its sides is again 1.62. We can subdivide
this second rectangle again into a square (BEHG) and a still smaller
rectangle (GHFC). If we keep on doing this long enough we shall have
an infinite number of squares getting smaller and smaller. This of
course does not "explain# why we should like them, but it is some-
thing at any rate.

Now for the Square Root of Two. Let us build another rectan-
gle as in fig.2 so that the ratio of the long and short side will

be 1.4 (it is really 1.41421 etc). This rectangle (ACDB) has a different peculiarity: if we divide its longer sides by two we shall
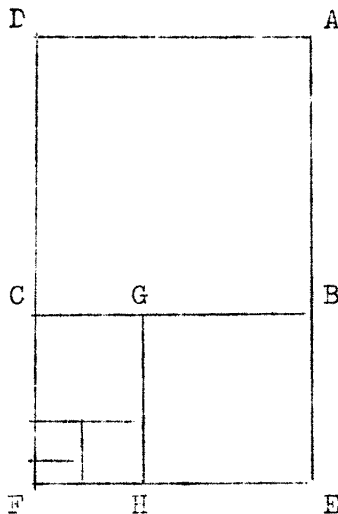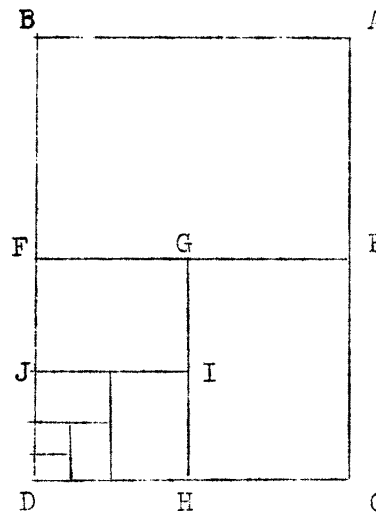

Fig.1

Fig.2

get two new rectangles (AEFB and ECDF) similar to the large one. If we agin subdivide on of these, e.g. ECDF into two, we shall get two more, still smaller rectangles GIJF and IHDJ of again the same shape. We can go on like that indefinitely getting more and more rectangles, all of them of the same ratio.

But you may ask: What of it?

And "what of it" indeed? Neither the first or the second rectangle can be proved to be beautiful, cr to posses any practical properties which could explain why it should be liked better than any other shape. Still the fact remains that the public opinion favours a ratio somewhere between these two. And it is not only our present opinion: it persists for quite a few thousand years.

What can we deduce from these facts?

First of all that for unknown reasons most people do not like a square and comparatively few like a very long rectangle. And second that it is not necessary to accept a very precise number for the proportions of a rectangle.

Thus when making aproject where we are not limited by other considerations (as in case of scarves, runners, head-squares etc.) we may as well keep close to one of these numbers, the golden mean being perhaps the most popular cne. Of course the right ratio between the width and the length of the fabric is important only when the whole piece is displayed lying flat on the floor or on a table, or hanging on the wall. Otherwise the proportions are of little importance and practical considerations must prevail.

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The same proportions may be observed in simple patterns. When the pattern divides the woven piece into two areas cr when there are two elements of the pattern of similar shape but different

size - then the two areas or the two elements may form the ratio 1.62. For instance in fig.3 we have a project in Turned Swivel (MW 16, and 25). First of all the rectangle ACEG has the ratio
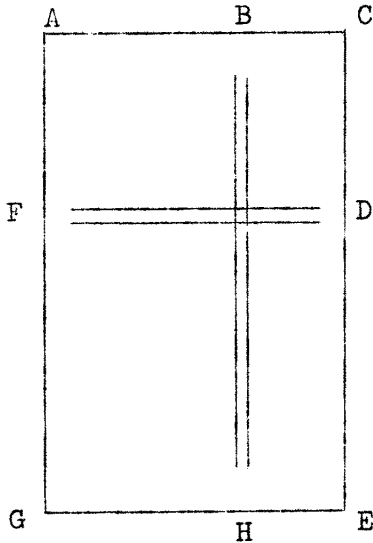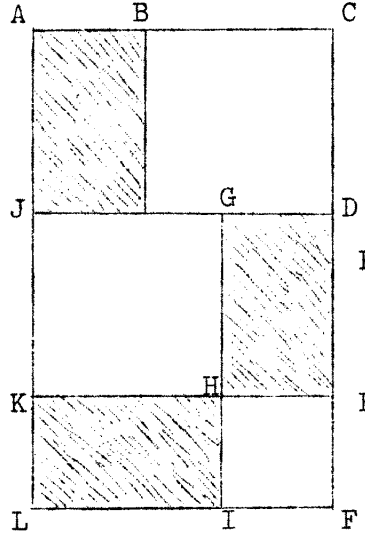

Fig.3

Fig.4

1.62 (e.g. 12" x 19"). Then the horizontal line DF divides the rectangle in the same way - DE : CD = CE : DE = 1.62. Also the vertical line BH divides the sorter side of the rectangle so that again AB : BC = 1.62.

Fig.4 is based on the same principle: CF:CA, DF:CD, CF:DF, DE:EF, CA:BC, CB:BA etc., have all the same ratio

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The same rule can be applied to the Areas occupied by different colours. We know from the previous article that the Dominant takes the largest area. Then the ratio between the dominant (D) and the sub-dominant (W) can be 1.62. Again - the ratio between W and A (accent on the dominant) may be 1.62, and finally the ratio between A and Z (accent on the subdominant) also 1.62. This gives us the following sequence: Z = 1; A = 1.6; W = 2.6; D = 4.2.

For instance when we make a project for plain stripes in 4 colours we shall have about 11% of colour Z, 17% of A, 28% of W, and 44% of D. These numbers are also numbers of picks in one repeat if the repeat has 100 picks of weft. If the number of picks in one repeat is different - multiply the numbers by the number of picks in one repeat and divide by 100.

In the table below we give other practical sequences in full numbers of picks:

2, 3, 5, 8	3, 5, 8,13	4, 6,10.16
5, 8,13,21	6,10,16,26	7,11,18,29
8,13,21,35	9,14,23,38	10,16,26,42
11,18,29,46	12,19,31,50	13,21,34,55
14,22,36,59	15,24,39,63	16,26,42,67.

Of course the order in which the colours will follow each other has nothing to do with this proportion. The rule gives us only the total number of picks in one repeat. For instance if we have a repeat with 47 picks we can take the sequence: 5,8,13,21 and arrange our colours as follows:

WWAAWAAWWWWWWWAAWAAWWDDDZZDDDDDDDDDZDDDDDDDDDZZDDD

Here we too D 22 times instead of 21, otherwise the right band would not be symmetrical. In the next example:

WDDWWDWWWAWAAAAAAWAWWWDWWDDWDDDZDZDDDZDDDZDZDDD.

we had to change the number of picks both in col. D and W for the pattern,s sake. We have now 5,8,14,20. We would probably do better to make it 5,8,14,22 which would be closer to the original ratio.

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We must repeat once more that this is only one way of figuring out the ratios or proportions. The fact that proportions of a project do not follow this particular rule does not condemn it, and cannot be used even as a base for criticism.

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RUGS

IN BOUND WEAVING -

What we mean here by "bound weaving" is such a method of weaving which does not require any binder, even with the traditional pattern weaves. The weave is then "bound" by itself and this explains the name. Although in theory any pattern weave can be woven in this way, there are practical considerations which make many "higher" weaves unsuitable for this purpose. We shall discuss here only the simple weaves such as Overshot, Crackle, and Summer-&-Winter on four frames.

In bound weaving we have no tabby. This is replaced by a shot of weft of the same weight as the pattern weft, but of a contrasting colour, and made on an opposite shed.

Since this is important we shall remind our readers that "the opposite shed" is one which reverses the positions of all harness-frames. A frame which has been sunk is raised now, and one which has been raised is sunk. Thus shed 1,2 is opposite to 3,4 etc. Thus there is no such thing as an opposite shed in inself. It must be always opposed to the last one. We shall see later that the opposite shed does not even need to follow the pattern shed

immediately, but it must come very close. Here is the list of all
opposite sheds possible with a 4 frame loom (numbers are frames):

Pattern shed: 12 23 34 14 1   2   3   4   123 124 134 234

Opposite shed: 34 14 12 23 234 134 124 123 4   3   2   1

    Thus we can take any traditional or modern pattern which
in normal circumstances requires tabby after each shot of pattern,
and replace the tabby with the proper opposite shed. For instance
the original treadling with the tie-up as in fig.1 runs as follows
(numbers are treadles): 6 2 6 1 6 2 5 1 5 2 5 1 4 2 4 1 4 2 3
1 3 2 etc. Then the treadling for bound
weaving will be: 6 4 6 4 6 4 5 3 5 3 5 3
4 6 4 6 4 6 3 5 3 5 etc.

```
|   | O | O |   | O |
|   | O | O |   | O |   |
| O | O |   |   |   | O |
| O |   |   | O | O |   |
| 6 | 5 | 4 | 3 | 2 | 1 |
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Fig.1

    We cannot be sure that the pattern
in the second treadling will be square.
This depends on too many factors (sett
of warp, weight of the weft, beating).
But we can experiment for a while and
find out how many more picks of weft are require to keep the pat-
tern straight. As a rule the number of picks per inch here is
much higher than in the traditional weave with a binder.

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    When weaving rugs, and in our case they will be rugs of
the flat tapestry type, we must go further than that. We must co-
ver the warp completely with the weft. This is done first to get
the desired thickness of the rug, and second - to conceal the
neutral colour of the warp which has no place in the design of
the rug.

    This condition means a lot of things. The warp must be
very open, i.e. with very few ends per inch. On the other hand
it must be very strong or the whole fabric will be too weak. Then
the weft must be bulky but soft. Finally the weaving itself be-
comes different. We shall come back to these problems at the end
of our discussion.

    There is however another more pressing problem partly
practical partly theoretical. If we keep weaving one block of
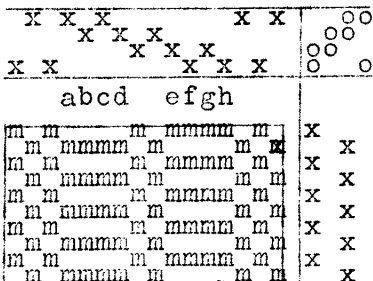pattern as in the treadling given above: 6 4 6 4 6 4 etc., we may
discover that to square it we must
repeat this combination of two
treadles for quite a while. What
happens in the meantime is that the
block gets distorted because the
warp ends marked in fig.2 "abcd"
and "efgh" are woven together all
the time, and they finally gather
into a bunch which acts as one
warp end of heavier count. This

Fig.2

makes the float "a - d" shorter and shorter. In other words should we keep weaving in this way for any length of time, the blocks would get narrower and less distinct.

Therefore when using overshot patterns for bound weaving - small blocks are a rule. But even with short floats as in Summer-&-Winter we cannot prevent the distortion of the blocks unless we change something in the treadling. Of course the easiest solution would be an occasional tabby shot, but this would ruin the texture of our rug. An alternative is to use from time to time the two remaining pattern treadles with different colours. For instance instead of treadling: 6 4 6 4 6 4 6 4 6 4 in fig.2 we can try: 6 4 6 4 5 6 4 6 4 3.

A still better solution is to use all four treadles all the time. This will produce an absolutely uniform texture (provided that the threading draft has all floats of about the same length). Thus the treadling in fig.2 would be: 3 4 5 6 regardless of the pattern.

The pattern can be of the traditional type, and dark on a neutral background. Then block 1-4 will be woven as follows: treadle 3 - dark (d); treadles 4, 5, and 6 - neutral (n). Block 3-4: tr.3 - n, tr.4 - d, tr.5 -n, tr.6 - n. Block 2-3: 3 - n, 4 - n, 5 - d, 6 - n. Block 1-2: 3 - n, 4 - n, 5 - n, 6 - d.

Or the pattern may have less background, but then the blocks will overlap. We shall use in each repeat of 4 picks of weft two shots of dark weft and two of neutral one. For instance: 3 - d, 4 - d, 5 - n, 6 - n for one block; 3 - n, 4 - d, 5 - d, 6 - n for the second, etc.

Then we can use three or even four colours: a different one on each treadle. Particularly charming effects will give gradations in value of the same colour with the darkest colour following the original pattern. For instance: dark brown, light brown, beige, natural (or ivory).

These are the general principles of weaving bound rugs; we shall go now into details.

OVERSHOT.

Few of the colonial overshot patterns are suitable for bound weaving. This is because of the difference in the length of floats. When using traditional overshot we must select patterns with floats not longer than 4. There are some in the Cross and Diamond class, as well as among the miniature patterns.

On the other hand all Modern Overshot patterns (MW 18) are suitable because of the uniform texture. However we must also think about the wearing qualitities of our rugs, and from this point of view it is better to avoid floats longer than 5.

As an example of simple traditional pattern we shall take the draft on fig.3 A. It will produce diamonds about 4 inches wide. The borders can be made in plain twill, or in very small diamonds. Since tabby is not going to be used except perhaps to start and finish the woven piece, we do not mark tabby treadles

in the tie-up. For practical reasons the tie-up in Fig.3 B will be preferable, because we can alternate the feet. Treadling directions given below apply to this 2-nd tie-up.

Fig.3 A   Fig.3 B
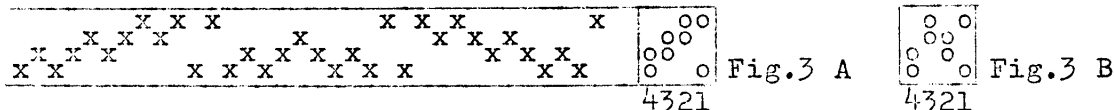
Here we have the following possibilities in treadling. Number means the treadle in the second tie-up, letter - the colour: d - dark, n - neutral.

1. The traditional pattern. First block: 1 - n, 3 - n, 2 - n, 4 - d. Second: 1 - n, 3 - n, 2 - d, 4 - n. Third: 1 - n, 3 - d, 2 - n, 4 - n. Fourth: 1 - d, 3 - n , 2 - n, 4 - n.

2. Overlapping blocks but still in two colours only. First: 1 - n, 3 - n, 2 - d, 4 - d. Second: 1 - n, 3 - d, 2 - d, 4 - n. Third: 1 - d, 3 - d, 2 - n, 4 - n. Fourth: 1 - d, 3 - n, 2 - n, 4 - d. We can also have spotted bands without any pattern by treadling: 1 - n, 3 - d, 2 - n, 4 - d; or 1 - d, 3 - n, 2 - d, 4 - n.

3. Three colours: a, d, w. Colour "d" is the dominant i.e. the darkest or the brightest in our case. The reamining colours can either follow the dominant one or produce a mottled background. In the first case the treadling will be: first block - 1 - a, 3 - w, 2 -d, 4 - d; second: 1 - w, 3 - d, 2 - d, 4 - a; third: 1 - d, 3 - d, 2 - a, 4 - w; fourth: 1 - d, 3 - a, 2 - w, 4 - d. In the second case use "d" as before, but change "w" and "a" at random, or alternate them every ¼" or so.

4. Four colours: a, d, w, z. Here we have so many possibilities that it would be difficult to describe all of them. But when the colours follow each other as in the example given before (d - dark brown, a - light brown, w - beige, z - ivory) the treadling will be: first block - 1 - z, 3 - w, 2 - a, 4 - d; second: 1 - w, 3 - a, 2 - d, 4 - z; third: 1 - a, 3 - d, 2 - z, 4 - w; fourth: 1 - d, 3 - z, 2 - w, 4 - a.

Crackle.

Since crackle has the sametie-up as overshot, and the main difference between the two weaves is the length of floats, all what we have said about overshot can be applied here. We can use with Crackle the same treadlings as with overshot.

However crackle is a more suitable weave for bound rugs than overshot, because it has a firmer and more uniform texture. Also the blocks of pattern can be of any size ezactly as in the Modern Overshot. Finally it can be woven with pattern blocks in one solid colour. This is done in the same way as in Summer-&-Winter, by using two treadles for each block. E.g. in plain crackle (fig.4) the treadling for bound weaving will be: 4 - d, 2 - n, 3 - n, 1 - n for one block. This will give vertical columns

of floats separated by narrow lines of a different colour. But if
we substitute for this treadling another one: 4 - d, 2 - d, 3 - n,
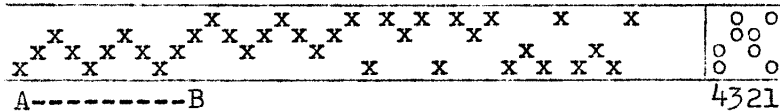1 - n - we shall have one block of pattern corresponding to the

Fig.4

A---------B   4321

first unit of the draft (A to B) in one solid colour. The tread-
ling for all four blocks will be as in fig.5 A and 5 B. The first
column (A) gives the same amount of pattern and of background. The
second (B) 3 times as much background as of pattern.

1-st bl.	-	4d 2d 3n 1n
2-nd bl.	-	4n 2d 3d 1n
3-rd bl.	-	4n 2n 3d 1d
4-th bl.	-	4d 2n 3n 1d

4d 2n 3n 1n	4n 2d 3n 1n
4n 2d 3n 1n	4n 2n 3d 1n
4n 2n 3d 1n	4n 2n 3n 1d
4d 2n 3n 1d	4n 2n 3n 1n

Fig.5 A   Fig.5 B

With more than two colours we simply follow treadling
given for overshot.

Summer-&-Winter.

This would be a perfect weave for bound fabrics, and if
not for one drawback, it could produce with a larger number of
harness-frames effects very similar to simple tapestries. The
drawback is the number of treadles required. Only traditional
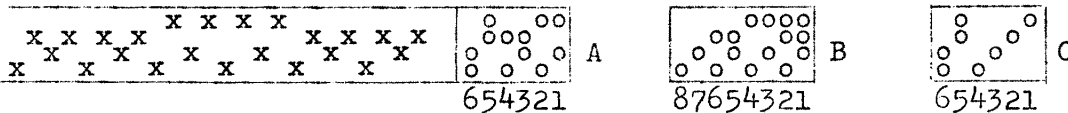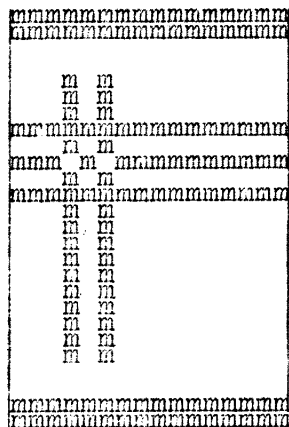Summer-&-Winter can be made in bound weaving on 6 treadles (fig.6).

Fig.6

To take full advantage of a 4-frame draft we should have
at least 8 treadles as in fig.6 B, better 10 treadles if tabby is
needed. In other words we must have an 8-frame loom to weave
4-frame patterns. On the other hand if we can use both feet at the
same time (which means much slower weaving) we can have a compound
tie-up as in fig.6 C. But even a compound tie-up would not help
with a large number of frames. This is because each shot of pat-
tern must be followed by the shot on an opposite shed. Thus is
the tie-up B - after tr.8 comes 1, after 7 - 2, after 6 - 3 etc.

Let us start with traditional patterns. The treadling for
the first block will be (tie-up 6 A): 4 - d, 1 - n, 3 - d, 2 - n;
and for the second block: 4 - n, 1 - d, 3 - n, 2 - d. Four co-
lours are not advisable, but three can be used by having two

shades in the background (e.g.: d - dark, n - neutral, w - white).
First block: 4 - d, 1 - n, 3 - d, 2 - w several times, then:
4 - d, 1 - w, 3 - d, 2 - n also several times. For the second
block we have: 4 - n, 1 - d, 3 - w, 2 - d, and 4 - w, 1 - d, 3 - n,
2 - d. This gives a mottled ground.

Now let us supposed that we would like to weave a more
"modern" pattern such as in fig.7 for instance. It has four dif-
ferent horizontal elements of the pattern
(or combinations of blocks): A, B, C, D.
And this is how they are treadled suppo-
sing that we have two colours only: d,
and n. Tie-up in fig.6 C; 4+5 etc. means
that we are pressing two treadles at a
time.

A - 4+5d, 3n, 3+5d, 4n.

B - 4d, 3+5n, 3d, 4+5n.

C - 1+4d, 2+3n, 1+3d, 2+4n.

D - 2+4d, 1+3n, 2+3d, 1+4n.

We can also have a sort of borders
without pattern. The vertical borders
should then be threaded (reading from
the left): 1 3 2 4 or 1 4 2 3. The
horizontal borders are treadled: 2+4d 2+3n 1+4d 1+3n 2+4n 2+3d
1+4n 1+3d.

Fig.7

A
B
C
A
D C
C
A
C
B
A

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The practical side of bound weaving is not less involved
than the theoretical one. First of all we must achieve a good ba-
lance between the sett of warp, its count, and the count of weft.

If we use wool for weft the best size for rather heavy
rugs is about 2/2 (two ply of no.2 or 560 yds per lb). The sett of
warp is then from 8 to 10 ends per inch. Either carpet warp (8/4
cotton) or 10/2 linen can be used. Single linen No.5 is not so
good because it may stretch at the edges.

For finer work we may use 4/2 wool (about 1150 yds/lb)
with the same warp as above set at 10 to 12 ends per inch.

The weaving is slow. The main difficulty is to keep the
edges from drawing in. Since all the take-up is in the weft, the
amount of weft to be left in each shed is much higher than with
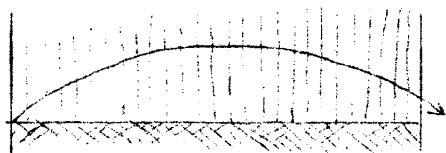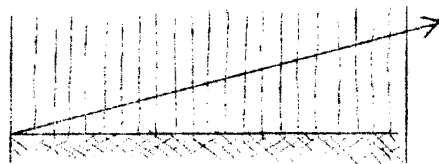any other kind of weaving. We can either throw the weft in an arc

Fig.8

Fig.9

as in fig.8, or at an angle as in fig.9. The latter is perhaps
easier. The exact amount of extra weft must be found by experiment.

If there is too little weft, the edges will pull in, and weaving will become impossible after a few inches. If there is too much of it, the edges will be uneven and soft.

The beating is done after changing the shed. Thus the rhythm is: throw the shuttle, adjust the angle of weft if necessary, change the shed, beat very hard several times. If the batten is not heavy enough it may be necessary to use a short comb or fork as in tapestry weaving. Even beating is extremely important - any variation will distort the pattern and the appearance of the fabric.

Finishing is the same as for tapestries. The warp is tied into small groups (4 ends) and the fringe left hanging. If so desired the ends can be pulled into the fabric and clipped off.

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PRACTICAL PROJECT. A rug 60 x 40 in Summer-&-Winter. Wool on linen.

Before making the draft we must decide what kind of wool we shall use, because the sett of warp and the number of ends in warp depend on this factor. Let us suppose that we have 3/2 wool (2 ply No.3) and that we shall set it at 10 ends per inch. Then the to tal No.of ends in the warp is 420 (2" for take-up and shrinkage). Now we can work out the draft. E.g.:

| 7x | 14x | 7x | 7x | 7x | 28x | 7x | 21x | 7x | 654321 |

The warp will be 10/2 linen (8/2 or even 12/2 can be substituted).

The colours: heather brown (d), old gold (n), and natural or ivory (w).
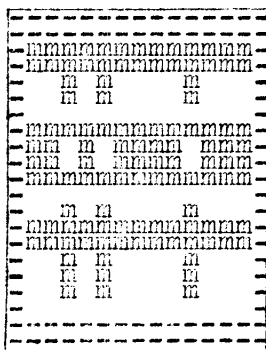
Treadling:

A - 2+4d 2+3n 1+4d 1+3w 2+4n 2+3d 1+4w 1+3d.

B - 4+5d 3n 3+5d 4w 4+5d 3w 3+5d 4n.

C - 4d 3+5n 3d 4+5w 4d 3+5w 3d 4+5n.

D - 1+4d 2+3n 1+3d 2+4w 1+4d 2+3w 1+3d 2+4n.

E - 2+4d 1+3n 2+3d 1+4w 2+4d 1+3w 2+3d 1+4n.

A
B
C
  D
B
  E
B D
C
B
C
D
A

We shall weave: 6 inches of A, 6" of B, 6" of C, 3" of D, 3" of B, 6"of E, 3" of B, 3" of D, 3" of C, 6" of B, 9" of C, 3" of D, and 6" of A,

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CERTIFICATES.

We have already written several articles about standards for weavers, and about other allied subjects. The general outcome of the discussion is that we cannot hope to have in the nearest future a national or international organisation, which would have any authority to issue weaving certificates of any kind. On the other hand such certificates issued by the existing organisations have no legal value.

This is because of the general confusion prevailing in the field of education both in Canada and United States. Education is subjected to the State or Provincial laws, and there is little chance of reconciling all these local laws, regulations, and customs to a point where a diploma issued in Manitoba would be recognised in Texas.

But we think that we found a way to get around this obstacle. In most cases the weaver is not after a formal diploma which would enable him a professional career, but a certificate that according to such an such requirements he should be considered as being on the level of an Apprentice, a Journeyman, or of a Master Weaver. The requirements established by different Guilds are not very different from the list of requirements which we have published some time ago (Master Weaver No.25, Jan.'56).

Therefore what a candidate must do to get such a certificate is quite simple. Take the copy of requirements for different grades of weaving skill, and make all the projects listed, until one comes to the level which is obviously too difficult.

Then when he thinks that he has fulfilled the requirements, he should go to his Guild, or any weaving studio, school, or private teacher generally known in weaving circles, and ask him to check up. If in the opinion of this organisation, person, or school he has reached the objective - a corresponding certificate should be issued.

The certificate can not simply state that Mr. or Mrs.X is a Master Weaver. Nobody has an authority to do that much. But it may say that the work submitted by Mr.X corresponds closely to the requirements generally accepted for this particular grade.

The wording of such a document should go on these lines:

"We .... undersigned certify hereby that in our "opinion Mr. .... has fulfilled the generally accepted require- "ments for the grade of a .... The copy of require- "ments appears on the verso of this certificate."

"We have personally inspected all samples and written "problems submitted by the candidate, and we found them satis-

"factory both as to the design and the technical execution."

"This certificate is issued in good faith and free of "charge."

Signed, etc.

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The beauty of this scheme is that it is really the candidate who becomes the judge, because with the requirements and instructions explicite enough, nobody would dare to submit his work unless he were 100% sure that it is acceptable. Therefore it will hardly ever happen that the submitted entries will have to be rejected.

The requirements must be specified on the certificate, simply to protect the candidate as well as the judges from unfair competition which could commercialise the whole idea by establishing ridiculously low standards. The same applies to the principle that the certificate itself must be free of charge. The candidate will pay only the actual cost of having his entries examined and of the operating expenses (printing, mailing etc.). There must be no suspicion of any profit in the whole transaction.

Entry forms which would have to accompany the entries must contain a statement signed (and perhaps sworn) by the candidate that all submitted articles and problems have been made by him without any help. This will give us further protection from any possible abuse.

The dandidates who have successfully passed tests in any Guild, school or similar organisation do not need to make again samples or problems already covered by the previous test. They send instead of entries - the former certificate with the list of requirements.

The only objection we can see to this project is that different teachers, schools, or Guilds may judge the same entries in a different way. This is inavoidable, but it happens as well in a Guild where the jury changes every year or so.

Detailed instructions will help here a lot. For instance instead of saying that the submitted work must have straight edges it should be stated how straight they are supposed to be (deviations in fraction of an inch). Instead of saying that the beating must be even, we shall say that the number of picks per inch can vary by not more than 5% for instance etc.

This is of course just an idea for discussion, and we shall welcome any suggestions.

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"MODERN WEAVER"

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