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(54) **Ascertaining a proportional reproduction factor**

(57) A method of ascertaining a proportional reproduction factor comprises attaching an elastomeric band (18, Figure 1), on which percentage markings (34) are imprinted, to a dimensionally-marked scale (24) or ruler. The zero-percentage end (16) of the band is fixed to the zero-measure end (22) of the scale, and the band is stretched until the end thereof (16a) opposite the zero-percentage end is juxtapositionally aligned with a scale marking representative, for instance, of the actual or starting size of the subject matter (i.e. three-dimensional object, copy, artwork, photograph, etc.) With the band thus stretched, the scale marking for the desired reduction size of the subject matter is noted, as well as the band percentage marking which is juxtapositionally aligned therewith. The latter percentage marking, then, is the factor to be used in the reproduction of the subject matter. The method comprises a corresponding process for ascertaining the factor to be used in enlargement of the subject matter. The apparatus (10) of the invention, usable in the above methods, comprises an expansible element (18) having incremental, reproduction-percentage graduation indicia (34) thereon.
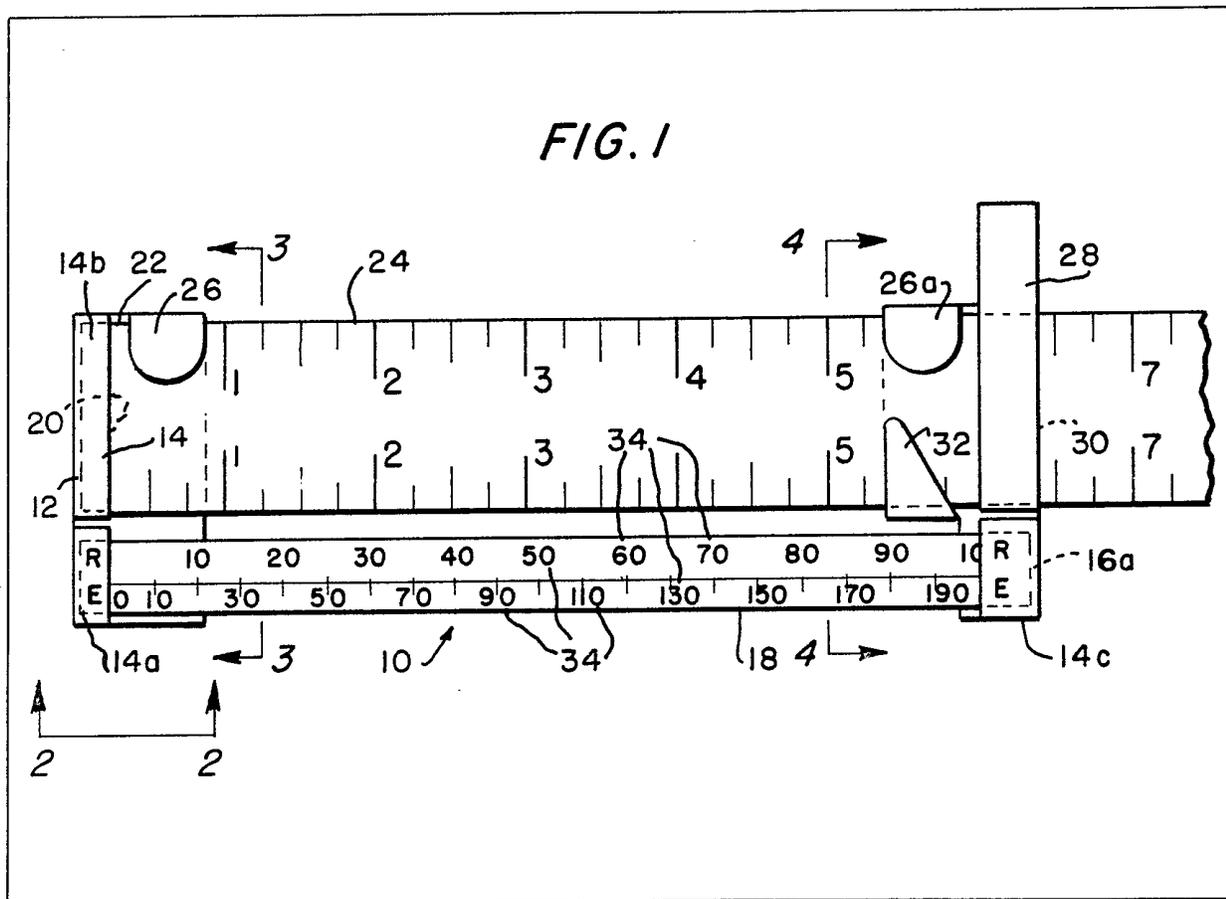
FIG. 1

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FIG.7
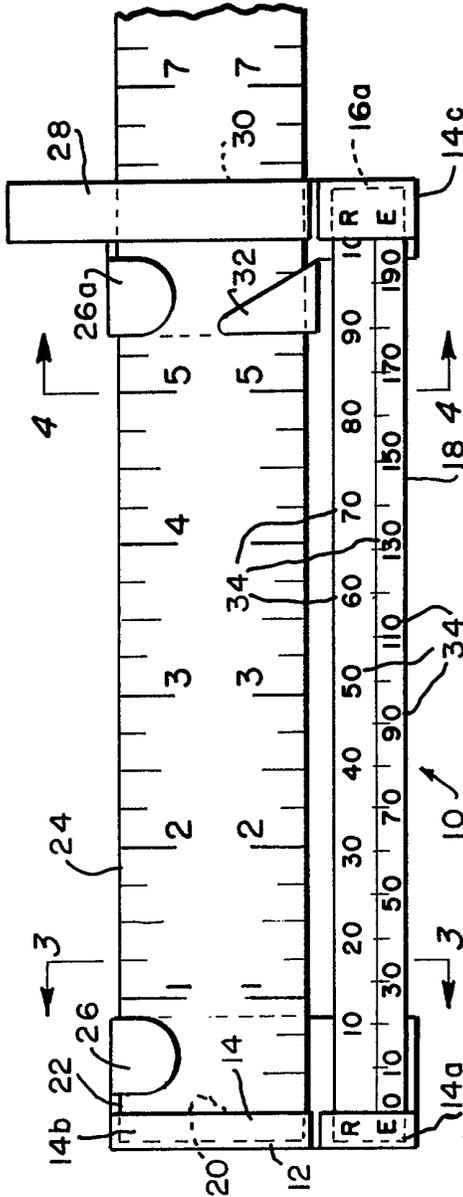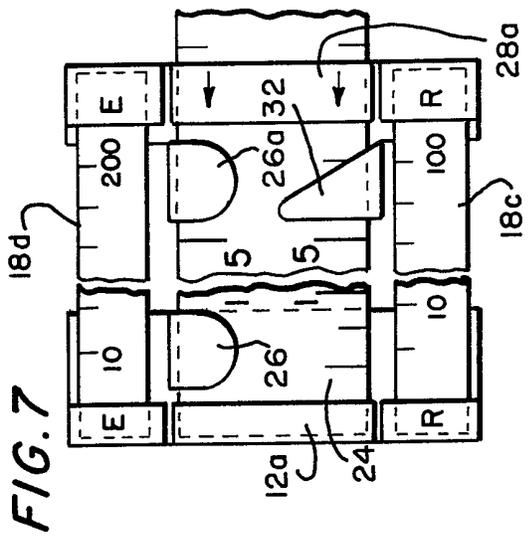
FIG.5

FIG.6

FIG.1
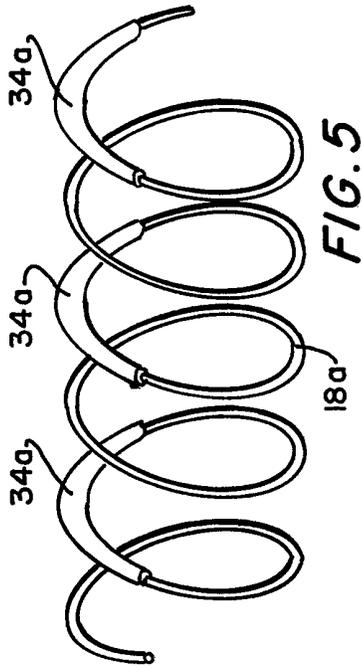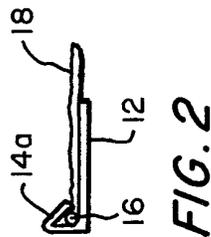
FIG.4

FIG.2
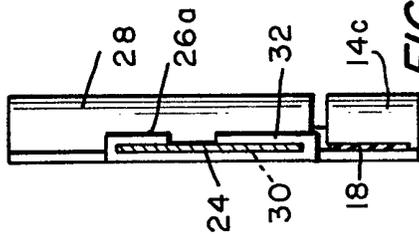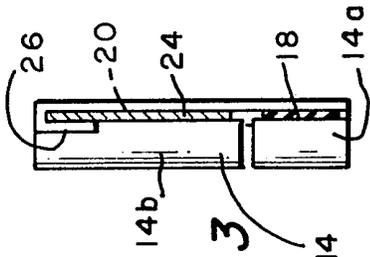
FIG.3
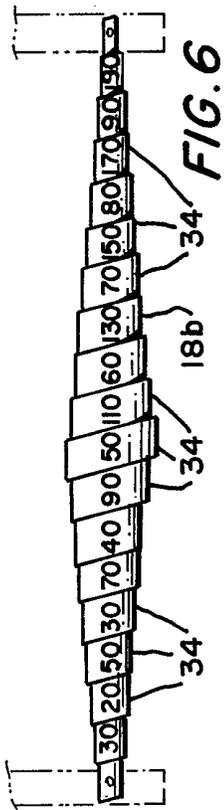
SPECIFICATION
Ascertaining a proportional reproduction factor

This invention pertains to methods and
apparatuses for ascertaining a proportional
5 reproduction factor to be used for three-
dimensional objects, and copy, artwork,
photographs and the like, having a given starting
dimension or dimensions, for reproduction thereof
to a desired reproduction dimension or
.10 dimensions.
Such methods and apparatuses are well known
in the art. Typical thereof is a sizing wheel, the
same comprising a pair of concentric disks, with
indicia thereon, and which are commonly and
15 centrally joined about a rotary center. By rotating
one of the disks, relative to the other, and noting
the appropriate indicia thereon, one may compare
copy starting sizes with reproduction sizes, and
read off the correct reduction or enlargement
20 factor from one of the disks.
The prior art practices, such as the foregoing,
are satisfactory and accurate, but they are all too
time consuming. Consider, if one has thirty, sixty,
or a hundred pieces of copy or artwork, of diverse
25 sizes, to be processed for as many reproduction
sizes, then the wheel device has to be used and
gyrated thirty, sixty, or the hundred times to derive
that number of enlargement factors. Also, in the
interim, or prior thereto, it is necessary to use a
30 scale on each of the pieces of copy, etc. to
determine the starting sizes of each, this so as to
have one of the input dimensions for each
handling of the wheel device.
What has been long needed, in this art, is a
35 much simpler method of ascertaining a
proportional reproduction factor for subject
matter, such as solid objects, or copy, artwork and
the like, and a simple facile apparatus usable in
such method.
40 According to one aspect of the invention there
is provided for subject matter such as a three-
dimensional object, and copy, artwork, and
photographs and the like, which subject matter
has a given, overall, starting dimension, a method
45 of ascertaining a proportional reproduction factor
to be used for altering said starting dimension, for
reproduction of said subject matter, to a
reproduction dimension, comprising the steps of
providing a substantially-uniformly-expansible
50 element which has incremental, reproduction-
percentage graduation indicia thereon, including a
zero-percentage indicium and a one hundred
percent indicium; providing a reference for the
reproduction dimension, aligning the zero-
55 percentage indicium of said element with a zero-
dimension end of the reference; expanding said
element until the zero-percentage and one
hundred-percent indicia bridge the starting
dimension; observing the element percentage
60 indicium which, with said zero percentage
indicium, bridges the reproduction dimension; and
noting the observed indicium as the reproduction
factor.
According to another aspect of the invention

65 there is also provided a method of ascertaining a
proportional reproduction factor to be used for
altering said starting dimension, for reproduction
of said subject matter, to a reproduction
dimension, comprising the steps of: providing a
70 substantially-uniformly-expansible element which
has incremental, reproduction-percentage
graduation indicia thereon, lengthwise thereof,
with a zero-percentage indicium at one end
thereof; providing a reference for the reproduction
75 dimension; aligning the zero-percentage indicium
of said element with a zero-dimension end of said
reference; expanding said element until said one
end and the end thereof which is opposite said
one end bridge said starting dimension indicia on
80 said reference; observing the element percentage
indicium which, with said zero-percentage
indicium of the element, bridges said reproduction
dimension; and noting said observed indicium as
the reproduction factor for the subject matter.
85 According to a further aspect of the invention
there is provided for subject matter, such as three-
dimensional objects, and copy, artwork,
photographs and the like, having a given, overall,
starting dimension, apparatus for ascertaining a
90 proportional reproduction factor to be used for
altering said starting dimension, for reproduction
of said subject matter, to a reproduction
dimension, comprising; a double-ended,
substantially-uniformly-expansible element; said
95 element having incremental, reproduction-
percentage graduation indicia.
Embodiments of the invention will now be
described by way of example with reference to the
accompanying drawings, in which:—
100 FIGURE 1 is an elevational view of an
embodiment of an apparatus for ascertaining a
proportional reproduction factor, shown attached
to a discontinuous scale;
FIGURE 2 is a fragmentary, end view, taken
105 along 2—2 of Figure 1;
FIGURE 3 is a cross-sectional view taken along
section 3—3 of Figure 1;
FIGURE 4 is a cross-sectional view taken along
section 4—4 of Figure 1;
110 FIGURE 5 is an elevational view of an
alternative embodiment of a double-ended,
substantially-uniformly-expansible element usable
in the novel means of the invention;
FIGURE 6 is an elevational view of another
115 alternative embodiment of such element, and
FIGURE 7 is a further alternative embodiment.
As shown in the Figures 1—4, a first
embodiment of the apparatus 10 comprises a clip
12 having an edge 14 which is turned back on
120 toward the plane of the clip. Edge 14 is divided
into portions 14a and 14b. Portion 14a secures an
enlarged end 16 of an elastomeric band 18.
Portion 14b, however, defines an opening or slot
20 in which to receive the zero dimension end 22
125 of a scale 24. An overlapping tongue 26, integral
with the clip, receives an edge of the scale 24.
The opposite end of the band 18, also having
an enlarged end 16a is secured in another turned-
back portion 14c of a slide bar 28. Bar 28 has an

elongate aperture 30 formed therein in which slidably to receive an intermediate portion of the scale 24. Integral with the bar 28 is another overlapping tongue 26a as well as a companion
5 tongue 32. Tongues 26a and 32 co-operate to retain the bar 28 in an attitude normal to the scale 24 against the bias of the band 18.

Band 18 has incremental, reproduction-percentage graduation indicia 34 printed thereon.
10 As illustrated, there are "R" (reduction) percentage indicia, and "E" (enlargement) percentage indicia as well. The former comprises increments from zero to one hundred percent, and the latter comprises increments from zero to two
15 hundred percent. Clearly, the latter could have increments to a thousand percent.

A method of the invention, particularly implemented by the apparatus 10, comprises the ascertaining of a proportional reproduction factor
20 for subject matter which is best explained by an arbitrary example. Assuming that the starting size of the subject matter — a piece of artwork, for example — has largest dimension of six inches, and it must be fitted into a reproductive space of
25 three inches. Clearly, the artwork shall have to be reduced by fifty percent. Such can be readily determined, mentally. Even so, with reference to Figure 1, it will be noted that the slide bar 28, with the band 18 attached, is just coming up on the
30 scale measurement of six inches. What one does, as the Figure 1 depiction suggests, is to move the slide bar 18 into juxtapositioned alignment with the indicium on the scale 24 which corresponds with the starting size of the subject matter — i.e.,
35 the artwork — hence six inches. Then, one has only to read the indicium "50", which is juxtapositionally aligned with the desired reproduction size (i.e. three inches), to ascertain that the reduction factor for the artwork is fifty percent.
40 For any reduction, then, which is not readily subject to quick, mental calculation, it is only necessary to move the slide bar 28 to the starting size of the subject matter, note on the scale 24 the desired reduction size, and observe in
45 juxtapositioned alignment the correct reduction percentage indicium on the band 18. As will be apparent, the reduction percentage indicia or factors are read from the "R" incremental indicia.

For any enlargement, a similar process is
50 performed. However, in this, the enlargement percentage indicia or factors are, of course, read from the "E" incremental indicia. Again, for the purposes of illustration, it will be assumed that the starting size of the subject matter is three inches,
55 and it must be enlarged to fit into a reproduction space of six inches. One pursues an exercise similar to the foregoing, albeit somewhat in reverse. The slide bar is moved along the scale 24 until the band 18 indicium for "100" (i.e. midway
60 between "90" and "110") is juxtapositionally aligned with the scale 24 indicium for three inches. At this extension of the band 18, the "200" indicium will be juxtapositionally aligned with the six-inch, desired reproduction size.
65 Hence, it will be appreciated that the subject

matter must be enlarged by a factor of two hundred percent. Taking another example, in which the enlargement reproduction factor is not self-evident, the starting size is five inches, and
70 the subject matter must be reproduced at seven inches. The same exercise will yield up the correct factor. Again, the slide bar 28 is moved to the right until the band 18 indicium for "100" is aligned with the scale 24 indicium for five inches.
75 The slide bar 28, of course, will be aligned with the scale indicium for ten inches. However, the band 18 indicium which is then aligned with the scale indicium for seven inches (i.e. the desired reproduction size) is "140". Accordingly, the
80 reproduction factor for a five-inch item of subject matter, which must be reproduced in seven inches, is one hundred and forty percent (enlargement).

Alternative embodiments of the apparatus can
85 employ an expansion spring 18a (Figure 5) in which alternative loops of the spring have sleeves 34a representative of incremental indicia. Also, alternative constructions of the means can comprise an expansion band, such as are used
90 with wristwatches, or a double-coil spring 18b (Figure 6) on which indicia 34 are printed, engraved or embossed. Spring 18b, as shown, will serve both reduction and enlargement factor-determining, as alternate coils can carry indicia for
95 reduction, and those therebetween indicia for enlargement.

The embodiment shown in Figure 7 comprises an extended clip 12a which, with a suitably devised bar 28a, receives an enlargement band
100 18d at one side of the scale 24, and a reduction band 18c at the other side.

The scale 24 is most useful; it is an ever present tool for sizing artwork, photographs, and the like, and for sizing reproduction spaces in
105 layouts, dummies etc. Yet, for most purposes, the scale will not be necessary. That is, the essential of the embodiments of the invention disclosed with reference to the Figures resides in the bands 18, 18a . . . . 18d. For example, consider the band
110 18 of Figure 1 removed from the scale 24, and the aforementioned proportioning problem of enlarging a five-inch subject matter to a seven-inch reproduction space. Again, it is only necessary to align the zero end of the band with
115 an edge of the subject matter, and expand the band until the "100" indicium thereon is aligned with the opposite edge of the subject matter. With the band thus expanded, the zero end thereof aligned again with an edge of the reproduction
120 space, and the indicium on that portion of the band which aligns with the opposite edge of the space will be "140".

CLAIMS
1. For subject matter, such as three-
125 dimensional objects, and copy, artwork, photographs and the like, having a given, overall, starting dimension, a method of ascertaining a proportional reproduction factor to be used for altering said starting dimension, for reproduction

of said subject matter, to a reproduction dimension, comprising the steps of: providing a substantially-uniformly-expansible element which has incremental, reproduction-percentage
5 graduation indicia thereon, including a zero-percentage indicium and a one hundred-percent indicium; providing a reference for the reproduction dimension, aligning the zero-percentage indicium of said element with a zero-
10 dimension end of the reference; expanding said element until the zero-percentage and one hundred percentage indicia thereof bridge the starting dimension indicia on the reference; observing the element percentage indicium which,
15 with the zero-percentage indicium of the element, bridges the reproduction dimension on the reference; and noting the observed indicium as the reproduction factor for the subject matter.
 2. For subject matter, such as three-
20 dimensional objects, and copy, artwork, photographs and the like, having a given, overall, starting dimension, a method of ascertaining a proportional reproduction factor to be used for altering said starting dimension, for reproduction
25 of said subject matter, to a reproduction dimension, comprising the steps of: providing a substantially-uniformly-expansible element which has incremental, reproduction-percentage graduation indicia thereon, lengthwise thereof,
30 with a zero-percentage indicium at one end thereof; providing a reference for the reproduction dimension; aligning the zero-percentage indicium of said element with a zero-dimension end of said reference; expanding said element until said one
35 end and the end thereof which is opposite said one end bridge said starting dimension incidia on said reference; observing the element percentage indicium which, with said zero-percentage indicium of the element, bridges said reproduction
40 dimension; and noting said observed indicium as the reproduction factor for the subject matter.
 3. A method according to Claim 1, wherein said

element-providing step comprises providing an element, as aforesaid, which has incremental,
45 reproduction-percentage graduation indicia thereon in excess of one hundred percent.
 4. A method according to Claim 2, wherein said element-providing step comprises providing an element, as aforesaid, which has incremental,
50 reproduction-percentage graduation indicia thereon ranging from zero percent to a maximum of one hundred percent.
 5. For subject matter, such as three-dimensional objects, and copy, artwork,
55 photographs and the like, having a given, overall, starting dimension, apparatus for ascertaining a proportional reproduction factor to be used for altering said starting dimension, for reproduction of said subject matter, to a reproduction
60 dimension, comprising: a double-ended, substantially-uniformly-expansible element; said element having incremental, reproduction-percentage graduation indicia.
 6. Reproduction factor ascertaining apparatus,
65 according to Claim 5, wherein said element comprises means for replaceably attaching the graduation-commencing or zero-percentage end of said element to a dimensionally-graduated scale.
70 7. Reproduction factor ascertaining apparatus, according to Claim 6, wherein said element further comprises means coupled to the end of said element which is opposite said zero-percentage end thereof for slidably engaging a dimensionally-
75 graduated scale.
 8. A method of ascertaining a proportional reproduction factor, substantially as herein described with reference to the accompanying drawings.
80 9. Apparatus for ascertaining a proportional reproduction factor, substantially as herein described with reference to the accompanying drawings.