

March 11, 1952

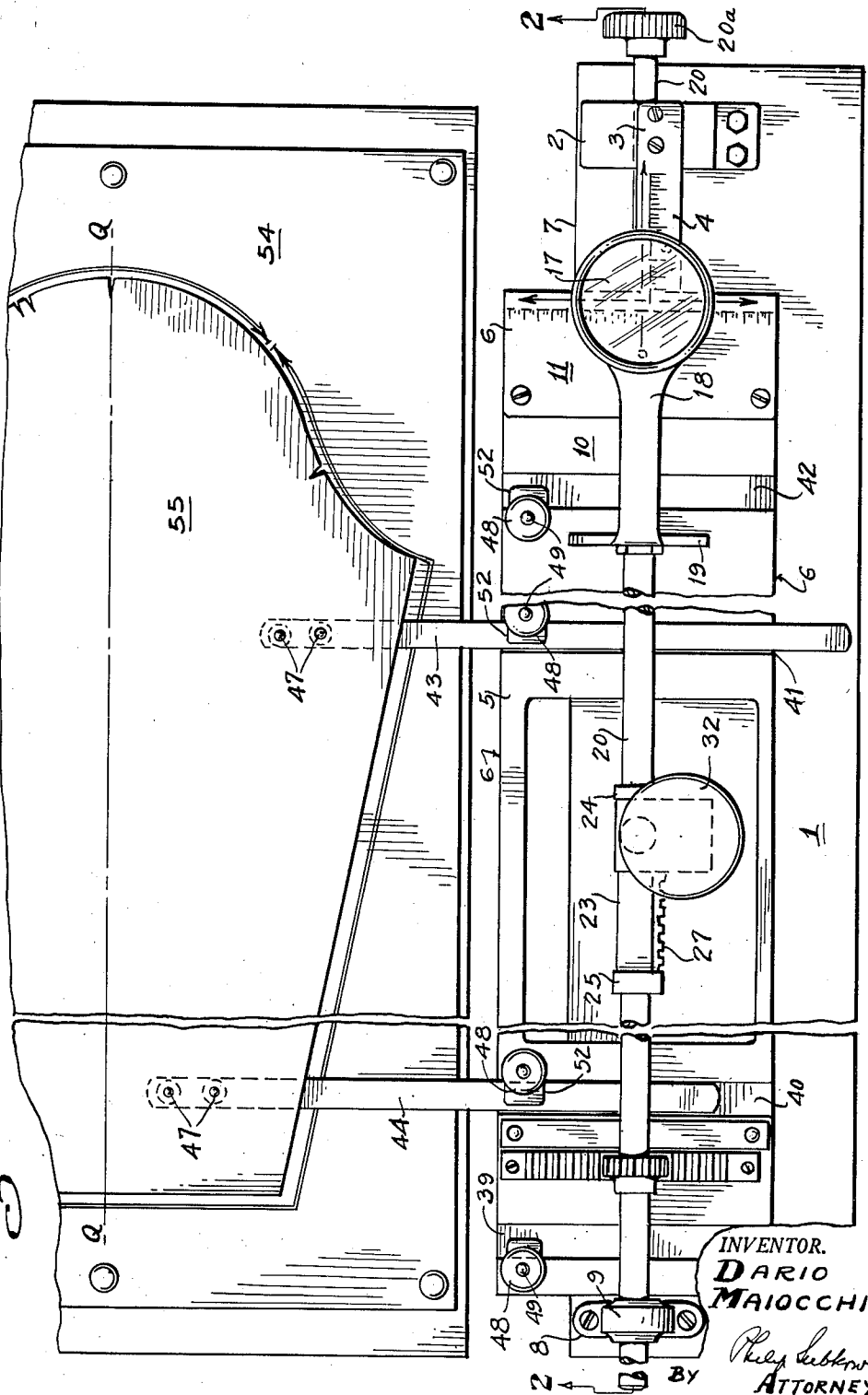
D. MAIOCCHI
PATTERN MACHINE

2,589,105

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3 Sheets-Sheet 1

Fig. 1.



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Fig. 2.

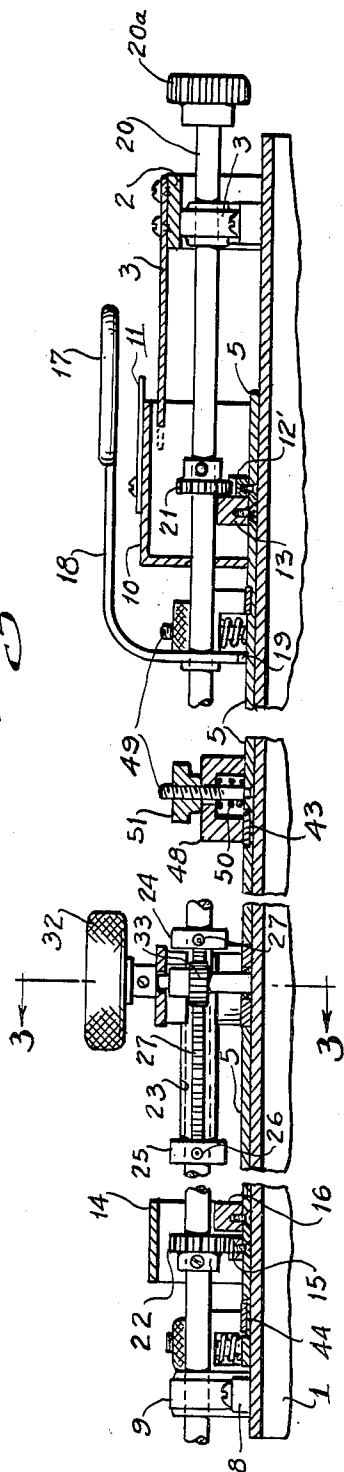


Fig. 4.

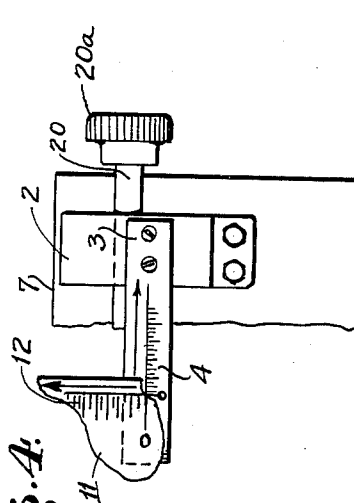
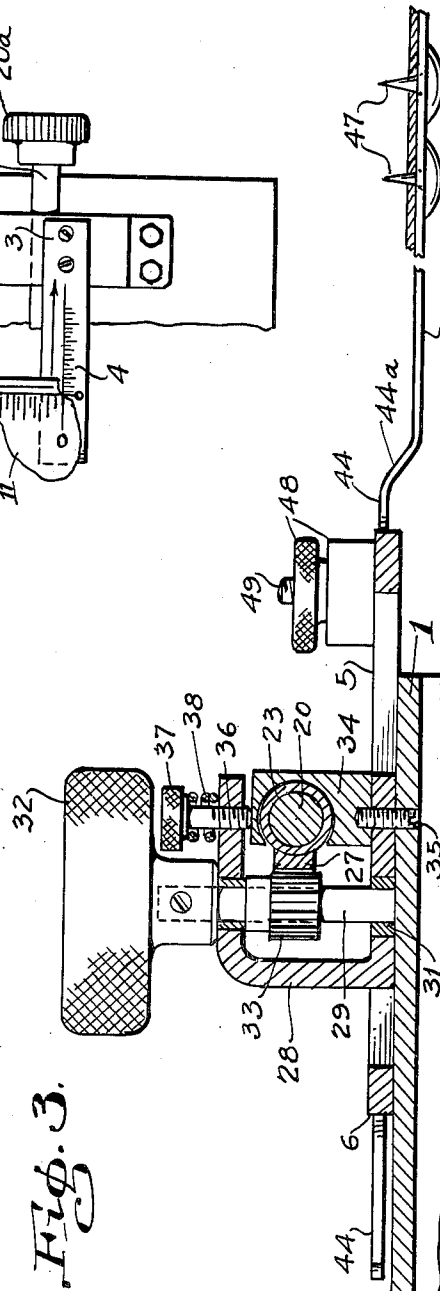


Fig. 3.



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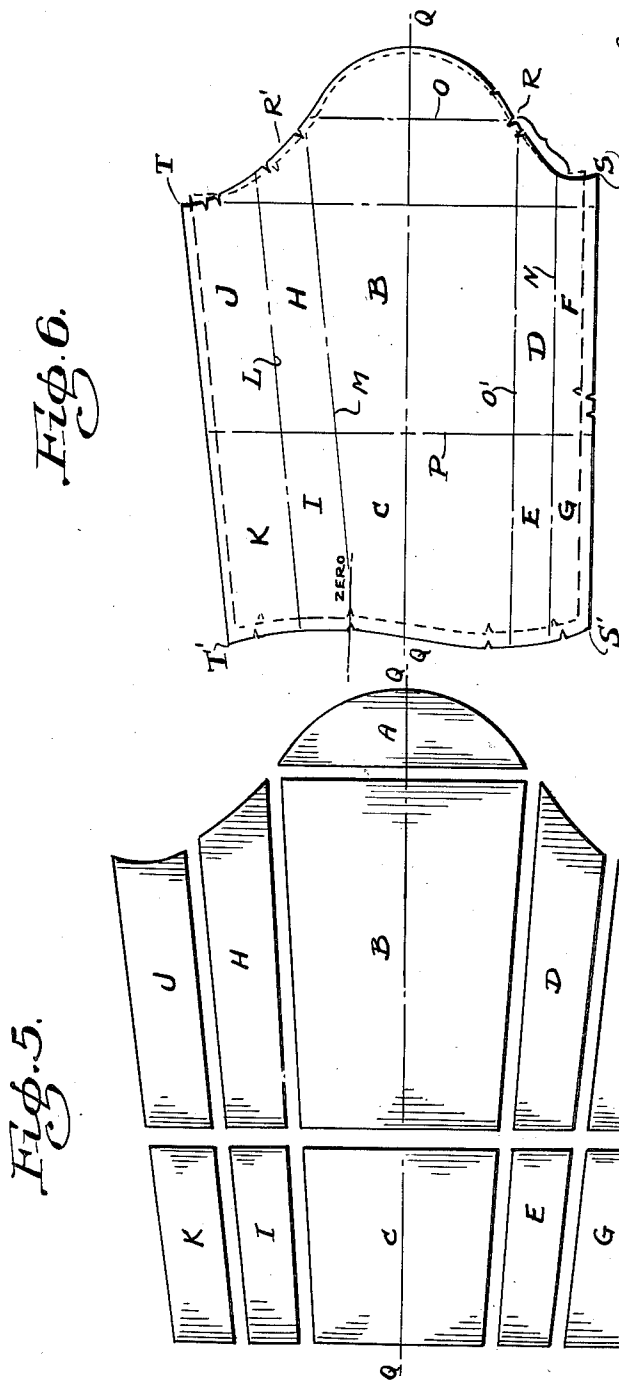
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PATTERN MACHINE

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10 Claims. (Cl. 33—12)

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This invention relates to a geometrical and drafting instrument, particularly useful for the layout of patterns and templets. It is particularly useful in the layout of templets and patterns from a master templet and pattern for the purpose of introducing variations in size and dimension into the templet or pattern.

It is frequently necessary in the cutting of sheet material to be fabricated into various shapes, to lay out upon a sheet of material an outline of the shape to be cut from the sheet material for fabrication, to act as a pattern or template. Such practice is followed in sheet metal work for the fabrication of various shapes. It is common practice in the garment industry for the cutting out of garments from textiles.

It is frequently necessary in such arts to fabricate various sizes of the same general design. Thus, for example, in the garment industry it is common practice in laying out a line of garments to draw a master pattern for what is termed the ideal size. It is then the practice to derive patterns of various sizes from this ideal size pattern by constructing patterns which bear certain size relations to the ideal pattern. This has been accomplished previously by geometric construction employing the master pattern as a base and deriving therefrom by geometric layout a subsidiary pattern which differs from the master pattern by the dimensions necessary to establish the various sizes. This is called "grading" in the garment industry.

It is an object of my invention to devise an instrument which will accomplish this result without the necessity of establishing the geometric construction previously referred to. From this point of view, my instrument may be termed a drafting instrument in that it is possible by using the same to construct the subsidiary size patterns by using the master pattern as a base directly upon a sheet material which is to be cut into the subsidiary pattern or templet.

It is an object of my invention to construct an instrument which will employ the master pattern as the drafting guide and to permit the adjustment of the pattern with respect to a sheet upon which the subsidiary size pattern is to be constructed in such manner that the pattern may be moved in a controlled manner and determinable degree over the sheet to draft directly from the ideal pattern the subsidiary patterns for the subsidiary sizes.

I accomplish this purpose by constructing an instrument in such fashion that it will receive the ideal pattern, which has been constructed

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from some sheet material having sufficient rigidity for the purpose, over a sheet of material which will receive the subsidiary pattern, drafted thereon from the master pattern. The instrument contains means for holding this master pattern in spaced relation to the sheet of paper upon which the subsidiary pattern is drawn, and means for moving the master pattern with respect to the sheet in various directions and particularly by means independently movable in two mutually perpendicular directions parallel to the base with means for indicating and controlling the degree of motion in these two perpendicular directions so as to move the pattern in any direction to the design desired.

These and other objects of my invention will appear more clearly from the following description when taken together with the drawings, in which

Fig. 1 is a plan view of my invention showing in fragmentary form the relationship of the master pattern and pattern-receiving sheet mounted with respect to the instrument;

Fig. 2 is a section taken on the line 2—2 of Fig. 1;

Fig. 3 is a section taken on the line 3—3 of Fig. 2;

Fig. 4 is a fragmentary view of one detail of my invention;

Fig. 5 is an illustrative drawing showing the relationship of a subsidiary to a master pattern;

Fig. 6 is a schematic drawing of the application of my invention to the development of the subsidiary of the master pattern; and

Fig. 7 is a detail of Fig. 6.

The instrument has a base 1 upon which is mounted a bracket 2 carrying a bearing 3 and a scale plate 4 graduated in inches and fractions of an inch. Plate 5, running substantially the length of the base 1, has an edge 6 which overhangs the longitudinal edge 7 of the base 1. The bracket 8 mounted at the other end of the base 1 carries a bearing 9. The plate 5 is thus slidably mounted upon the base 1 between the brackets 2 and 8 with its ends suitably spaced therefrom.

Mounted on the plate 5 is a bracket 10 under which the ruled plate 4 may pass. On the top of the bracket 10 and running in a direction perpendicular to the axis of plate 4 is a plate 11 which is screwed to the top of the bracket 10 and carries a scale 12 graduated similarly to plate 4. Each scale carries inches and fractions of an inch on both sides of a zero marking. Mounted inside the bracket 10 and upon the plate 5 is a rack 12'. A guide bar 13 abuts the side of 12'.

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Mounted upon the other end of the plate 5 is another bracket shown at 14 under which is mounted, upon plate 5, a rack 15 and a guide bar 16 abutting rack 15.

A magnifying glass 17 is mounted upon a bent arm 18 which is mounted on a bracket 19 positioned in the plate 5. A shaft 20 carrying a knob 20a is journaled in bearings 3 and 9 and extends longitudinally of the plate 5, passes through a bore in the bracket 19, and carries a pinion 21 which is in mesh with the rack 12' and the face of which abuts the guide bar 13. The shaft also carries a pinion 22 which is in mesh with the rack 15. The face of the pinion abuts the guide bar 16.

Positioned on the shaft 20 intermediate the racks and pinions previously referred to is a sleeve 23 carrying collars 24 and 25 mounted upon the shaft 20 by means of set screws 26 and 27. The sleeve 23 carries a rack 27. Mounted upon the base 1 is a bracket 28 through the top of which passes a spindle 29 suitably journaled in bearings in the top of the bracket 28 and at 31 on the base 1. The spindle 29 carries a knurled knob 32 and a pinion 33 which is in mesh with the rack 27.

Mounted underneath the bracket 28 and surrounding the sleeve 23 is a split block 34 which is mounted in the base 1 by means of a screw 35. The split block 34 envelopes the sleeve 23 but stops short of the rack 27. Mounted in the top of the bracket 28 is a screw 36 having a knurled knob 37 abutting a spring 38 mounted upon bracket 28. The end of the screw bears against the block 34 to cause it to grip the sleeve 23 when the screw is screwed down.

Formed in the plate 5 is a plurality of transverse grooves, shown as four in the drawing at 39, 40, 41, and 42. The grooves extend across the plate 5 in a direction perpendicular to the axis of shaft 20. Into these grooves may be set arms of various lengths such as those shown at 43 and 44. Each of these arms is of a width and thickness to fit into the grooves and to form a coplanar surface with the top of the plate 5 when the arms are positioned in the grooves. Each of the arms is downwardly bent, as shown at 44a, so that the underneath side of the arm shown at 45 is substantially coplanar with the underneath side of base 1 so that when base 1 is placed on a table, the arms will bear on the table with sufficient clearance to move over the surface of the table. As shown in the drawings each of the arms at the ends thereof carries pins 47. The arms are flat so that the paper pattern supported on them is not raised to any material degree above the paper on which the graded pattern is to be drawn. The pins are small and cause little distortion of the paper pattern.

Mounted on the plate 5 over the grooves and the arms 44 are clamps 48 which fit over screw threaded pins 49 mounted in plate 5 and encompass a spring 50 which abuts the plate 5 and the underneath side of clamp 48. A knurled screw 51 is threaded on the pin 49 and abuts the top of the clamp 48. One edge 52 of the clamp presses against the plate. It will thus be seen that each of the arms 43 and 44 extends beyond the base 1 and plate 5 and each may be adjusted longitudinally of the grooves in plate 5 independently of each other.

The rotation of the knob 20a mounted upon the shaft 20 will move the plate 5 and the racks 15 and 12' in a direction perpendicular to the axis of the shaft 20 and perpendicular to the edge 6

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of the plate 5 and parallel to the axis of the carrier arms 43 and 44, while the rotation of the knob 32 will move the plate 5 in a direction parallel to the axis of shaft 20 and the edge 6 and perpendicular to the axis of the carrier arms 43 and 44. These motions are made independently. The scales 4 and 12 provide means for measuring the degree of each of such mutually independent and mutually perpendicular motions with respect to the base 1.

The application of this instrument to the grading of garment patterns will illustrate one of its preferred utilities although, as has been explained above and as will be understood by those skilled in this art, the application is merely by way of illustration, and other uses, as for example, the increasing or decreasing of the dimensions of templates, may also be accomplished by this instrument.

In order to illustrate its utility for the grading of garment patterns reference may be had to Fig. 5 to show how a pattern is altered. In Fig. 5 this is illustrated by means of a graphical representation of a method for increasing the size of a sleeve pattern from an ideal pattern design.

As shown in Fig. 6 in dotted line, a sleeve pattern consists of a trapezoid the ends of which are the development of an ellipse at one end, that is, the end which fits into the shoulder arm hole, and the other end the development of substantially a circle or an ellipse. In order to increase the size of the pattern, the ideal pattern is divided into panels, illustrated at A, B, C, D, E, F, G, H, I, J, and K. The line O is drawn to intersect the points of inflection of the developed curve and the lines M and O are drawn from these points of intersection parallel to the longitudinal edges of the pattern. Lines L and N are drawn parallel to the lines M and O at about the midpoint between said points of inflection and the outside longitudinal edges of the pattern. Line P is drawn about midway of the longitudinal edges. There is thus formed panels A to K, inclusive. Thus, for example, if the pattern is to be increased to the next size panel, A is separated from panel B by $\frac{1}{8}$ ", panel C is separated from panel B by $\frac{1}{8}$ ", and panels H, I, D, and E are each separated from the adjoining panels B and C by $\frac{1}{8}$ ", and the panels F, G, J, and K are separated from their adjoining panels D, E, H, and I, respectively, by $\frac{1}{8}$ ".

With my instrument it is possible to cause this expansion of the pattern without cutting it into panels either mechanically or graphically. To accomplish this the instrument is mounted upon a drafting board adjacent a sheet of paper shown at 54 and a pattern 55 which is to be graded is mounted upon arms 43 and 44 on their pins 47. As illustrated in Fig. 1 two such arms are employed but if the pattern is larger so that it encompasses the grooves 39 and 42, additional arms may be inserted in the grooves and the pattern also mounted on the pins 47 of such arms. The arms are then adjusted laterally in their corresponding grooves to adjust the axis, for example, Q—Q of the pattern shown in Fig. 1, Fig. 5, and Fig. 6, so that the axis Q—Q is parallel to the edge 6 of the plate 5. The pattern is thus mounted on the arms with the plane of the pattern substantially parallel to the plane of the base 1 and plate 5. The knobs may then be screwed down to clamp the arms in position. The knobs 20a and 32 are adjusted until the O points on the scales 12 and 4 are at intersection. This is there-

fore the O position of the pattern over the paper 54. By screwing down the knob 37 the brake or split block 34 grips the sleeve 27 to hold the plate 5 in position with respect to the shaft 20. It is not necessary, although if it is desired it may be done, to outline the O position of the pattern.

As shown in Fig. 6, this O position is shown in dotted line. If the brake is tight, by slightly releasing the grip of the brake 34 by rotating the knob 37, knob 32 may be rotated in order to move plate 5 and the pattern mounted upon the arms to the right, as illustrated in Fig. 6, $\frac{1}{8}$ ". The movement may be read on scale 4. When it is moved to this position, by screwing down 37 split blocks or brake 34 may lock plate 5 in position at this point. It is not necessary to screw the brake down to locking position. Enough friction to prevent accidental displacement is all that will be needed. The outer edge of the pattern (at panel A, Fig. 5) between the points of inflection of the outer developed curve may then be drawn as outlined by the ideal pattern. This is shown in full line between R—R' on Fig. 6. The pattern is then shifted downward by rotating the knob 20a clockwise until the plate 5 has been shifted $\frac{1}{4}$ " as read upon the scale 12. The pattern is then shifted backward (i. e., to the left, Fig. 6) by counterclockwise rotation of the knob 32 for a distance of $\frac{1}{8}$ " which is read on scale 4. The pattern is then outlined from R to S and S to S'.

In the next step, by rotation of the knobs 32 and 20a, the instrument is set back to O; in other words, the O of the scale 12 and the scale 4 intersect. The pattern is then moved to the right (Fig. 6) by rotation of the knob 32 in clockwise direction until the plate 5 has been moved $\frac{1}{8}$ " to the right as marked on scale 4. It is then moved in a direction perpendicular to the axis of 20 by rotation of the knob 20a in a counterclockwise direction to move the pattern in a direction perpendicular to the axis of 20 for $\frac{1}{4}$ " as read on scale 4. The knob 32 is then rotated in a counterclockwise direction to move the pattern backward, i. e., to the left (Fig. 6), $\frac{1}{8}$ " as read on scale 4. The outline of the pattern between the points R' to T and T to T' is then drawn. The instrument is again brought to O by rotating the knobs 20a and 32 until the zero points on the scales 12 and 4 intersect. Then by counterclockwise rotation of the knob 32 the plate 5 is moved to the left $\frac{1}{4}$ " (see Fig. 6). The line S' and T is then drawn as outlined by the ideal pattern.

There is thus developed a graded pattern which differs in size from the master pattern by the expansion shown in Fig. 5.

It will be understood that sizes smaller than the ideal pattern and also different larger patterns may thus be constructed to obtain graded patterns which differ from the master pattern according to accepted grading standards for patterns of different size based on a given ideal pattern. Wherever used in this application, the term "two mutually perpendicular directions" shall mean and include any direction vector resolvable into two mutually perpendicular directions.

While I have described a particular embodiment of my invention for the purpose of illustration, it should be understood that various modifications and adaptations thereof may be made within the spirit of the invention as set forth in the appended claims.

I claim:

1. A pattern grading instrument for marking a pattern on a sheet of paper adapted to receive the said pattern marking, comprising a base, means mounted on said base for holding and supporting the body of a sheet of paper in the form of a pattern in extended position over and adjacent the said sheet of paper, means for moving said pattern holding and supporting means in any desired direction over said sheet in a plane parallel to the plane of the base, and graduated means for measuring the degree of said motion in two mutually perpendicular directions with respect to the base.

2. A pattern grading instrument for marking a pattern on a sheet of paper adapted to receive the said pattern marking, comprising a base, means mounted on said base for holding and supporting the body of a sheet of paper in the form of a pattern in extended position over and adjacent the said sheet of paper, means for independently moving said pattern holding means in two mutually perpendicular directions over said sheet and with respect to said base, and graduated means mounted on said base for measuring the degree of movement in each of said mutually perpendicular directions.

3. A pattern grading instrument, comprising a base, a plate movably mounted on said base, means mounted on said base for moving said plate in two mutually perpendicular directions in respect to said base, arms extending beyond said base and beyond said plate, means for adjustably mounting said arms on said plate, and means for mounting a pattern in the form of sheet material on said arms and for supporting the body of said pattern.

4. A pattern grading instrument, comprising a base, a plate movably mounted on said base, means mounted on said base for moving said plate in two mutually perpendicular directions in respect to said base, arms extending beyond said base and beyond said plate means on said arms for holding and supporting the body of a flexible pattern, means for adjustably mounting said arms on said plate, and means mounted on said base for measuring the degree of motion in each of said directions, and means for mounting a pattern in the form of sheet material on said arms.

5. A pattern grading instrument, comprising a base, a plate movably mounted on said base, means mounted on said base for moving said plate in two mutually perpendicular directions in respect to said base, arms extending beyond said base and beyond said plate, means for adjustably mounting said arms on said plate in a direction parallel to one of said mutually perpendicular directions, and means for mounting and supporting a pattern in the form of sheet material on said arms.

6. A pattern grading instrument, comprising a base, a plate movably mounted on said base, means mounted on said base for moving said plate in two mutually perpendicular directions in respect to said base, means mounted on said base for measuring the degree of motion in each of said directions, arms extending beyond said plate, means for adjustably mounting said arms on said plate in a direction parallel to one of said mutually perpendicular directions, and means for mounting and supporting the body of a pattern in the form of sheet material on said arms.

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7. A pattern grading instrument, comprising a base, a shaft rotatably mounted on said base, a plate slidably mounted on said base underneath said shaft, a rack mounted on said plate perpendicular to the axis of said shaft, a pinion mounted on said shaft in mesh with said rack, a rack mounted on said shaft, a second shaft rotatably mounted on said base, the axis of said second shaft being substantially perpendicular to the axis of said first shaft, a second pinion mounted on said second shaft in mesh with the rack mounted on said first shaft, grooves positioned in said plate and extending in a direction substantially perpendicular to said first shaft, arms positioned in grooves and extending beyond the edge of said plate and independently adjustable in said grooves longitudinally thereof, and means on said arms for positioning sheet material with its plane substantially parallel to said base.

8. A pattern grading instrument, comprising a base, a shaft rotatably mounted on said base, a plate slidably mounted on said base underneath said shaft, a rack mounted on said plate, perpendicular to the axis of said shaft, a pinion mounted on said shaft in mesh with said rack, a rack mounted on said shaft, a second shaft rotatably mounted on said base, the axis of said second shaft being substantially perpendicular to the axis of said first shaft, a second pinion mounted on said second shaft in mesh with the rack mounted on said first shaft, arms adjustably mounted on said plate and extending beyond the edge of said plate and means for independently adjusting the extension of said arms beyond the edge of said plate, and means on said arms for positioning sheet material with its plane substantially parallel to said base.

9. A pattern grading instrument for marking a pattern on a sheet of paper or other markable material adapted to receive said pattern markings, comprising a base, a plate movable on said base in all directions in a plane parallel

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to said base, means mounted on said base for moving said plate in any of said directions, arms extending beyond said base and beyond said plate, means for adjustably mounting said arms on said plate, and means for mounting a pattern in the form of sheet material on said arms and for supporting the body of said pattern.

10. A pattern grading instrument for marking a pattern on a sheet adapted to receive said pattern markings, comprising a base, a plate movable on said base in all directions in a plane parallel to said base, means mounted on said base for moving said plate in any of said directions, arms extending beyond said base and beyond said plate, means for adjustably mounting said arms on said plate, means for mounting a pattern in the form of sheet material on said arms and for supporting the body of said pattern, and means mounted on said base for measuring the degree of said motion in each of two mutually perpendicular directions.

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