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**Arkenberg**

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[54] **DRAFTING SET FOR DRAWING A BODY IN PARALLEL PERSPECTIVE**


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[58] **Field of Search**.....33/77



[56] **References Cited**

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[57] **ABSTRACT**

A drafting set for drawing a body in parallel perspective, of which the coordinate of height is vertical, the coordinate of length forms an angle of $\alpha°$ with the horizontal and the coordinate of width forms an angle of $\beta°$ with the horizontal in the drawing plane. The drafting set consists of a pair of angle rulers adapted to one another. The first angle ruler has a guiding edge by means of which it displaceable parallel to itself and vertically on a drawing surface, and a straight locating edge for the second angle ruler and forming an angle of $\alpha°$ with the horizontal. The second angle ruler possesses a first drawing edge for the presentation of height lines, a second drawing edge forming an angle of $\alpha + 90°$ with the first drawing edge for the presentation of width lines and a third drawing edge for the presentation of length lines forming an angle of $\alpha + \beta°$ with said second drawing edge.


**15 Claims, 2 Drawing Figures**

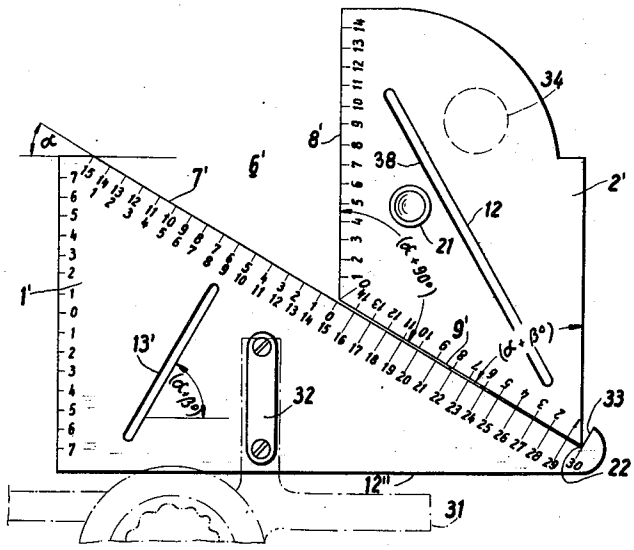
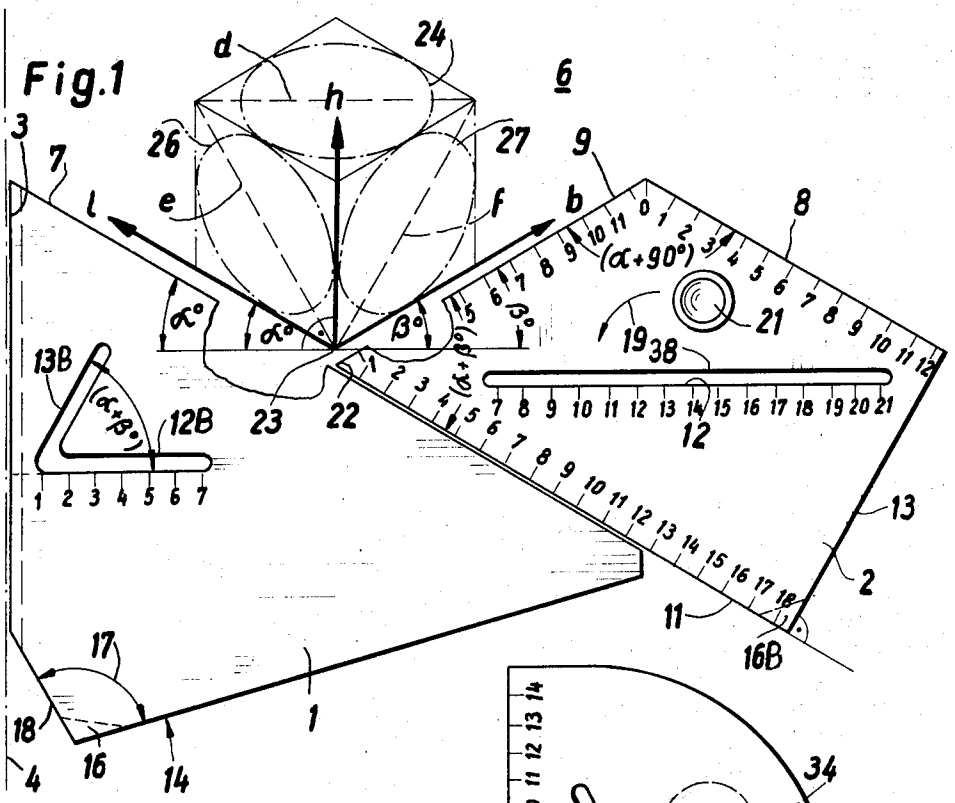


Fig.1



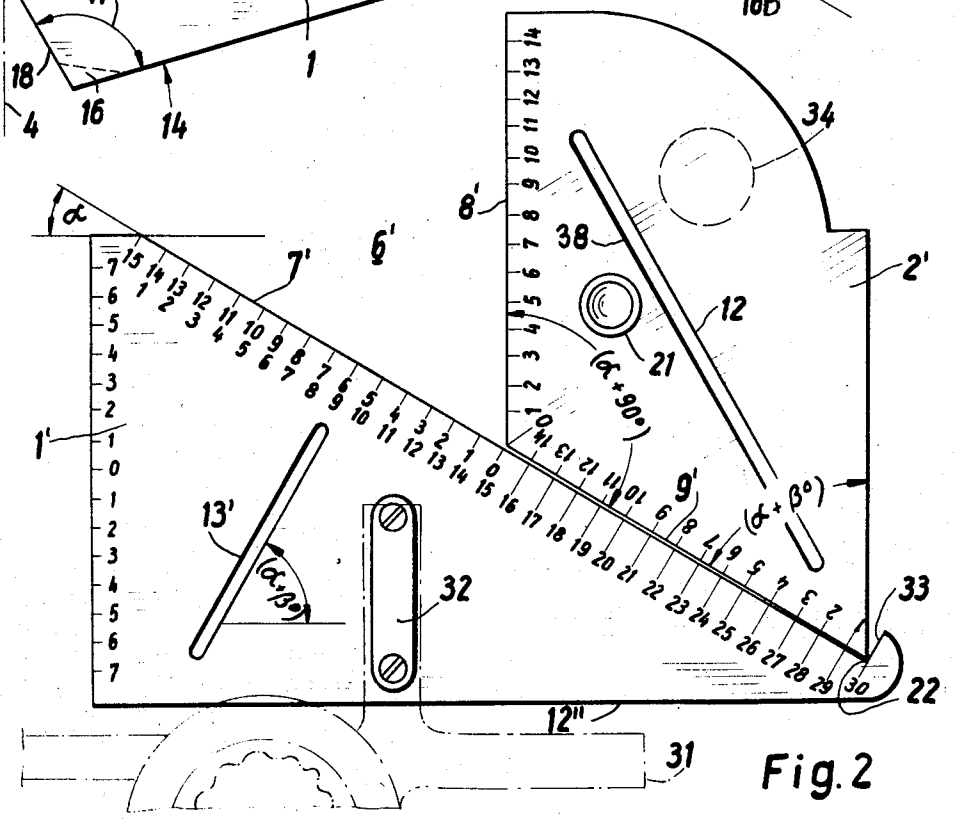




Fig.2

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# DRAFTING SET FOR DRAWING A BODY IN PARALLEL PERSPECTIVE

## BACKGROUND OF THE INVENTION

This invention relates to drafting sets, and more specifically to a drafting set for drawing a body in parallel perspective, of which the coordinate of height $h$ is vertical, the coordinate of length $l$ forms an angle of $\alpha°$ with the horizontal and the coordinate of width $b$ forms an angle of $\beta°$ with the horizontal in the drawing plane, said drafting set consisting of a pair of angle rulers adapted to one another, of which the first angle ruler can, by means of a guiding edge, be displaced parallel to itself and vertically on a drawing surface, and has a straight locating edge for the second angle ruler which is provided with drawing edges.

For the spatial presentation of bodies in parallel perspective various types of perspective are customary, in which the ratio $h:l:b$ and the angles between the coordinate of length and the horizontal as well as between the coordinate of width and the horizontal have in each case certain values. These values are 1:1:1: or 30°/30° in the case of isometric parallel perspective, 1:1:1 or 45°/45°with military perspective, 1:1:10.5 or 0°/45° with cavalier perspective, and 1:1:0.5 or 7°/42° with axonometric parallel perspective. In addition there are, of course, infinite possibilities of variation for different measuring unit ratios or angles formed with the horizontal, as regards coordinates.

The presentation of a body in a certain parallel perspective has hitherto been effected with the aid of a ruler and a protractor. Such a method is extremely time wasting and hence uneconomical. This even applies if in the case of a drafting machine one or two rulers are linked with a protractor so as to be rotatable in relation to each other since the given angles of incidence for the coordinate of length or width must constantly be reset if lines in the direction of the coordinate of height are drawn inbetween. Besides, with this method reading and setting errors are common, the correction of which—in as far as such errors are discovered at all—also entails an unnecessary expenditure of time. For this reason one has already changed over to designing special drawing equipment for the presentation of bodies in parallel perspective. These drawing devices are, however, very complex in design, relatively costly, and, above all, very difficult to handle.

## SUMMARY OF THE INVENTION

It is an object of the invention to avoid these disadvantages and to provide a drafting set for drawing a body in parallel perspective which is simple in design and hence easy to handle, and which can at the same time be manufactured cheaply so that it can be used also as a teaching appliance.

Another object of the invention is completely to avoid all possibilities of error which occur with the known method and the known drawing appliances.

To attain these objects the present invention provides a drafting set for drawing a body in parallel perspective, of which the coordinate of height is vertical, the coordinate of length forms an angle of $\alpha°$ with the horizontal and the coordinate of width forms an angle of $\beta°$ with the horizontal in the drawing plane, said drafting set consisting of a pair of angle rulers adapted to one another, of which the first angle ruler has a guiding edge for displacement of said angle ruler parallel to itself and vertically on a drawing surface, and a straight locating edge for the second angle ruler and forming an angle of $\alpha°$ with the horizontal, said second angle ruler possessing a first drawing edge for the presentation of height lines, a second drawing edge forming an angle of $\alpha+90°$ with the first drawing edge for the presentation of width lines and a third drawing edge for the presentation of length lines forming an angle of $\alpha+\beta°$ with said second drawing edge.

In order to make it possible to use the drafting set according to the invention especially simply and efficiently and to join further drawing aids such as stencils for ellipses to the individual drawing edges, the invention provides for the first, second and third drawing edge of the second angle ruler to be outer edges of the angle ruler. In this connection one drawing edge, preferably however all drawing edges may be provided with a measuring scale.

In order to enable ellipses which frequently occur in perspective drawings to be entered in the drawing as simply and quickly as possible, for instance with the aid of a stencil for ellipses, it has proved advantageous for the second angle ruler to have a fourth straight drawing edge forming an angle of $\beta°$ with the second drawing edge and an angle of $\alpha°$ with the third drawing edge, for the presentation of a long axis of an ellipse. To this end, the second angle ruler may be provided with a slot, the longitudinal edge of which is the fourth drawing edge. With a drafting set for isometric parallel perspective with the angles $\alpha=\beta=30°$ at least one of the two angle rulers, preferably however both angle rulers may be provided with a drawing edge for the drawing of a long axis of an ellipse which is perpendicular to the locating edge of the first angle ruler. With a drafting set in accordance with the invention, the first angle ruler of which has such a drawing edge, it is advantageous for this drawing edge to extend approximately to an edge section of the first angle ruler since with such a drafting set the format of the drawing surface can be utilized almost completely.

In order to enable the first angle ruler, in the case of small drawing boards with a lower edge raised in relation to the drawing surface, to be simply moved beyond this edge, the lower edge of the first angle ruler may be of angular design. With such a design it is particularly advantageous if the lower edge near the guiding edge has an angle directed downwards, one edge of which is a drawing edge for a long axis of an ellipse.

The locating edge of the first angle ruler may be provided with a measuring scale, having its zero point approximately in the center of the locating edge. With such a design it is particularly useful if the first and second drawing edges of the second angle ruler are approximately equal in length and if the locating edge of the first angle ruler is provided with a stop for the second angle ruler at a distance from the zero point which corresponds to the said length. Such a design is particularly advantageous in the case of a drafting set in conjunction with a drafting machine. To this end the first angle ruler may be provided with securing means for attachment to the drawing head of the drafting machine. In order to prevent the second angle ruler which is not fixed to the drawing head from falling down if the second angle ruler is temporarily not in use,

the second angle ruler may advantageously be provided with securing means to attach it to a drawing board placed at an angle through the horizontal plane. A prefered method of attachment is a magnet provided on the second angle ruler or inserted in it, which, if the second angle ruler is not in use, can cooperate with an iron element of the drafting machine.

With a drafting set, the mutually corresponding positions of whose angle rulers do not include a horizontal drawing edge, as may be the case with a drafting set for isometric perspective, a development of the invention provides for an angle ruler to be provided with a horizontal drawing edge which, in the case of isometric perspective, may at the same time be used for drawing a long axis of an ellipse. The horizontal drawing edge may be a slot in an angle ruler. In a preferred embodiment a second slot forming an angle of $\alpha+\beta°$ with the horizontal may be associated with the horizontal slot, in particular with a drafting set for isometric parallel perspective ($h:l:b = 1:1:1$; $\alpha=\beta=30°$).

## BRIEF DESCRIPTION OF THE EMBODIMENTS

Two embodiments of the invention will now be described by way of example and with reference to the accompanying drawing, in which:

FIG. **1** is a plan view of a drafting set for isometric parallel perspective for use on a small drawing board with vertical guiding edge, and

FIG. **2** is a plan view of a drawing set for isometric parallel perspective for use in conjunction with a drawing head and the linkage of a drafting machine.

## DESCRIPTION OF THE PREFERRED EMBODIMENTS

The drafting sets shown in FIGS. **1** and **2** are intended for the presentation of a body in parallel perspective, this body being for instance a cube as shown in FIG. **1**. As regards the three coordinates, the coordinate height $h$ is vertical, the coordinate of length $l$ forms an angle of $\alpha°$ with the horizontal, and the coordinate of width $b$ forms an angle of $\beta°$ with the horizontal in the drawing plane. With the two embodiments shown in FIGS. **1** and **2** the angles are $\alpha=\beta=30°$ and the measuring units of the three coordinates $h:l:b$ are at a ratio of 1:1:1, hence, the two drafting sets shown by way of example in FIGS. **1** and **2** serve for the spatial presentation of bodies in isometric parallel perspective.

The drafting shown in FIG. **1** consists of a pair of mutually adapted angle rulers with a first angle ruler **1** and a second angle ruler **2**. The first angle ruler **1** is provided with a guiding edge **3** which cooperates with a guiding edge **4** of a small drawing board not shown in detail. The first angle ruler **1** is therefore capable of being displaced in parallel to itself and vertically on a drawing surface **6**. It has a straight locating edge **7** for the second angle ruler **2** which, in the guided position of the first angle ruler **1**, forms the angle of $\alpha°$ with the horizontal.

The second angle ruler **2** has drawing edges **8**, **9** and **11** which are designed as outer edges of the angle ruler **2**. The first drawing edge **8** for the presentation of height lines in the direction of coordinate $h$ forms an angle of $\alpha+90°$ with the second drawing edge **9** for the production of lines in the direction of the coordinate of width $b$. The third drawing edge **11** forms an angle of $\alpha+\beta°$ with the second drawing edge **9** and serves for the presentation of length lines in the direction of the coordinate of length $l$. The drawing edges **8**, **9** and **11** are each provided with a measuring scale, the measuring units of which are equal in respect of one another. The second angle ruler **2** has a fourth straight drawing edge **12** for the presentation of a long axis $d$ of an ellipse **24**. The fourth straight drawing edge **12** forms an angle of $\beta°$ with the second drawing edge **9** and an angle of $\alpha°$ with the third drawing edge **11**. The fourth drawing edge **12** is a longitudinal edge of a slot **38** formed in the second angle ruler **2**. Finally the second angle ruler **2** has also a fifth drawing edge **13** which likewise constitutes an outer edge and forms a right angle with the third drawing edge **11**, and is hence in the drawing position of the second angle ruler perpendicular to the locating edge **7** of the first angle ruler. The fifth drawing edge **13** serves for drawing of a long axis $f$ of an ellipse **27**. In order to be able to utilize the format of the drawing surface as fully as possible, the first angle ruler **1** is also provided with a drawing edge **13B** in its edge sector facing the guiding edge **3**, this drawing edge serving also for the drawing of the axis $f$ of an ellipse and being thus perpendicular to the locating edge **7** of the first angle ruler **1**. The lower edge **14** of the first angle ruler **1** is designed with an angle in order to enable the first angle ruler **1** to be moved simply over the lower edge of the drawing board which extends at right angles to the guiding edge **4** of the drawing board and is not shown in the drawing, if any drawing in the lower part of the drawing surface is to be made. To this end the tip **16** of the angle on the lower edge **14** is chamfered on the side facing the drawing surface in the same manner as the corner **16B** of the second angle ruler **2**. The angle **17** of the lower edge **14** has been so selected that the leg **18** extending in the direction toward the guiding edge **3** constitutes a drawing edge for a long axis $e$ of an ellipse **26**. A horizontal slot **12B** is associated with the slot **13B** forming an angle of $\alpha+\beta°$ with the horizontal slot **12B**.

The drafting set shown in FIG. **1** is used as follows:

The presentation of a body explained here with reference to a cube is best started with the height in the direction of the coordinate $h$, the second angle ruler **2** being turned from the drawn position in the direction of the arrow **19** until the second drawing edge **9** of the second angle ruler rests against the locating edge **7** of the first angle ruler **1**. To simplify the rotation of the second angle ruler **2** the latter is provided with a handle **21** which has been designed, in this embodiment, with a convex knob. To construct the perspective length in the direction of the length coordinate $l$ the second angle ruler **2** is turned back into the drawn position in the direction opposite to that indicated by the arrow **19** and is then displaced along the locating edge **7** in the direction of the length coordinate $l$ until the corresponding length measure is at the root of the height. In this position the pencil is placed at tip **22** and drawn back against the coordinate of length $l$ along the locating edge **7** together with the second angle ruler **2** as far as the root **23** of the height. In this position of the second angle ruler **2** the width of the body can then be drawn in the direction of the coordinate of width $b$ along the drawing edge **9**, without any need for the second angle ruler to be rotated again. The remaining

contours of the cube to be drawn can now be entered in the simplest way by mere parallel displacement. Then the long axes *d*, *e*, and *f* for the ellipses **24**, **26** and **27** can be drawn with the aid of the drawing edges **12**, **13**, **13B**, and, if required, **18**.

The drafting set shown in FIG. **2** is a modification of the drafting set shown in FIG. **1** and is intended for attachment to the drawing head **31** of a drafting machine not shown in detail, and it is, for this reason, provided with a securing means **32**. As distinct from the drafting set shown in FIG. **1**, with this design the locating edge **7'** of the angle ruler **1'** has a measuring scale, the zero point of which is approximately at the center of the locating edge **7'**, the numerical values rising from the zero point to the left in FIG. **2** in order to enable a length to be measured in the direction of the coordinate of length *l*. The length of the first drawing edge **8'** and the second drawing edge **9'** of the second angle ruler **2'** are equal, i.e., they correspond to the distance of a stop **33** from the zero point of the locating edge **7'**. The stop **33** prevents slipping of the second angle ruler **2'** if the drawing surface is slanted. In order to prevent the second angle ruler **2'** from falling down from the inclined drawing surface **6'** , the latter is provided with a securing means **34** which is designed as a magnet and cooperates with an iron element of the drafting machine which is not shown in the drawing, if the second angle ruler **2'** is temporarily out of use. The first angle ruler **1'** is provided with a drawing edge **13'** formed by a slot extending normal to the locating edge **7'** and forming an angle of $\alpha+\beta°$ with the horizontal. The way in which the drafting set shown in FIG. **2** should be used is, incidentally, entirely analogous with that of the drafting set shown in FIG. **1**. The essential difference consists in that the first angle ruler **1'** is not provided with a guiding edge but is moved parallel to itself by means of the drafting head **31** and the linkage of the drafting machine which is not shown. The reference numeral **12''** denotes the lower edge of the first angle ruler **1'**.

With drafting sets for parallel perspective drawing for different measuring units of length and width the foreshortening of the body to be drawn may be effected either in length or in width. For this purpose it is sufficient to turn the first angle ruler in the appropriate way.

The advantage of the drafting set according to the invention consists above all in the fact that it is extremely easy to use and that in spite of the possibility of drawing with little expenditure of time, error sources due to incorrect angles such as occur frequently with the known types of drafting sets, are virtually eliminated. This is achieved by means of the mutually adapted shapes of the two angle rulers of the drafting set, thus creating not only an ideal instruction appliance but equally a more efficient appliance for practical use.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The embodiments are therefore to be considered in all respects as illustrative and not restrictive.

What is claimed is:

**1.** A drafting set for drawing a body in parallel perspective on a drawing surface, wherein the coordinate of height is vertical, the coordinate of length forms an angle of $\alpha°$ with the horizontal and the coordinate of width forms an angle of $\beta°$ with the horizontal in the drawing plane, said drafting set comprising:

a. a first angle ruler and a second angle ruler adapted to be used in combination with one another,

b. the first angle ruler including

a guide means in combination with the drawing surface for displacement of said first angle ruler parallel to itself and vertical with respect to the drawing surface, and

a straight locating edge provided for the second angle ruler and forming an angle of $\alpha°$ with the horizontal of the drawing surface, and

c. the second angle ruler including

a first drawing edge for the drawing of height lines,

a second drawing edge forming an angle of $\alpha+90°$ with the first drawing edge for the drawing of width lines, and

a third drawing edge for the drawing of length lines forming an angle of $\alpha+\beta°$ with said second drawing edge.

**2.** A drafting set as defined in claim **1** wherein the first, second and third drawing edges of the second angle ruler are outer edges of said angle ruler.

**3.** A drafting set as defined in claim **1** wherein at least one of the edges of the second angle ruler is provided with a measuring scale.

**4.** A drafting set as defined in claim **1** wherein the second angle ruler includes

a fourth drawing edge for the drawing of a long axis of an ellipse on said body, and

said fourth drawing edge forms an angle of $\beta°$ with the second drawing edge and an angle of $\alpha°$ with the third drawing edge.

**5.** A drafting set as defined in claim **4** wherein the second angle ruler includes

an elongated slot, and

one of the longitudinal edges of said slot forms said fourth drawing edge.

**6.** A drafting set as defined in claim **1** wherein

the angles $\alpha$ and $\beta$ equals 30°,

at least one of the two angle rulers is provided with a drawing edge for the drawing of a long axis of an ellipse on said body, and

said drawing edge extends perpendicular to the locating edge of the first angle ruler.

**7.** A drafting set as defined in claim **1** wherein

the first angle ruler guide means includes a guide edge, and

the first angle ruler includes a lower drawing edge which intersects said guide edge and extends downwardly from said guide edge.

**8.** A drafting set as defined in claim **1** wherein

the straight locating edge of the first angle ruler is provided with a measuring scale, and

the zero point of said measuring scale being located approximately at the center of said locating edge.

**9.** A drafting set in accordance with claim **8** wherein

the first and second drawing edges of the second angle ruler are of equal length,

a stop is provided on the locating edge of the first angle ruler for supporting the second angle ruler, and

said stop being positioned from the zero point at a distance equal to said length.

**10.** A drafting set as defined in claim **1** wherein

the drawing surface includes a drafting machine with a drawing head, and

the first angle ruler is provided with a means for attaching the ruler to the head of the drafting machine.

**11**. A drafting set as defined in claim **1** wherein

the second angle ruler includes a securing means for attaching the second angle ruler to the drafting surface.

**12**. A drafting set as defined in claim **11** wherein

the securing means includes a magnet.

**13**. A drafting set as defined in claim **1** wherein

at least one of the angle rulers is provided with a horizontal drawing edge.

**14**. A drafting set as defined in claim **13** wherein

the angle ruler includes an elongated horizontal slot, and

one edge of said slot forms the horizontal drawing edge.

**15**. A drafting set as defined in claim **14** wherein a second slot intersects the elongated horizontal slot, and

the second slot forms an angle of $\alpha+\beta°$ with the elongated horizontal slot.

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