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⑤④ **Set square.**

⑤⑦ A set square (1) has substantially the form of a 30/60/90° triangle (ABC) having therein an aperture (2) having sides (p, q, r) at 15° and 45° to each external side. The aperture (2) may be in the form of a 30/30/120° triangle (PQR) disposed with its longest side (q) closest to the hypotenuse (b) of the 30/60/90° triangle and at an angle of 15° thereto, said side (q) diverging from the hypotenuse (b) towards the 30° vertex (A) of the 30/60/90° triangle. Preferably a line (3) is indicated perpendicular to one of the external sides (c) other than the hypotenuse (b), the line (3) being indicated adjacent that side (c) and extending across the aperture (2), and being indicated on either side thereof. There may be a protractor scale (5) whose origin is at the intersection of the line (3) and the perpendicular side (c).



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SET SQUARE

The present invention relates to a set square.

5 Set squares in general are well known. The usual form is that of a right angled triangle whose other angles are both  $45^{\circ}$  or are  $60^{\circ}$  and  $30^{\circ}$ . The square is commonly made of a plastics material or metal.

10 Numerous proposals have been made to render set squares more versatile. However none of these seems to have had any success. This is probably because they either add little to the potential utility of the square, or because they are so complicated as to frighten off potential users and/or to increase manufacturing costs  
15 substantially.

For example, U.S. Patent 2,043,729 (Bilder) discloses a  $90/45/45^{\circ}$  set square having three cut-outs which provide various straight edges at predetermined angles to external edges. There are also numerous apertures for use in  
20 drawing circles, and a protractor scale. The whole is of dauntingly complicated appearance, and would apparently require much practice to master. U.S. 1,598,690 (Petronio) discloses a  $90/60/30^{\circ}$  set square with three apertures (a slot and two triangles) for providing further angles.  
25 The triangles are right-angled, with the perpendicular sides parallel to those of the set-square. Thus only the hypotenuses provide additional angles. Generally, a given angle is obtainable only relative to one particular external side. Thus the user must locate the square the  
30 correct way up, and select the correct aperture. There is also a protractor scale, symmetrical about the  $90^{\circ}$  angle of the square, its origin indicated by an aperture.

Further examples of patent specifications disclosing modified set-squares are:

French 908163 (Vardanian)  
French 934943 (Le Material Automatique Electrique)  
French 957869 (Lewin)  
French 981857 (Cordani)  
5 French 1124247 (Balloche)  
French 1208614 (Hoellinger)  
French 2351801 (Bord)  
U.S. 1845449 (Smith)  
U.S. 3375589 (Dolgorukov)  
10 Swiss 276736 (Clerc)  
G.B. 794192 (Midulla)

According to the present invention there is provided a  
15 substantially triangular set square having three external  
straight edge portions with angles of  $30^{\circ}$ ,  $60^{\circ}$  and  $90^{\circ}$   
defined by respective pairs thereof, and an internal  
substantially triangular aperture having respective  
straight edge portions which define angles of  $15^{\circ}$  and  $45^{\circ}$   
20 with each of the external straight edge portions.

By means of such a set square, a draughtsman using a  
T-square can set the four usual angles ( $30^{\circ}$ ,  $45^{\circ}$ ,  $60^{\circ}$ ,  $90^{\circ}$ ), and  
also obtain angles of  $15^{\circ}$  and  $75^{\circ}$ .

Preferably the straight edge portions of the aperture  
25 define a  $30^{\circ}$ ,  $30^{\circ}$ ,  $120^{\circ}$  triangle. Then a user, even  
without a T-square, can set angles precisely. Angles can  
be drawn easily and accurately, particularly interior  
angles of the aperture, but also angles formed by one side  
of the cut-out and one external edge portion. Use of the  
30 interior angles to draw vertices is of course not affected  
by the degradation of the external corner portions of the  
square, which commonly happens in use.

Preferably there are means indicating a straight line  
at right-angles to one of the external straight edge  
35 portions other than that defining the hypotenuse, said line

traversing the aperture. This line can be used to set 45, 60, 75 and  $90^\circ$  angles precisely, without the need for a T-square. The line is then used as a reference instead of an external edge/portion.

5        Preferably there are means defining a protractor scale arranged so that the origin of the protractor is at the intersection of said line and the straight edge portion at right angles thereto, said line indicating the  $90^\circ$  line of the protractor. Having the origin of the protractor at the  
10       edge makes the protractor particularly simple to use, e.g. for setting the square at any desired angle to a given line.

      The versatility of the implement can be increased by providing one or more of the edge portions with measuring scales and/or by providing a plurality of holes at  
15       predetermined spacings for receiving pencil points for drawing arcs of predetermined radii.

      There may be indicia indicating the angular relationships of at least some of the straight edge portions.

      Some preferred embodiments of the invention will now  
20       be described by way of example with reference to the accompanying drawings, in which:

      Fig. 1 is a plan view of a preferred embodiment of a set square according to the invention;

      Fig. 2 is a section along XY in Fig. 1; and

25       Fig. 3 is a schematic view of a second embodiment.

      The set square 1 shown in Figs. 1 and 2 has the general form of a  $30/60/90^\circ$  triangle ABC, having sides a and c at right angles, and side b as hypotenuse. Angles A and C are  $30^\circ$  and  $60^\circ$  respectively. An aperture  
30       2 has the form of a  $30/30/120^\circ$  triangle PQR, the sides p and r and the angles P and R being equal. It is oriented so that its longest side q is adjacent the hypotenuse b, and makes an angle of  $15^\circ$  therewith, approaching nearer it towards the vertex C.

Thus, the single cut-out 2 provides angles of  $15^\circ$  and  $45^\circ$  to each external side a, b, c as follows:

| 5  | External Side | Side forming angle of |            |
|----|---------------|-----------------------|------------|
|    |               | $15^\circ$            | $45^\circ$ |
|    | a             | p                     | q          |
|    | b             | q & r                 | p          |
|    | c             | r                     | q          |
| 10 |               |                       |            |

Angles of  $75^\circ$  to sides a and c are also provided, by sides r and p respectively.

As indicated at 6, the square 1 may bear indicia for showing the user where to obtain various angles.

15 A line 3 is indicated (suitably by an inked indentation), extending at right angles to edge c from a point O thereon. The line 3 is interrupted by the aperture 2, and continues on the other side thereof until it reaches an arcuate slot 4 furnished with protractor  
20 scales 5. The slot and scales have their centre of origin at O. The edge c and the line 3 are respectively the  $0/180^\circ$  and  $90^\circ$  lines of the protractor. Thus the square 1 can easily be positioned at any desired angle to a given line. Although the slot 4 extends only over  
25 about  $95^\circ$ , angles up to  $180^\circ$  can be measured or set by using either the edge c or the line 3 as the reference line. Having the line 3 traverse the aperture 2 makes it easy to align with a line on a drawing even if the square 1 is opaque.

30 The longer external sides b, c are provided with scales 7 graduated in inches and centimetres respectively. Adjacent side c is a line of small apertures 8: five with 2mm spacings, seven more at 1cm spacings, and another 7cm from the last of these. The apertures 8 are dimensioned  
35 to receive pencil points with minimal play, so that arcs

of known radii can be drawn using two pencils.

This instrument design does not necessitate transparency, and it may be manufactured in any suitable material such as metal or plastics by any conventional means. If sheet metal or plastics is to be used, section X-Y in Fig.2 shows typically how its structure can be stiffened to minimise the material thickness and weight, and also provide additional benefits. A fold can be pressed or moulded all round the periphery of the instrument, resulting in bevelled edges for the scales 7. This not only provides stiffening, but improves the appearance, and also enables the instrument to be used face down with advantage when using pen and ink, to discourage running of the ink as may occur with a flat surface against the paper.

Although the arrangement shown in Fig.1 is felt to be particularly useful, others are possible and may be favoured in some circumstances. Other shapes and orientations of the aperture 2 are possible, while still giving the desired angles with the external sides. Thus Fig.3 shows an alternative arrangement with an aperture 2' formed as a 30/60/90° triangle XYZ with sides x, y, z. The hypotenuse y is at 15° to side b, and 45° to side a. The shortest side z is at 15° to side c, and 45° to side a. The other side x is at 15° to side a and 45° to side b.

While the invention has been illustrated above with reference to preferred embodiments, those skilled in the art will understand that various changes may be made without departing from the spirit and scope of the invention, and it is intended to cover all such changes and modifications by the appended claims.

CLAIMS:

1. A substantially triangular set square (1) having three external straight edge portions (a, b, c) with  
5 angles of 30°, 60° and 90° defined by respective pairs thereof, and an internal substantially triangular aperture (2), characterised in that the internal aperture (2) has respective straight edge portions (p, q, r) which define angles of 15° and 45° with each  
10 of the external straight edge portions.
2. A set square according to claim 1 wherein the straight edge portions (p, q, r) of the aperture (2) define a 30°, 30°, 120° triangle (PQR).  
15
3. A set square according to claim 2 wherein the edge portion (q) of the aperture (2) which is opposite the 120° angle (Q) is at 15° to that external edge portion (b) which defines the hypotenuse.  
20
4. A set square according to any one of the preceding claims having means (3) indicating a straight line at right-angles to one of the external straight edge portions (c) other than that defining the hypotenuse  
25 (b), said line traversing the aperture (2).
5. A set square according to claim 4 further including means defining a protractor scale (5) arranged so that the origin of the protractor is at  
30 the intersection of said line (3) and the straight edge portion (c) at right angles thereto, said line (3) indicating the 90° line of the protractor (5).
6. A set square according to any one of the preceding  
35 claims wherein at least one of the straight edge

portions (b, c) is provided with a measuring scale (7).

- 5 7. A set square according to any one of the preceding claims wherein the set square is provided with a multiplicity of apertures (8) at predetermined spacings for receiving pencil points for use in drawing arcs.
- 10 8. A set square according to any one of the preceding claims having a peripheral channel-section portion (9) whose outer margin (10) is arranged to form a bevelled edge of the square (1).
- 15 9. A set square according to any one of the preceding claims bearing indicia (6) indicating the angular relationships between at least some of the straight edge portions (e.g. p/a; q/a; r/a).





| DOCUMENTS CONSIDERED TO BE RELEVANT                                                                                                                                                                                     |                                                                               |                                                                                                                                                                                                                                                                                       |                                                            |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|
| Category                                                                                                                                                                                                                | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim                                                                                                                                                                                                                                                                     | CLASSIFICATION OF THE APPLICATION (Int. Cl. <sup>3</sup> ) |
| A                                                                                                                                                                                                                       | CH-A- 205 209 (SARTORI)<br>*Figure 2*                                         | 1, 2                                                                                                                                                                                                                                                                                  | B 43 L 7/02                                                |
| A, D                                                                                                                                                                                                                    | ---<br>US-A-2 043 729 (BILDER)<br>*The whole document*                        | 1, 6, 7, 9                                                                                                                                                                                                                                                                            |                                                            |
| A, D                                                                                                                                                                                                                    | ---<br>US-A-1 598 690 (PETRONIO)<br>*The whole document*                      | 1, 4, 5                                                                                                                                                                                                                                                                               |                                                            |
| A                                                                                                                                                                                                                       | ---<br>DE-C- 585 040 (RUCKERT et al.)<br>-----                                |                                                                                                                                                                                                                                                                                       |                                                            |
|                                                                                                                                                                                                                         |                                                                               |                                                                                                                                                                                                                                                                                       | TECHNICAL FIELDS SEARCHED (Int. Cl. <sup>3</sup> )         |
|                                                                                                                                                                                                                         |                                                                               |                                                                                                                                                                                                                                                                                       | B 43 L 7<br>B 43 L 9<br>B 43 L 13                          |
| The present search report has been drawn up for all claims                                                                                                                                                              |                                                                               |                                                                                                                                                                                                                                                                                       |                                                            |
| Place of search<br>THE HAGUE                                                                                                                                                                                            |                                                                               | Date of completion of the search<br>11-08-1982                                                                                                                                                                                                                                        | Examiner<br>LAMMINEUR P.C.G.                               |
| CATEGORY OF CITED DOCUMENTS                                                                                                                                                                                             |                                                                               |                                                                                                                                                                                                                                                                                       |                                                            |
| X : particularly relevant if taken alone<br>Y : particularly relevant if combined with another document of the same category<br>A : technological background<br>O : non-written disclosure<br>P : intermediate document |                                                                               | T : theory or principle underlying the invention<br>E : earlier patent document, but published on, or after the filing date<br>D : document cited in the application<br>L : document cited for other reasons<br>-----<br>& : member of the same patent family, corresponding document |                                                            |