A LATE BRONZE AGE DRAWING INSTRUMENT?

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1. INTRODUCTION

The frequent occurrence in Bronze Age art and ornament of circles drawn so perfectly as to imply the use of some sort of compass is well known. Representative examples can be found in any of the standard works on the Bronze Age of Denmark, Sweden and North Germany; sun discs, belt plates and hanging bowls are among the many sorts of objects often so decorated. In Central Europe, many examples of the "Mycenean" art style, which appears late in the Central European Early Bronze Age, are evidently compass-drawn, and accurately drawn circles of bosses and pointillé are a feature of Late Bronze Age sheet metal work (*e.g.* Jockenhövel, 1974).

Actual examples of Bronze Age compasses have hitherto been unknown (though an unpublished example is said to be in the museum in Perugia in Italy: cited by V. G. Childe, Cahiers d'Histoire Mondiale 2, 1954, 23, whence Lenerz-de Wilde, 1977, 7, note 19). The use of string compasses has been argued in detail, for spirals as well as circles Ringbom, 1923; qualifications by Drescher, 1954). Compasses consisting of a bar of wood or other material and two metal points, and of the hinged two-legged type, have been mentioned speculatively, though the earliest actually known examples of the latter, in bronze or iron, known in trans-Alpine Europe, date from Late La Tène times (Lenerz-de Wilde, 1977, 7, Abb. 5). One may suppose that Bronze Age compasses were normally of wood, and would therefore rarely survive.

While studying the possible use of circles in the design of objects such as the ceremonial swords of Plougrescent type (Butler and Sarfatij, 1970-1, with previous references) our eye fell on a peculiar and unexplained bronze object in the Late Bronze Age hoard from Drouwen in Drenthe. This object has never been described or properly illustrated in print; the few published illustrations have not even shown it as one object. In this paper we shall suggest that it may have functioned as a mechanical aid for the drawing of circle and concentric-circle patterns.

A brief glance at the whole hoard and its find circumstances are necessary as background, although full publication will take place elsewhere.

2. THE FIND CIRCUMSTANCES

The hoard was found on 5 December 1939, during the emergency excavation of part of an urnfield just west of the hamlet of Drouwen, Gem. Borger, Drenthe[1]).

A field with heath cover on wind-blown sand had recently been ploughed for the first time, and urns had been found; this led to the emergency winter excavation. During the stripping of the plough-soil, under the supervision of the BAI draughtsman Postema, fragments of some of the bronzes were found; these had evidently been disturbed and displaced by the plough. The rest of the bronzes were then excavated by Professor A. E. van Giffen and his then assistant H. Brunsting. The soil in which the objects lay was dark and "poorly legible", and as the bronzes had to be taken up in failing light toward the end of the day, conditions for observation were poor. Fragments of cremated bone were not observed in association with the bronzes, and Brunsting (typescript, 1970) insists that they would have been observed had they been present. Nor were traces of a ring-ditch observable at the level of the bronzes; it was only after excavation to a lower level, where ditch fillings showed up against light-coloured sand, that it was established that the bronzes must have been directly above or in the upper filling of a comparatively large ring-ditch, about 5.5 meters in diameter, on its north side. In the centre of this enclosure was only an un-urned cremation deposit; the bone fragments are now lost. Van Giffen, in his summary accounts of the discovery, took the view that the bronzes had been ploughed out of the grave. Brunsting, who had lifted many of the bronzes himself, maintains that in view of the direction of the ploughing and his

1 Summary accounts were published by Van Giffen (1941, 1943), and the finds were briefly discussed in several public lectures of which summary accounts survive, but there was no final excavation report. A draft prepared for Van Giffen by W. Glasbergen is present in the archives of the BAI, Groningen. A description and plan of the Urnfield will be published in his forthcoming dissertation by P. B. Kooi (1979). We are grateful to Professor H. Brunsting for a typescript memorandum dated December 1970 with his reminiscences of the Drouwen discovery. See also Butler, 1965, 163-189, Pl. I-II; 1969, 120-3, Pl. 36.

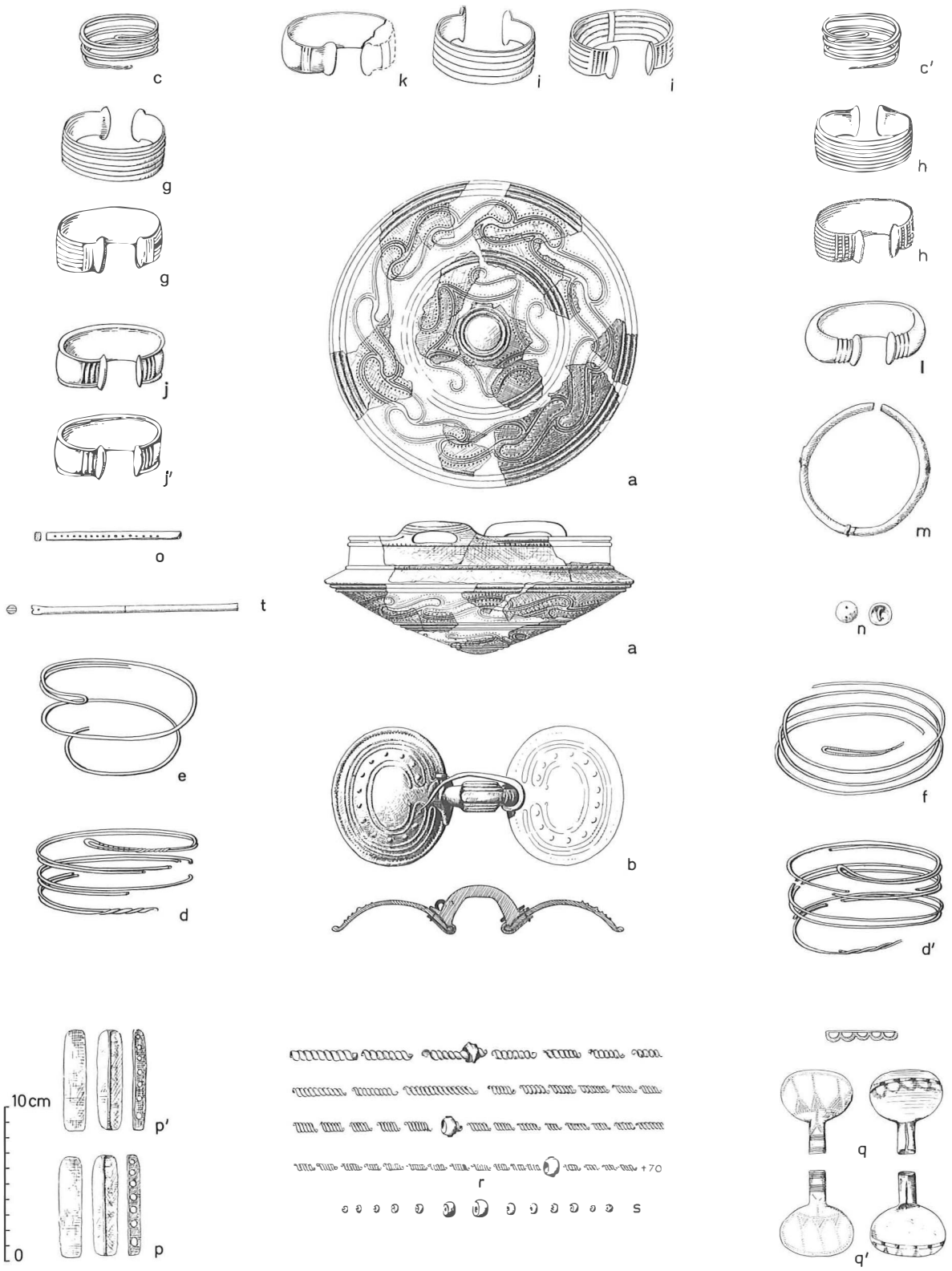

Fig. 1. The Drouwen hoard. Drawing L. Postema; after Van Giffen.

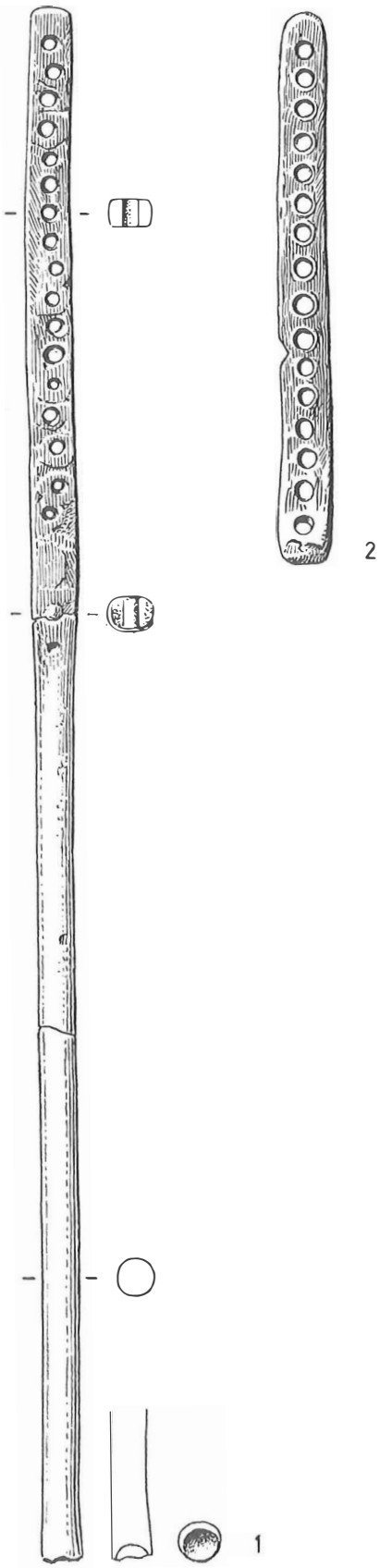

Fig. 3. Part of the shaft of the Drouwen "compass". At the broken edge below is the perforation pugged with a bronze pin. Notice the faint flanges surrounding some of the perforations. Photograph R. J. Kosters (B.A.I.).

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Fig. 2: 1. The compass from the Drouwen hoard. Scale 1:1. Drawing H. R. Roelink (BAI).
2. Fragment of object from Lake Bienne, Mörigen, Switzerland. Scale 1:1. After Sprockhoff.

observations in the soil only a few of the pieces had been plough-disturbed, and that most of the material must have been *in situ* in the upper part of the ditch filling. In his view, the hoard was a deposit in the ditch made in connection with the burial. A connection between hoard and burial is thus assumed by both observers, although there is perhaps a third possibility not excluded by the observed circumstances, namely that the hoard was a subsequent deposit in the ring-ditch.

Whatever may be the correct interpretation, several important facts emerge from an examination of the bronzes themselves:

(1) All the breaks observable on the bronzes are unpatinated, and therefore the result of recent plough damage; the objects must have been intact when deposited.

(2) The objects are mostly of ornamental character, and appropriate to womens' costume: decorative fibula, bracelets, beads, a hanging bowl, spacer plates, a bronze button. Whether grave deposit or not, the hoard has a personal and female character, and seems to represent the property of a woman.

(3) The hoard contains rare and expensive import objects; among them two Scandinavian pieces – a hanging bowl and a spectacle brooch – which are quite unusual in this region. Besides these, there is a set of seven bronze bracelets made by *circle perdue* casting, each different and individually designed, as if specially made for their wearer, and other ornamental objects of rare and even unique character. The lady must therefore have been of exceptional wealth and prestige for this area.

3. THE DROUWEN "COMPASS": DESCRIPTION

The object in question, which we think may have been a drawing instrument, is a thin bronze rod, 22 cm long and weighing 40 grams. It is now broken into three pieces, but the breaks are unpatinated, so that it must have been intact until recently broken by the plough. It has evidently been worked into its present form by forging from a cast blank.

The rod is bipartite. One part, about 9 cm in length, is rectangular in cross-section, about 4.5 by 6 mm. Through this part are 17 cylindrical perforations; most of them about 2 mm in diameter, though two are only about 1 mm wide. Their spacing is fairly regular, but not accurately so, as the intervals vary from 3.5 to 5 mm, measured centre to centre. There is also an eighteenth hole, which differs from the others in two respects: it does not go all the way through the thickness of the rod, and its spacing is deviant, it being over 13 mm away from its nearest neighbour. This hole is presently occupied by a bronze cylindrical pin, 2 mm in diameter. The end of this pin, at the point of its emergence from the hole, is rough and irregular, suggesting that it may originally have projected outward beyond the surface of the object; but this end is patinated, so that the break would have been ancient.

The longer part of the rod is circular in section, and 5 to 6 mm in diameter. Into its end has been worked a half-hemispherical hollow, probably by forging, as the metal surrounding the hole has been forced outward slightly, and there is a part-circumferential crack which also suggests forcing.

Most of the perforation mouths are surrounded, at least at one side, by a very shallow flange or collar, of hardly measurable height and up to 5 mm in diameter. How exactly these were made is not clear; their surfaces have been flattened by hammering and/or filing. Possibly they are the remains of burrs raised by punching the perforations.

The workmanship of this object is fairly crude. The perforations vary somewhat in diameter and are not exactly in line; the faces of the rectangular-section part are slightly wavy in outline, and the end is irregularly pyramidal. It seems to have been made with an eye to rough utility, and careful finishing was not deemed necessary.

4. FUNCTIONAL INTERPRETATION

Our interpretation of the Drouwen rod as a kind of compass is encouraged by the lack of any other sensible functional interpretation for so unusual an object. Other perforated objects in the same hoard and elsewhere seem to be some sort of spacer plate, but the long handle on the rod under discussion precludes its use it that manner.

A remarkable feature of the Drouwen object is the bronze pin which fills the "18th hole", and which one must presume, if it had any function at

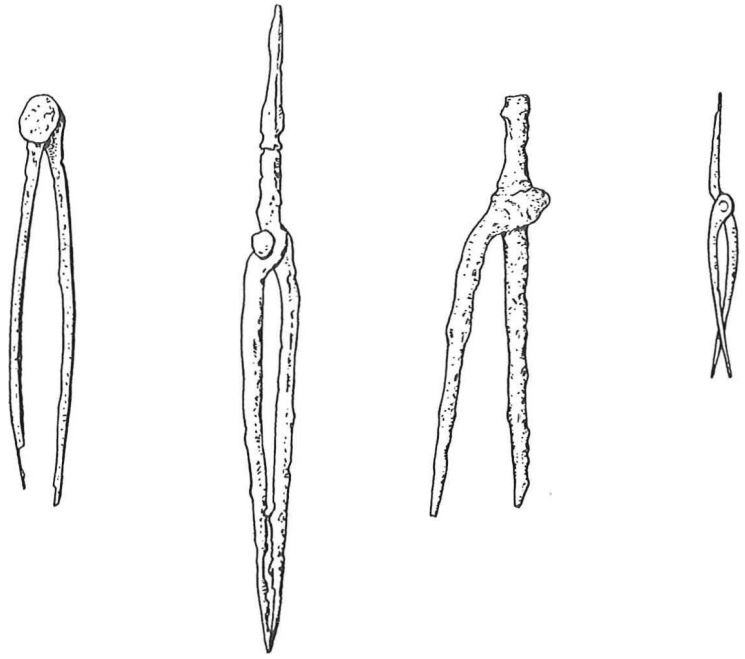


Fig. 4. Bronze and iron hinged compasses. After Lenerz-de Wilde.

all, to have projected outward originally. We reconstruct it as having had a projecting point, by which it could have served as a pivot, upon which the rod could have been rotated. Using a hammer-hardened pointed wire as a scriber, each of the seventeen holes could be used to incribe a circle on some flat-surfaced object. The circular-sectioned part of the rod then serves as a handle to facilitate the manipulation of the "compass". The instrument can thus be used to trace out seventeen different circles, which, if done concentrically, would look like figure 5. (This figure has been made with an ordinary compass, but using the intervals actually present on the Drouwen "compass").

It is equally possible to pivot the compass with the moveable pin, and to use the fixed pin in the "18th hole" as the scriber. As the original object cannot be used, being broken, we have experimented with a wooden replica equipped with a pointed pivot pin, and the results are excellent.

Compared with a two-armed hinged compass, the type of compass here envisaged has two disadvantages: it can only be used on more or less flat surfaces, and it cannot be used for pointing off arbitrary distances. It could, however, be used for a wide variety of pattern work on wood, leather, or other materials. "Sun disc" patterns such as Jockenhövel (1974, 16ff) has illustrated from metal vessels could easily be produced with such an instrument, though not on a curved surface, at least not directly (see fig. 6).

5. POSSIBLE PARALLELS

Complete objects of the Drouwen "compass" type do not seem to be known. A number of examples can be cited from the literature of fragmentary perforated rods of similar size and shape, which might be parts of similar "compasses".

An example from the Swiss "lake dwelling" site of Mörigen (Gross, 1883, 113, Pl. XXX:1) has been illustrated natural size by Sprockhoff (1956, Abb. 62:7); it has 16 regularly spaced perforations up to the point where it is broken. In size and shape it is remarkably similar to the Drouwen specimen, and the spacing of the perforations, if the published drawing is to be relied upon, is remarkably similar, if not quite identical (see below, p. 202). According to Gross, this object is, however, made of tin. A similar tin object, with 17 perforations, is from Corcelettes (Gross, 1883, pp. 80, 112, Pl. XVIII:31;

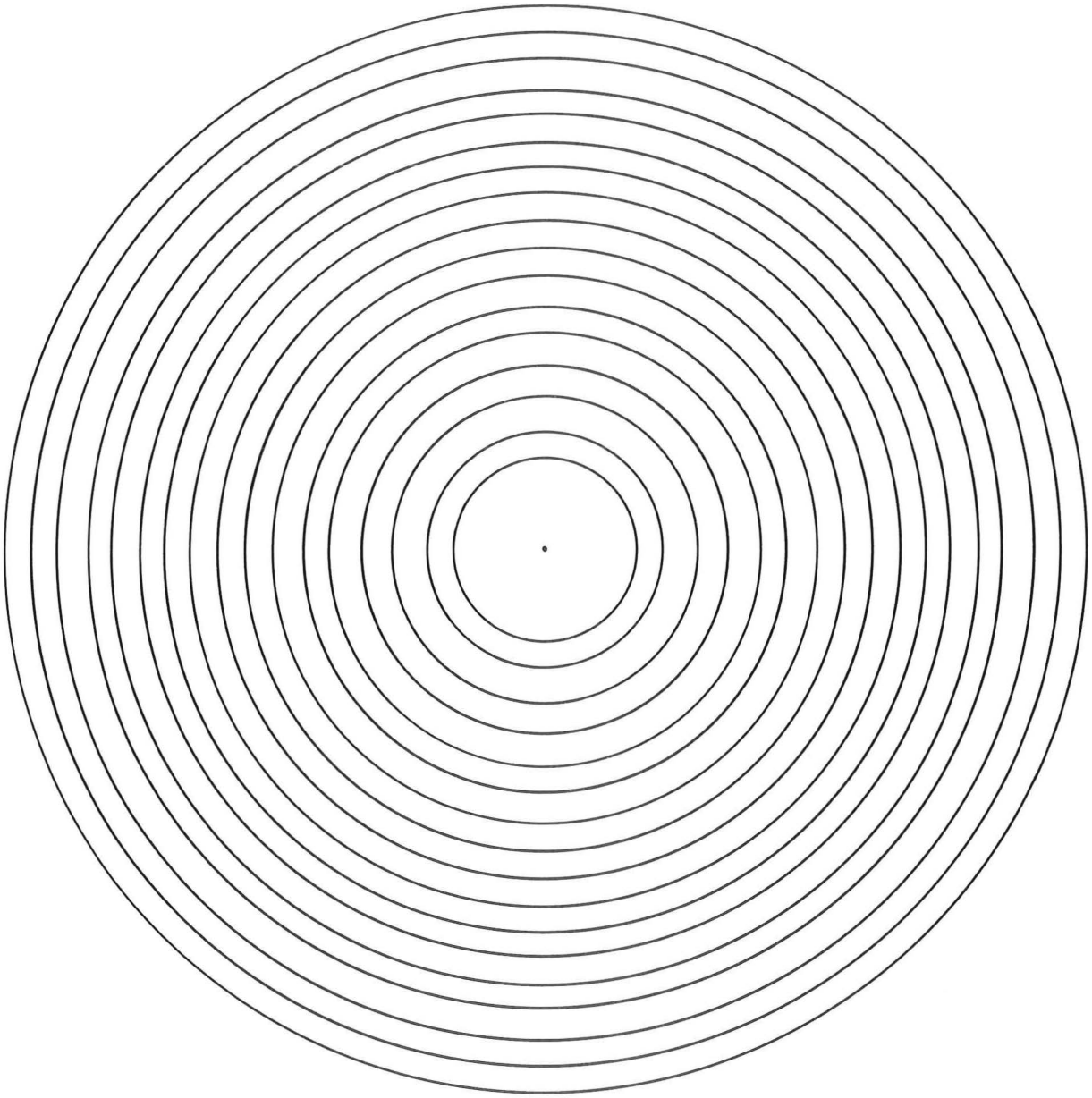
Munro, 1890, 521, fig. 189:12, 523).

Four possibly related objects occur in the Bohemian Late Bronze Age (HaB1) hoard from Jenišovice (for references see Filip Enzyklopedie under Jenišovice). We are grateful to Dr. O. Kyclicova (Prague) for 1:1 drawings of these four objects. They are not so strictly comparable to the Drouwen specimen in size; the spacing of the holes is about twice as great, and they are much thinner.

6. MEASUREMENTS

Elsewhere (Butler and Sarfatij, 1970-1; Butler, 1973, 24-5) we have cited evidence suggesting the use of an "inch" unit, in several cases at least ap-

Fig. 5. Pattern of concentric circles, drawn with a modern compass, but with the spacing of the holes in the Late Bronze Age compass from the Drouwen hoard.



parently standardized at 26.5 mm, with a related unit being equal to the diagonal of a 26.5 mm square.

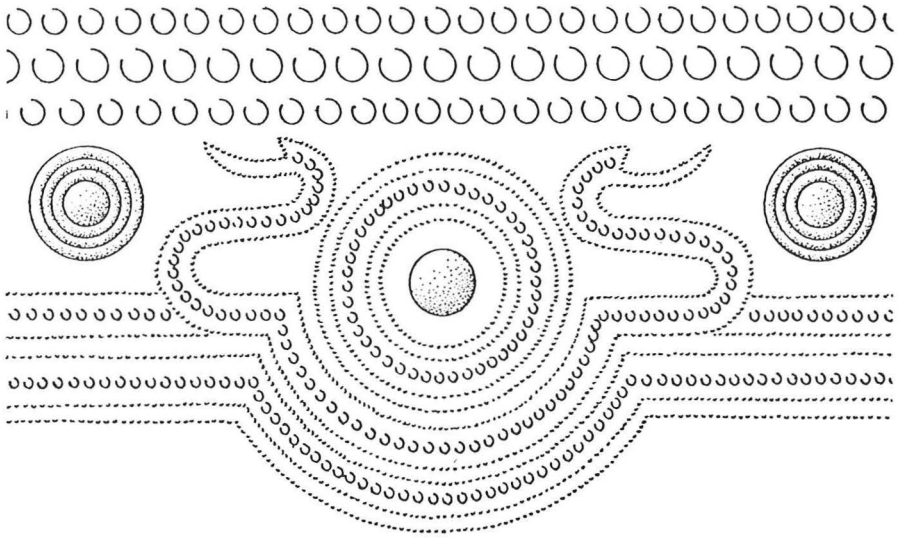
The spacing of the intervals on the Drouwen compass is somewhat irregular, so that we cannot be sure whether the maker did or did not intend to follow a fixed system. The total distance from hole 1 to hole 18 is 80 mm, which is close to 3 Jutphaas inches (79.5 mm). As the distance from hole 17 to hole 18 is 1/2 J-inch, and most of the other spacings would fit well into the supposition that an interval of 1/6 J-inch was intended, one could suppose that this was indeed the plan. Unfortunately for this hypothesis, however, the outermost "J-inch" has seven intervals instead of six.

We must defer comment on the Mörigen parallel, as we have not had the opportunity to examine the original, and do not know whether the drawing published by Sprockhoff (see above, p. 200) is accurately enough drawn to permit one to trust its measurements. As published, the intervals shown – 15 intervals over a distance of 68 mm, average interval 4.5 mm – would be consistent with an "inch" of 27 mm divided into sixths. Comparative information is scarce; but Jockenhövel (1974, 19-20, Taf. 3, Abb. 7:2) has measured the series of concentric circles in a "sun disc" motif on the bronze amphora from Gevelinghausen, Kr. Meschede in Sauerland. The series of 11 intervals yielded an average interval of 4.4 mm, which would equal sixths of an "inch" of 27.6 mm. These figures do not prove anything, and we cite them merely as being suggestive, and to suggest the utility of further study of interval series on Bronze Age metalwork.

7. CONCLUSIONS

Our conclusion is that the Drouwen rod with perforations and a handle could very well have served as a mechanical aid for drawing circle and concentric circle patterns. It is not, however, a precision instrument, though one may perhaps speculate on the possibility of its being a rough copy of a hypothetical instrument designed to yield regular sixth-of-an-inch intervals.

Fig. 6. "Sun bark" motif with compass-drawn setting-out marks, on a bronze amphora from Gevelinghausen, Kr. Meschede, Sauerland, Germany. Scale 1 : 2. After Jockenhövel.



8. CONCLUSIONS

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