THE KARLSON REPRODUCER

The following is a description of a speaker enclosure that at one stage was at the centre of attention in the US because of its reputedly favourable characteristics. The reader is encouraged to experiment with building this enclosure to their hearts' content, because of its simple construction.

An independent consumer's lab in the US publicly stated that the Karlson is able to reproduce 16 Hz with very little distortion. At an audio show, a demonstration was made of an 8 Hz oscillation between a record player and a speaker. Other audio exhibitors complained that their equipment vibrated at their demonstration tables. Hotel management reported that the vibration was noticeable from the lobby where the audio show was, up to the sixth floor. Distortion was so low that only the vibration was felt, and hardly anything was heard.

The latter is the important factor for determining the quality of the bass; real low bass is felt rather than heard. Let's compare two speaker systems with known characteristics, where it is known that one system is able to reproduce very low bass with little distortion, as opposed to the other system that does not go as low yet has more distortion. We'll then discover that the latter system will reproduce 30 Hz more noticeably than the system that has less distortion, and is able to reproduce lower frequencies. The cause of this is that sensitivity is not equal in our ears for different frequencies. Fletcher Munson created sensitivity response curves for our ears, and from those it appears that 2% of the second harmonic of 30 Hz (being 60 Hz) is more noticeable than the fundamental 30 Hz. The enclosure that has more distortion has more 2nd harmonic, and hence that enclosure appears to be louder. The mind just imagines the missing 30 Hz fundamental tone. The real 30 Hz is noticeable by a vibration that is mainly felt in the sternum.

The Karlson enclosure is rather compact, being approximately 80 centimeters high, 60 centimeters wide, and 45 cm deep. This cabinet can be designated as a broadband resonator–a resonator being a column of air in a pipe that is closed at one end. These pipes have a nasty habit of resonating at odd harmonics in addition to the fundamental resonance, which is four times the length of the pipe. The response curve is shown in figure 72a. An acoustic short happens at frequencies where the column length is half of the frequency and the resulting acoustic radiation is minimal.

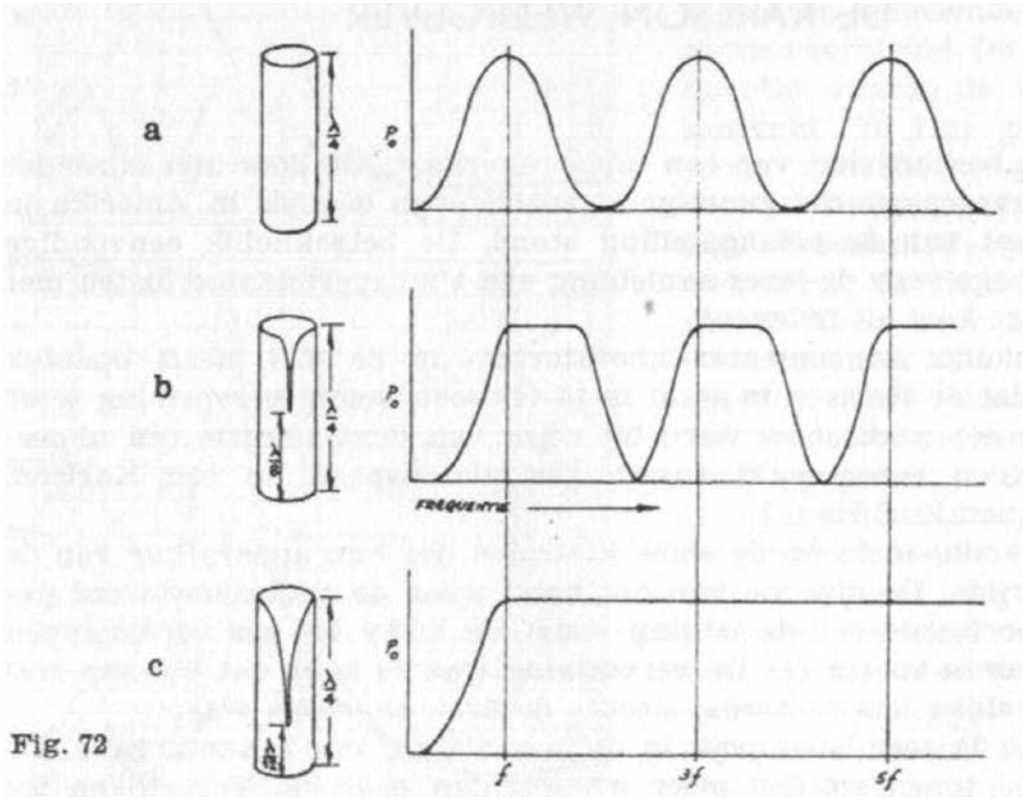


Fig. 72

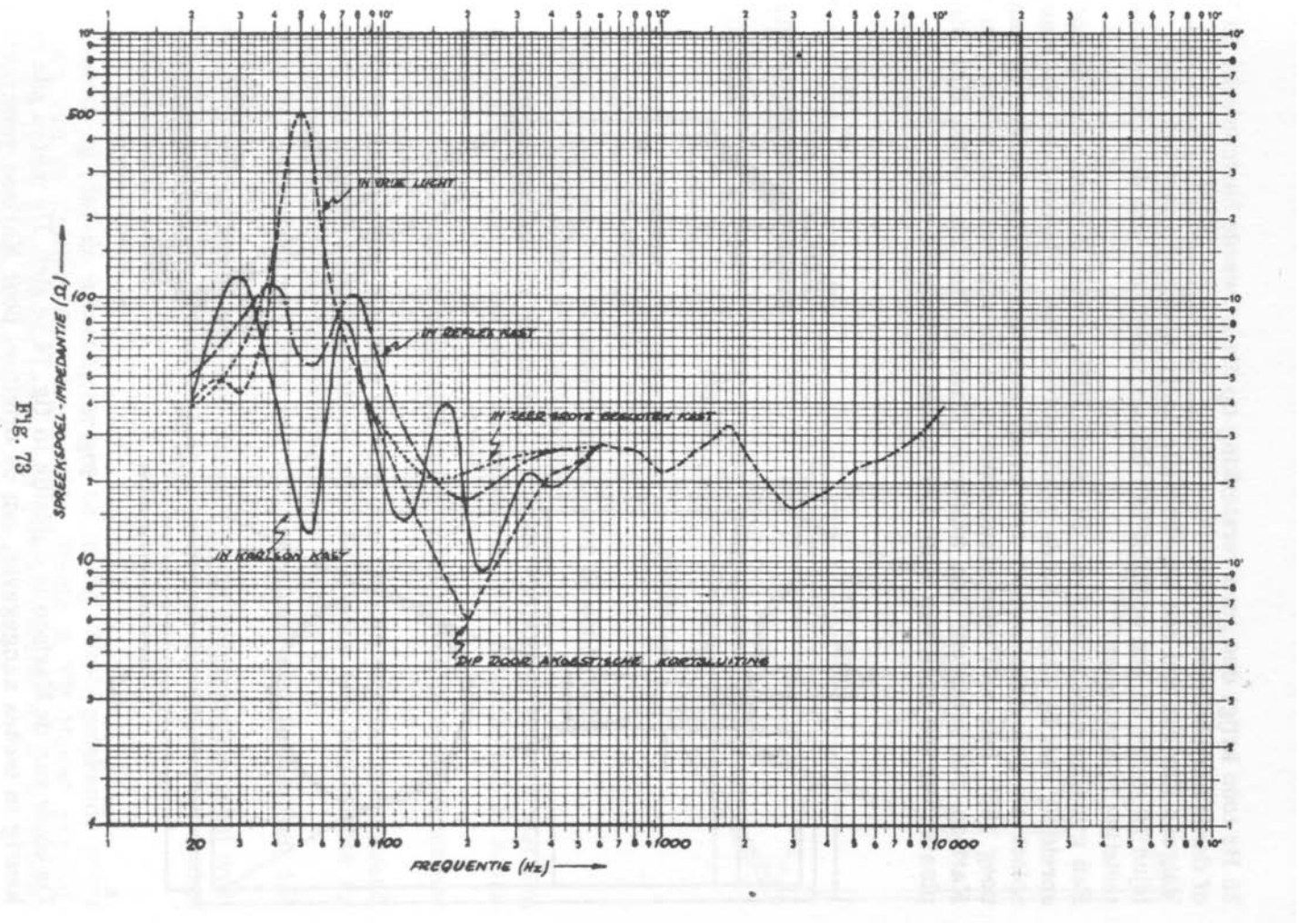
If an exponential slot is made at the open end of the pipe then the air column no longer has a specific length, resulting in the sharp peaks and dips being smoothed.

In fig. 72c the broadband behavior is shown for an exponential slot that is 2/3 the length of the column. It is not easy to visualise the pipe with an exponential slot in the Karlson cabinet, because John Karlson included a bass reflex system in order to improve efficiency. Perhaps the Karlson can be viewed as a bass reflex system that has a port with an exponential slot opening.

The impedance curves shown in fig. 73 indicate the achieved results with the Karlson. The broken line in fig. 73 indicates a driver which is not mounted at all. It shows a sharp dip at 200 Hz, which is the result of the front and back acoustical shorting. There is no acoustic radiation below this frequency.

The acoustic short disappears when we mount the same driver in an infinite baffle of 73 liters. The driver has its highest efficiency at the resonant peak, and once again no radiation is present below this. The impedance curve is shown by the dotted line in fig. 73.

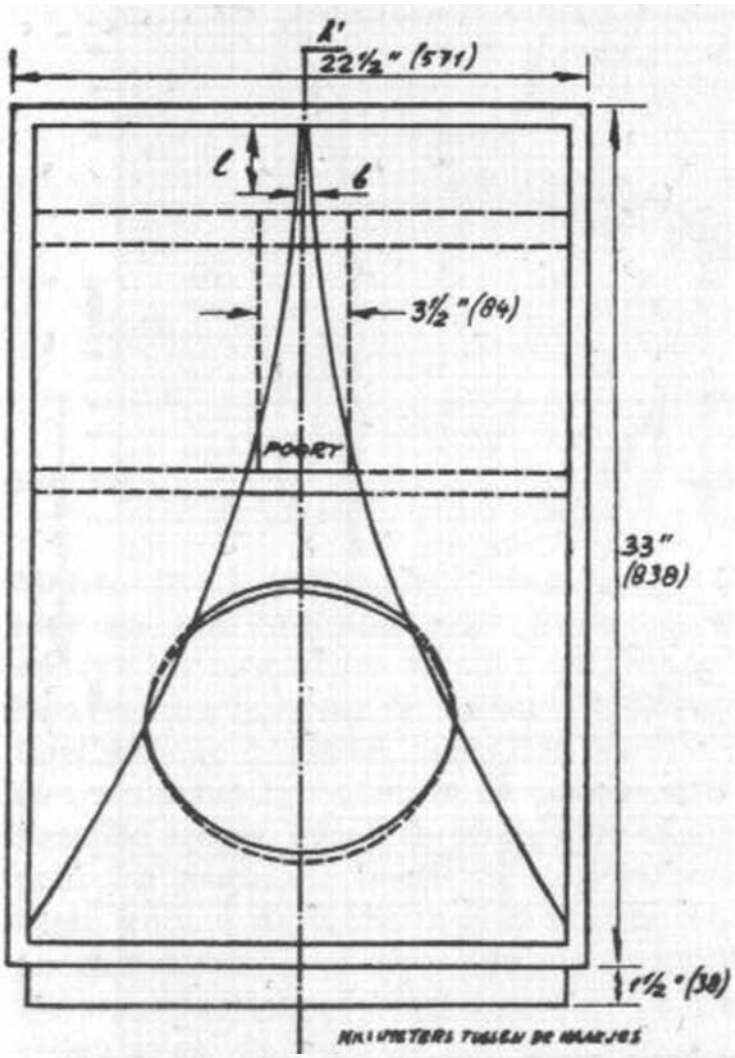
The resonant peak disappears and is replaced by two lower peaks when the driver is mounted in a 165 liter bass reflex enclosure. The bass reflex enables the driver to reproduce to a lower frequency, in this case to approximately 40 Hz. (dotted/broken line in fig. 73)

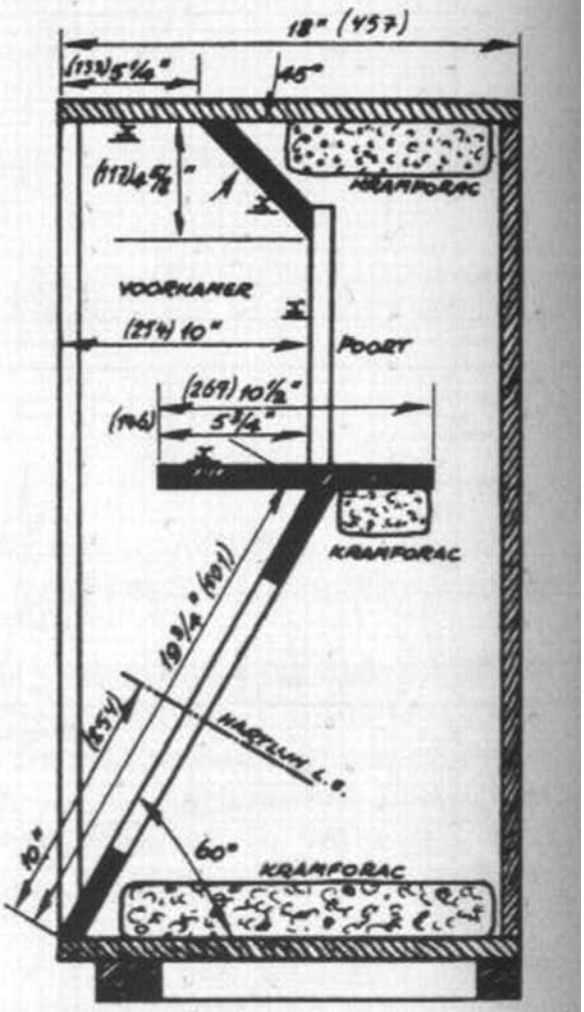


The solid line in fig. 73 shows the impedance curve of a driver in a Karlson cabinet. It looks much like the impedance curve of an exponential horn.

Peaks are less pronounced and well damped, and radiation is still present at 20 Hz. As far as the many peaks goes, Olsen states that an impedance deviation of 1:6 is necessary to create a 2 db change in acoustic output. In light of the latter, the peak and dip impedance curve is no longer disconcerting. It is important to notice that the peaks and dips do not have a harmonic relationship, which means no reinforcement of acoustic output deficiencies. (e.g., 30 Hz => 60 Hz or 90 Hz).

John Karlson indicates that a 10 meter long exponential horn with a mouth opening of 4 meters is required to achieve a similar response curve. A slot is responsible for an equal dispersion of nearly 180 degrees of radiated sound, and thus no beaming occurs. Something of this characteristic has remained with the exponential slot in the Karlson: a near uniform radiation pattern occurs over 120 degrees in the horizontal plane up to 10,000 Hz.





TABEL

l	b	l	b	l	b
1"	0,46"	11"	3,12"	21"	10,14"
2	0,52	12	3,62	22	11,16
3	0,64	13	4,18	23	12,18
4	0,80	14	4,76	24	13,18
5	1,00	15	5,42	25	14,28
6	1,24	16	6,10	26	15,38
7	1,52	17	6,82	27	16,58
8	1,88	18	7,60	28	17,80
9	2,22	19	8,42	29	19,04
10	2,64	20	9,30	30	20,34
				30 3/16	20,50

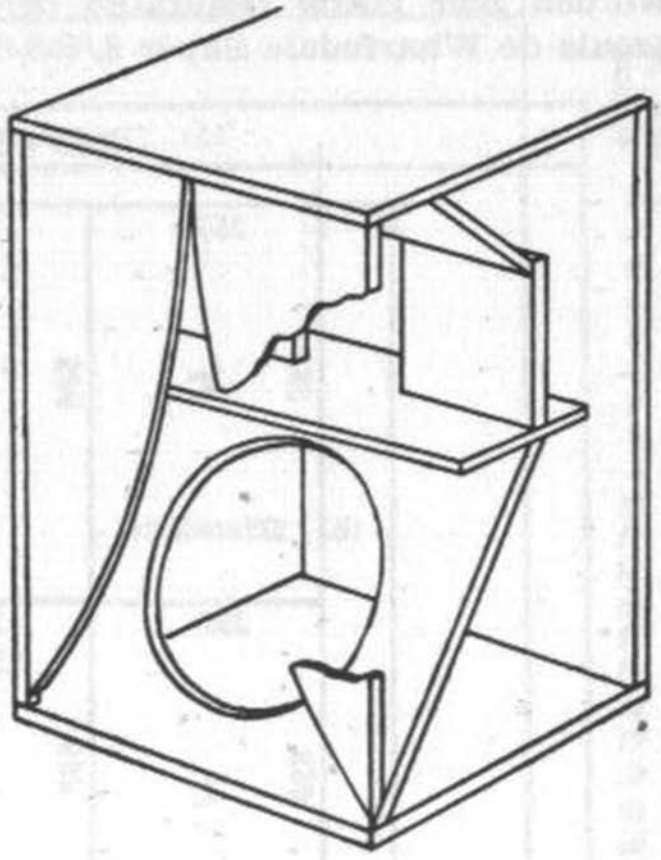
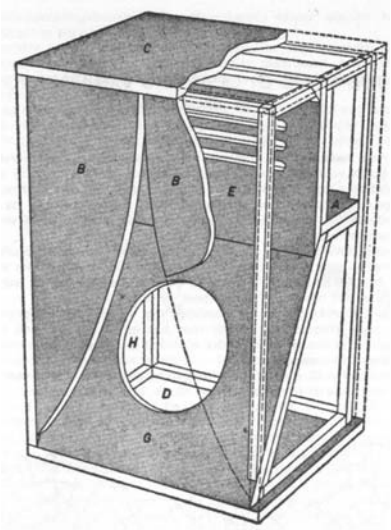


Fig. 75



THE DUTCH K12

The following is a description of a much smaller Karlson, which hardly gives up anything to the large Karlson, and is a far more wife friendly size for use in the lounge. The larger Karlson was designed for a driver of 15", yet there are two other designs: one for a 12" and one for an 8". Very good results can be achieved with the 12" design even when mounting a 8" inside. (e.g., the Wharfedale 8/RS/DD).

(construction remarks omitted)

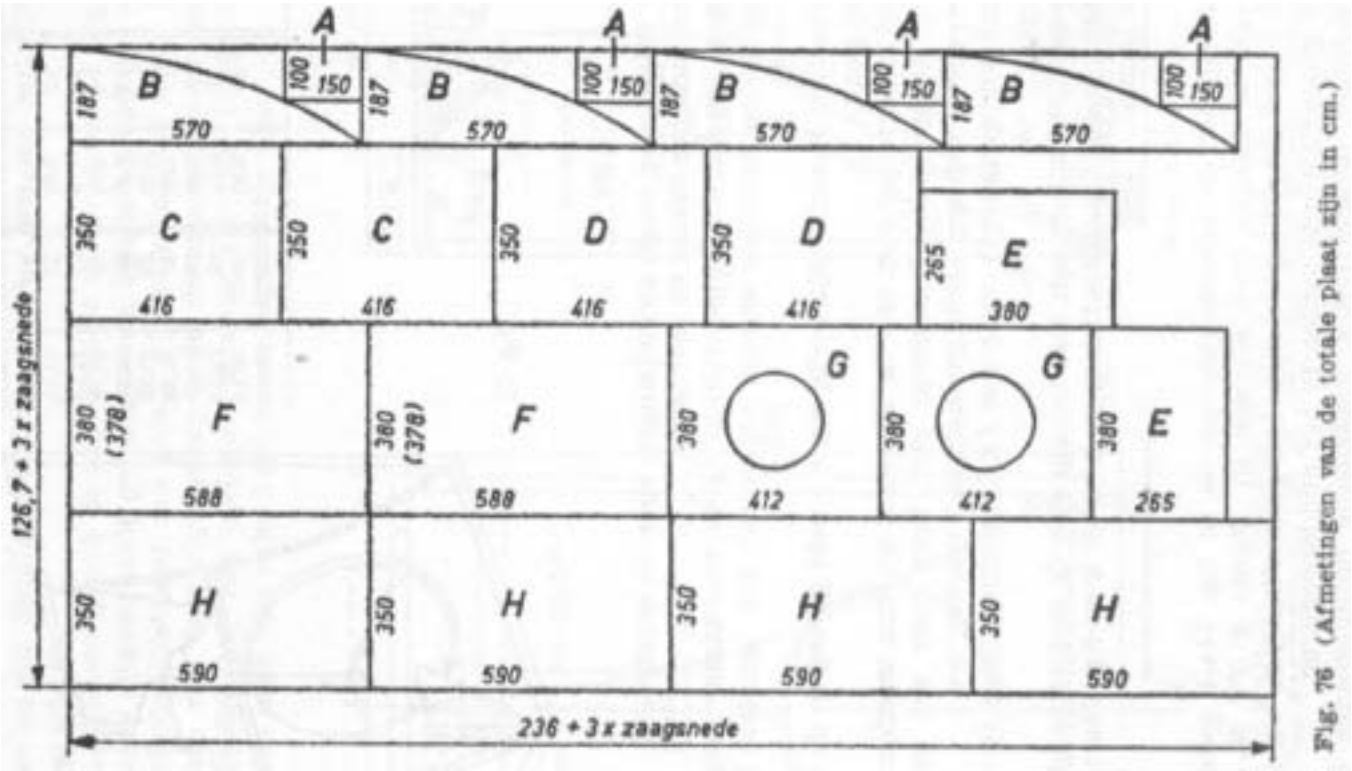


Fig. 76 (Afmetingen van de totale plaat zijn in cm.)

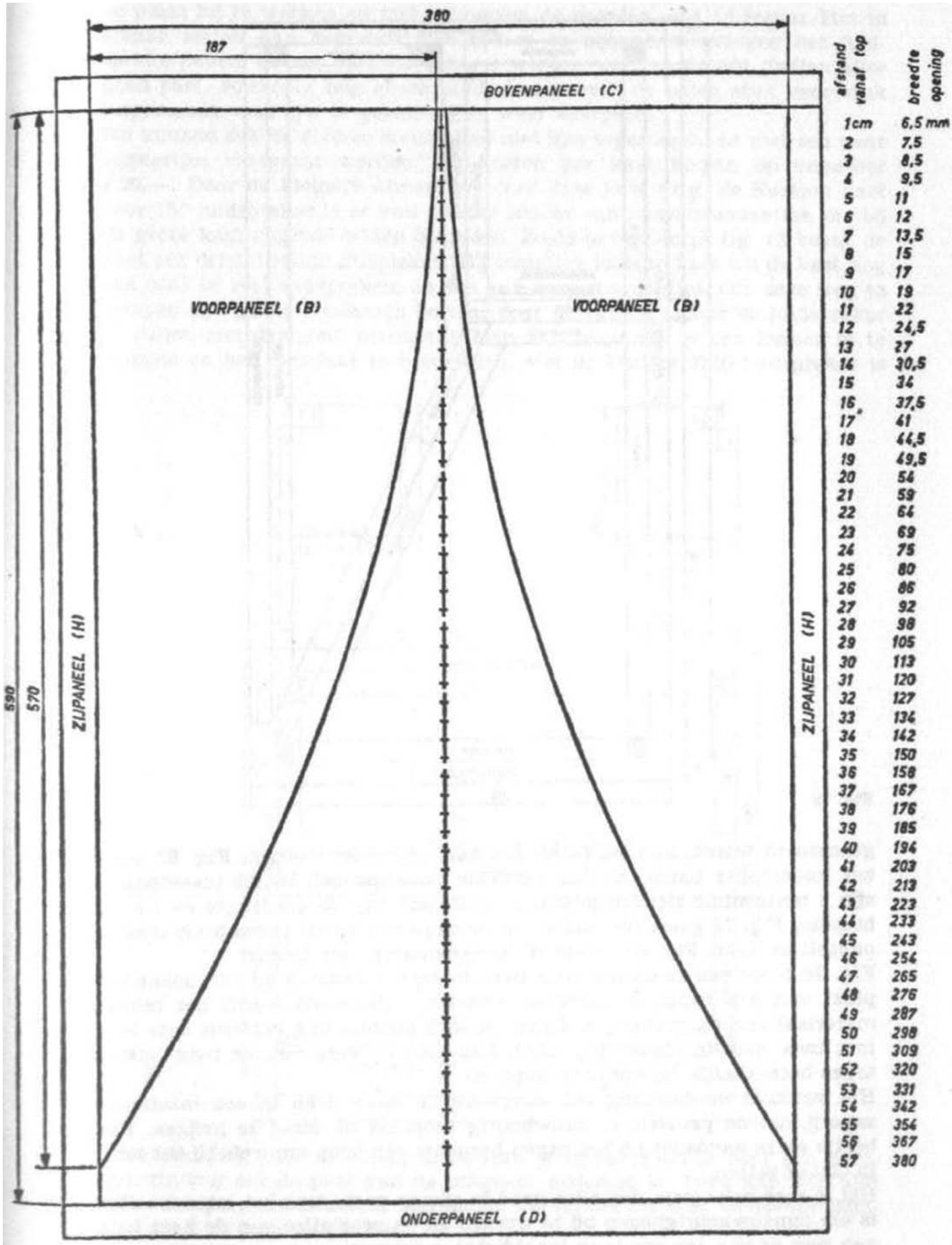

380
187
BOVENPANEEL (C)
VOORPANEEL (B)
VOORPANEEL (B)
ZIJPANEEL (H)
ZIJPANEEL (H)
590
570
ONDERPANEEL (D)
afstand vanaf top
breedte opening
1cm 6,5 mm
2 7,5
3 8,5
4 9,5
5 11
6 12
7 13,5
8 15
9 17
10 19
11 22
12 24,5
13 27
14 30,5
15 34
16 37,5
17 41
18 44,5
19 49,5
20 54
21 59
22 64
23 69
24 75
25 80
26 86
27 92
28 98
29 105
30 113
31 120
32 127
33 134
34 142
35 150
36 158
37 167
38 176
39 185
40 194
41 203
42 213
43 223
44 233
45 243
46 254
47 265
48 276
49 287
50 298
51 309
52 320
53 331
54 342
55 354
56 367
57 380

Fig. 77

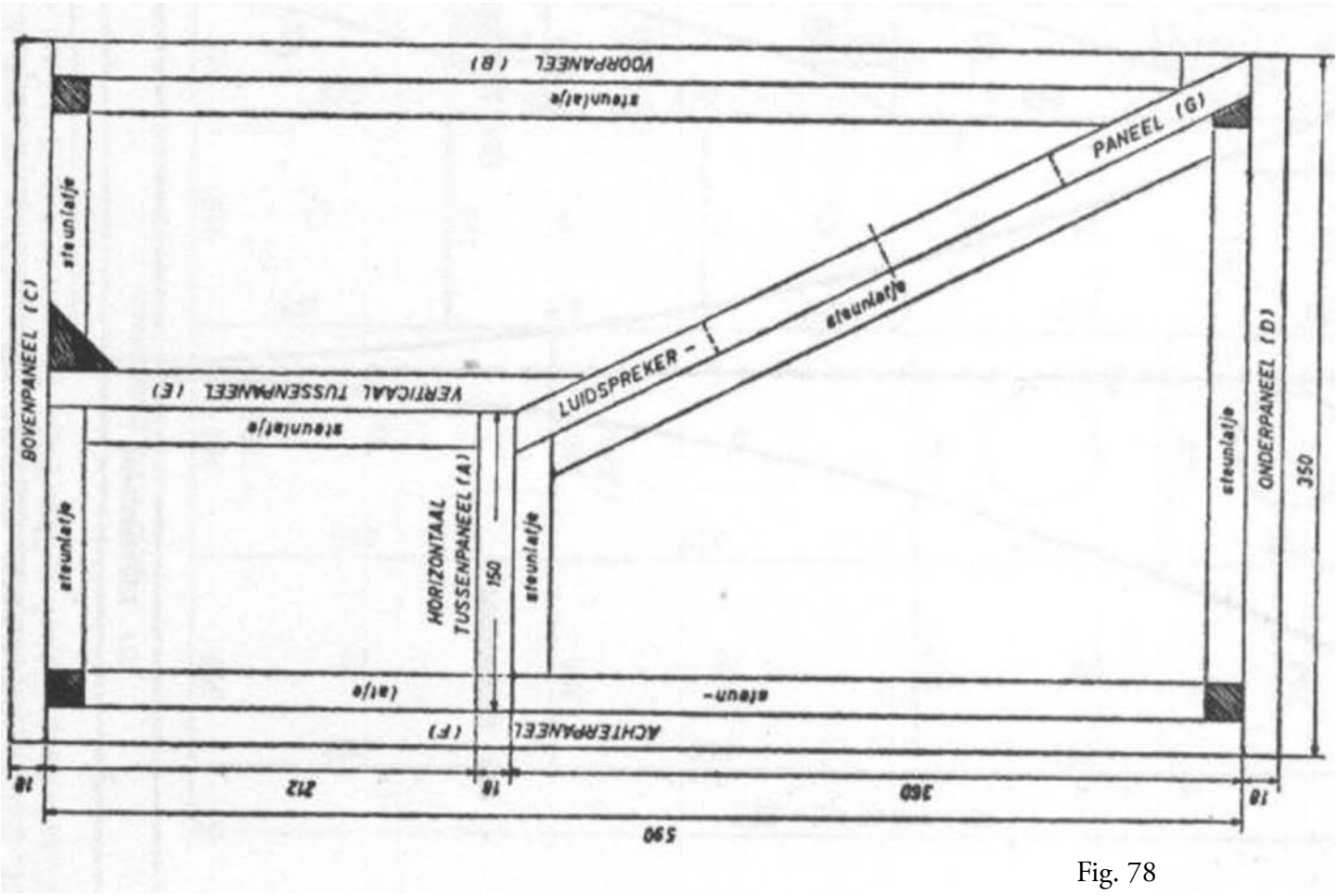

VOORPANEEL (B)
steunlatje
PANEEL (G)
LUIDSPREKER
steunlatje
BOVENPANEEL (C)
steunlatje
VERTICAAL TUSSENPANEEL (E)
steunlatje
HORIZONTAAL TUSSENPANEEL (A)
150
steunlatje
steunlatje
ONDERPANEEL (D)
350
steunlatje
ACHTERPANEEL (F)
18
212
18
360
18
590

Fig. 78

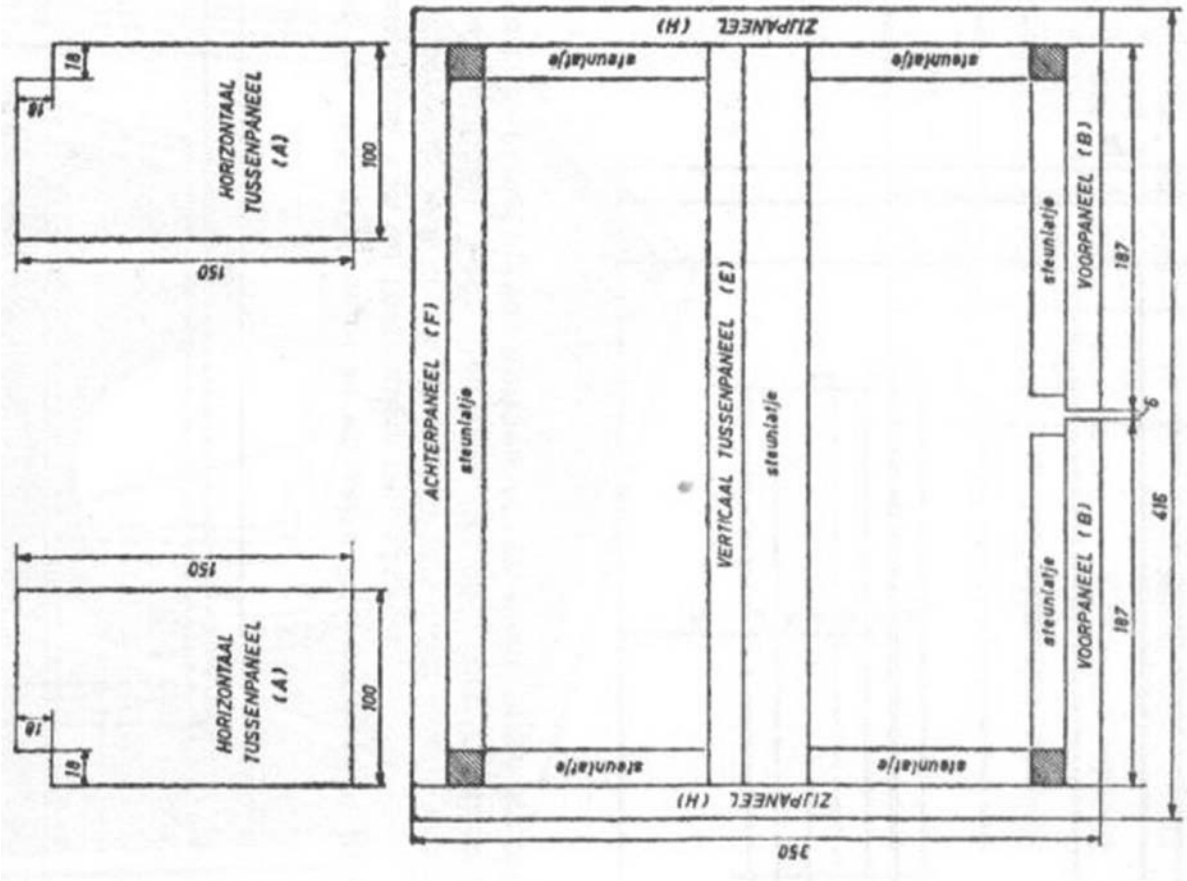

ZIJPANEEL (H)
steunlatje
steunlatje
HORIZONTAAL TUSSENPANEEL (A)
18
18
100
150
ACHTERPANEEL (F)
steunlatje
VERTICAAL TUSSENPANEEL (E)
steunlatje
steunlatje
VOORPANEEL (B)
187
steunlatje
VOORPANEEL (B)
187
416
6
150
HORIZONTAAL TUSSENPANEEL (A)
18
18
100
steunlatje
steunlatje
ZIJPANEEL (H)
350

Fig. 79

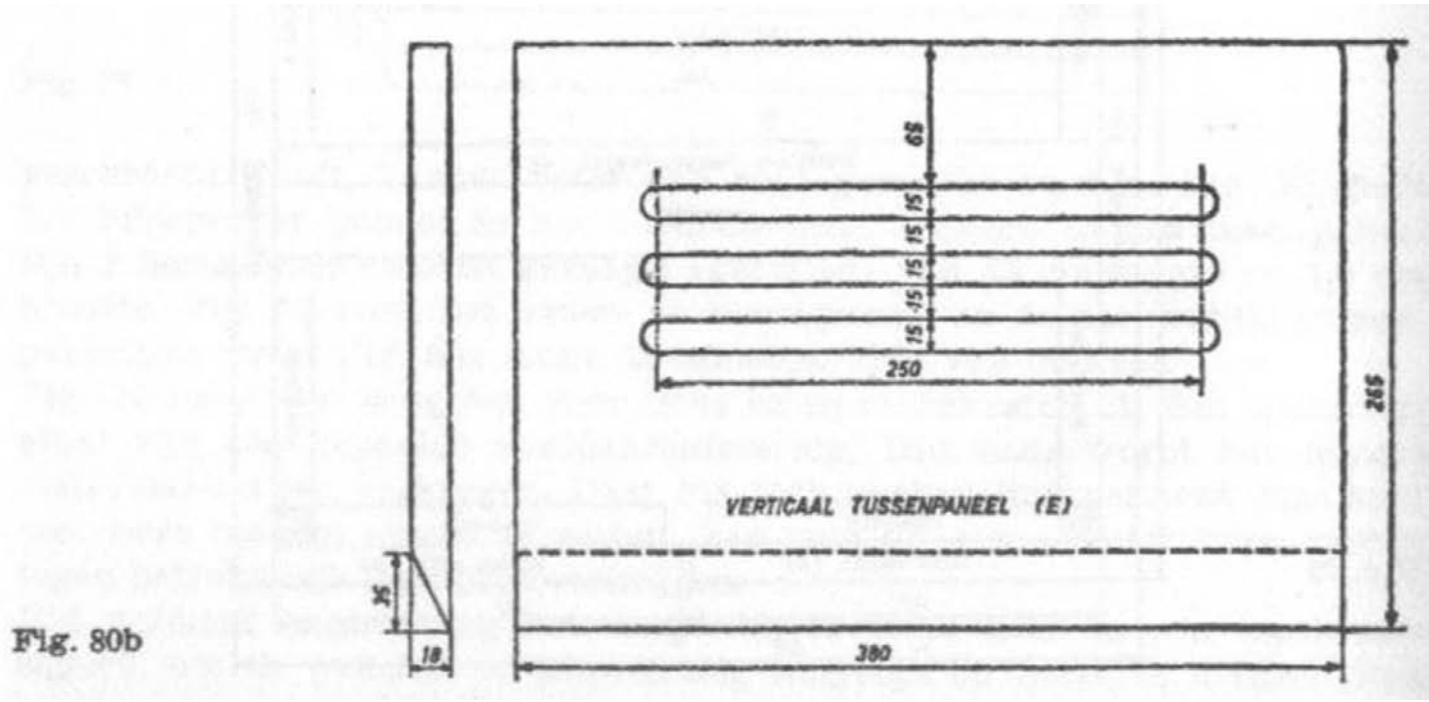


Fig. 80b

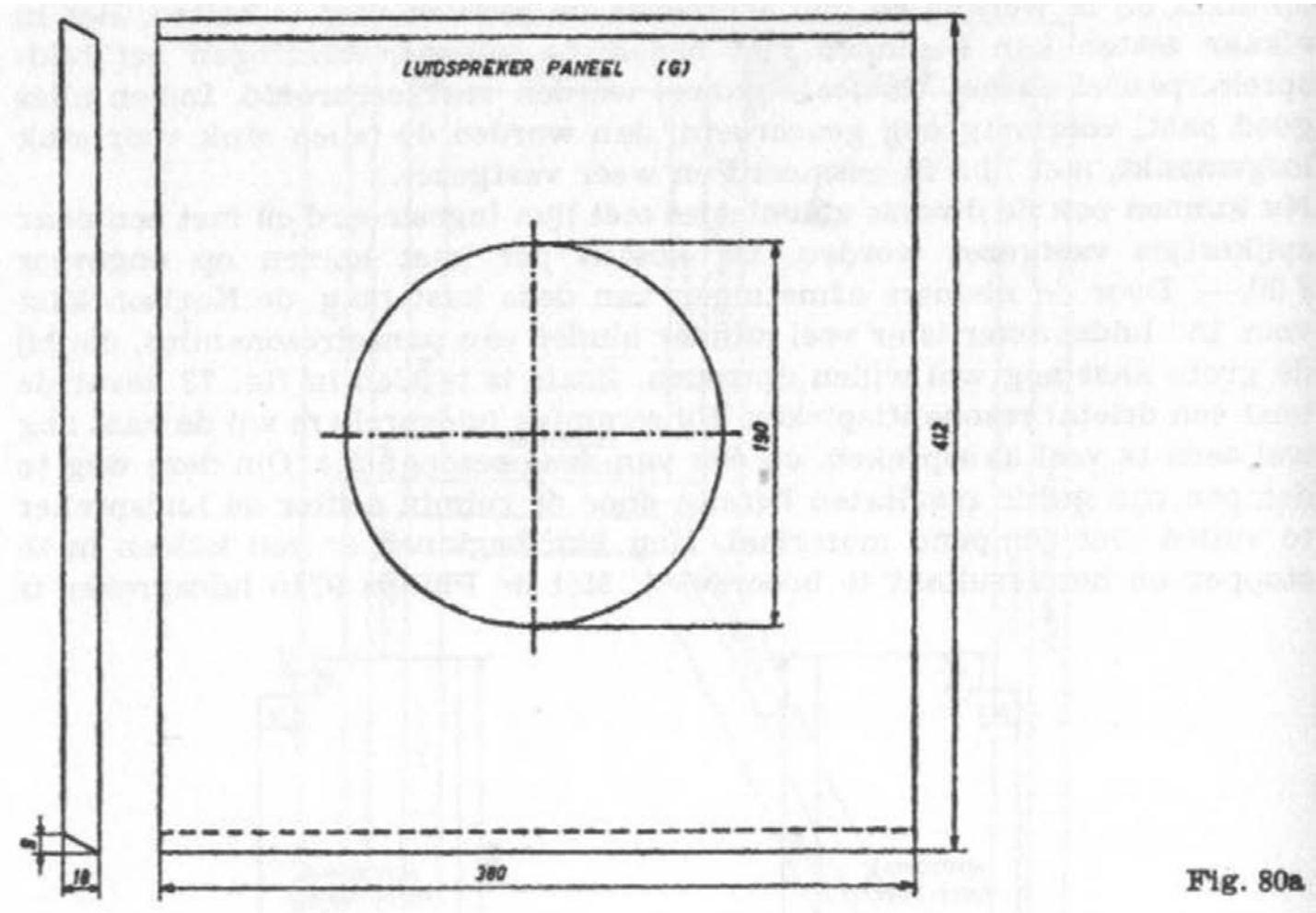


Fig. 80a

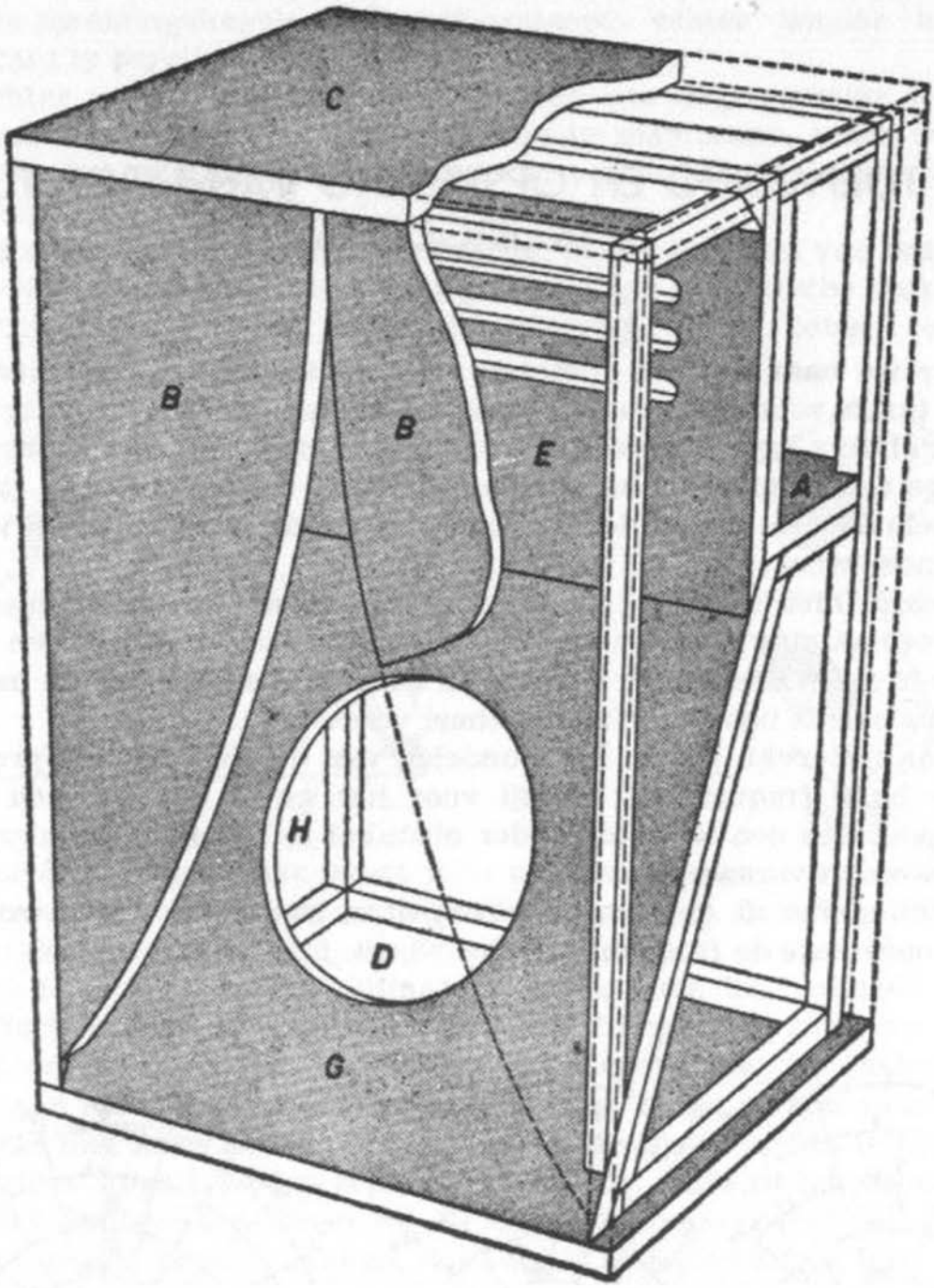


Fig. 80c

	15″ kast	12″ kast	8″ kast
Hoogte uitwendig	838	628	438 mm
„ inwendig	800	590	400 „
Breedte uitwendig	572	418	298 „
„ inwendig	534	380	260 „
Diepte uitwendig	458	352	248 „
„ inwendig	420	314	210 „
Oppervlakte opening van:			
verticale schot	185	117	ca. 55 cm^2
horizontale schot	320	270	ca. 100 „

LUIDSPREKERS

SAMENGESTELD
ONDER REDACTIE VAN

RADIO Bulletin

BASREFLEXKASTEN
HOORNS
HOEKPANELEN

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