SI/Note DL 69-20
16.12.69

VACUUM CHAMBER APERTURES FOR THE PSB

C. Bovet

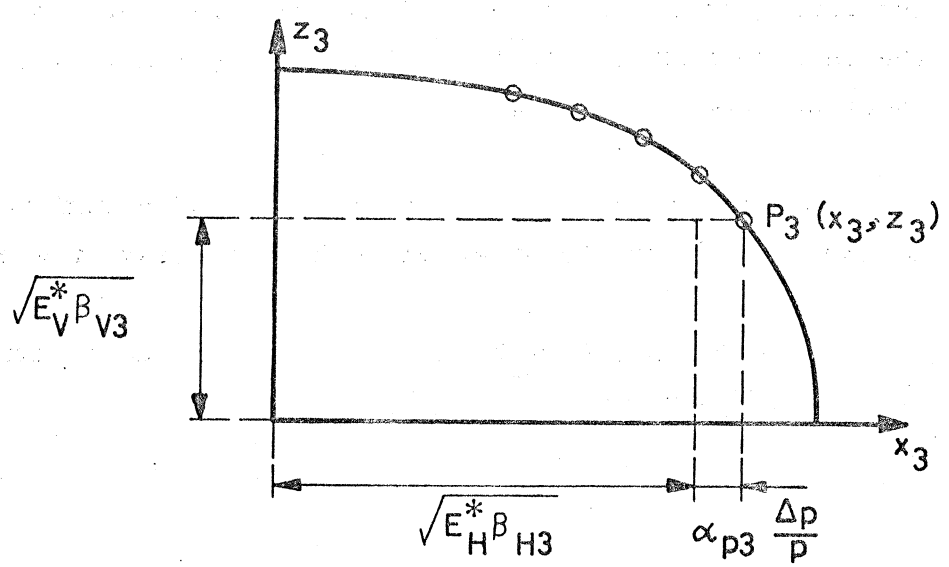


Fig. 2 - Aperture contour at location ③

E^* includes the normal emittance of the beam and the amplitude of the closed orbit.

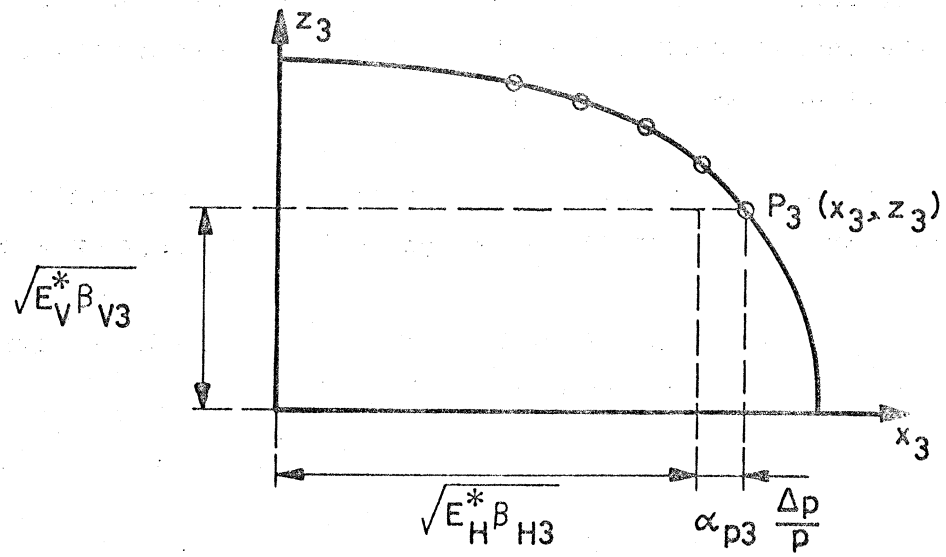
At the location ⓘ the point P_i corresponding to P_3 has the following coordinates :

$$x_i = \sqrt{E_H^* \beta_{Hi}/\beta_{H3}} + \alpha_{pi} \frac{\Delta p}{p}$$

$$z_i = \sqrt{E_V^* \beta_{Vi}/\beta_{V3}} \quad .$$

The calculation can be done for a series of points P_3 so as to describe the whole contour.

The complexity of the problem is increased by the fact that the machine will be used with different values of $4.1 < Q_H < 4.9$ and $4.1 < Q_V < 4.9$, which imply different functions $\beta(s)$ and $\alpha_p(s)$.



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At the location ⓘ the point P_i corresponding to P_3 has the following coordinates :

$$x_i = \sqrt{E_H^* \beta_{Hi} / \beta_{H3}} + \alpha_{pi} \frac{\Delta p}{p}$$

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The calculation can be done for a series of points P_3 so as to describe the whole contour.

The complexity of the problem is increased by the fact that the machine will be used with different values of $4.1 < Q_H < 4.9$ and $4.1 < Q_V < 4.9$, which imply different functions $\beta(s)$ and $\alpha_p(s)$.

No simple argument can be made to select the Q's for which the largest aperture is required. The graph plotter has therefore been used to draw the 16 curves corresponding to the combinations of the Q's given the values 4.1, 4.3, 4.7, 4.9.

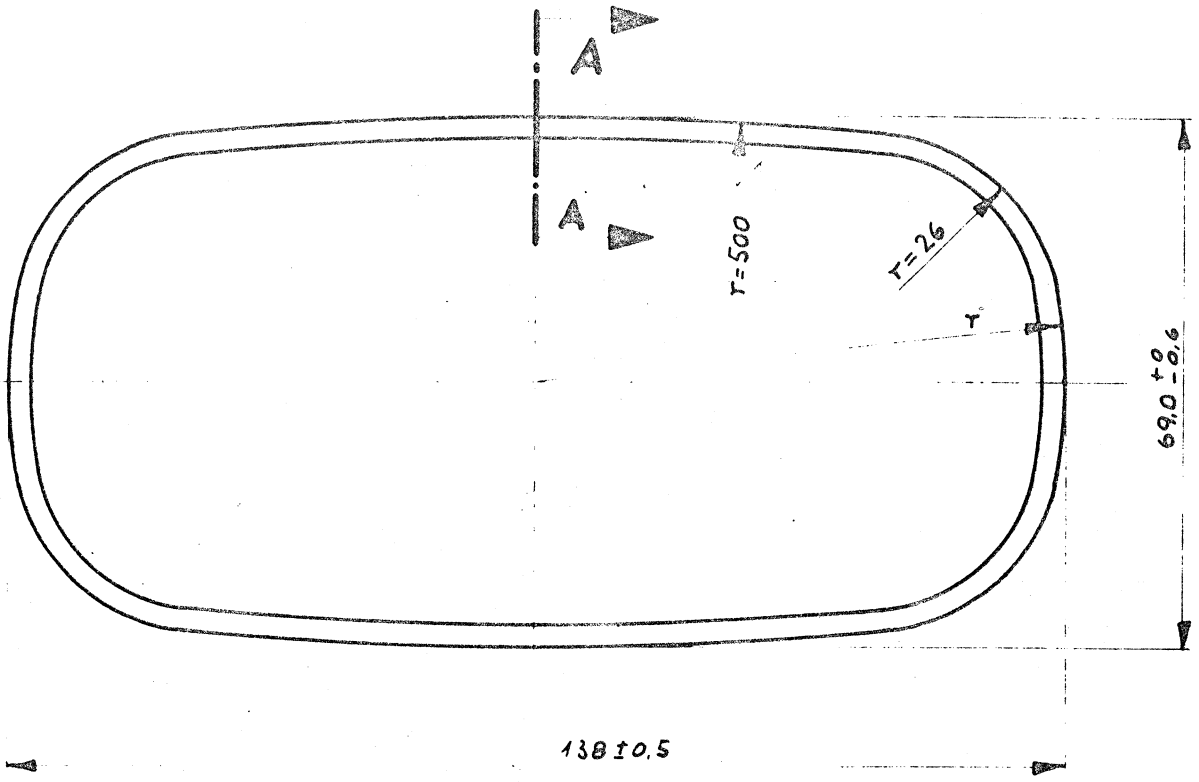
On Fig. 5, a,b, the envelope of the maximum beam passing through the magnet vacuum chamber at location (3), (where the maxima of β_H and β_V are reached for this type of of vacuum chamber), are drawn, for the different locations.

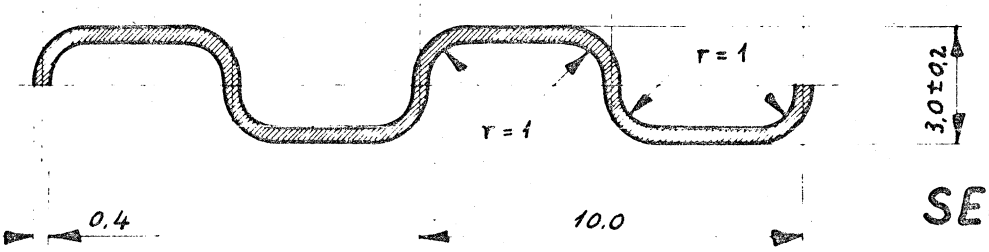
The contour of the triplet vacuum chamber is also drawn on Fig. 5, b. and one can appreciate that there will be another bottleneck for the beam in this region.

Unfortunately, there is no one of these locations (4) to (11) for which the beam envelope is larger than anywhere else. The procedure used for the aperture at location (3) must then be repeated for any of those locations (4) to (11). And from all these drawing a minimum maximorum envelope is drawn of a beam passing through the vacuum chamber in the triplet (Fig. 6 a,b) combining Fig. 5 and Fig. 6 on gets the actual largest envelope of a possible beam in the PSB shown on Fig. 7 a,b.

Distribution

SI Scientific and Technical Staff.





SECTION A-A
SCALE 5:1

INCONEL X 750, OR EQUIV.

NO / UNITE

DESCRIPTION	POS.	MAT.	OBSERVATIONS

Rugosité VSM 10321 Roughness

Groupe	▽	▽▽		▽▽▽			▽▽▽▽	
Classe	N 10	N 9	N 8	N 7	N 6	N 5	N 4	N 3	N 2
μm.	12,5	6,3	3,2	1,6	0,8	0,7	0,2	0,1	0,05

Abréviations	VSM 10319
Symboles usinage, traitement	VSM 10320
Symboles de formes	VSM 10324

Tolérances

0 - 10	± 0,1
10 - 80	± 0,2
80 - 360	± 0,3
360 - 750	± 0,4
.....	.....
.....	.....

REMPLACE	
REMPLACE PAR	
REDUCTION	
CONTROLE	
VU	

ASS. | S/ASS.

BENDING MAGNET - PSB RING

VACUUM CHAMBER

69 × 138 AND 3.0 × 3.0

Echelle Scale 1:1 (5:1)

Fig. 3

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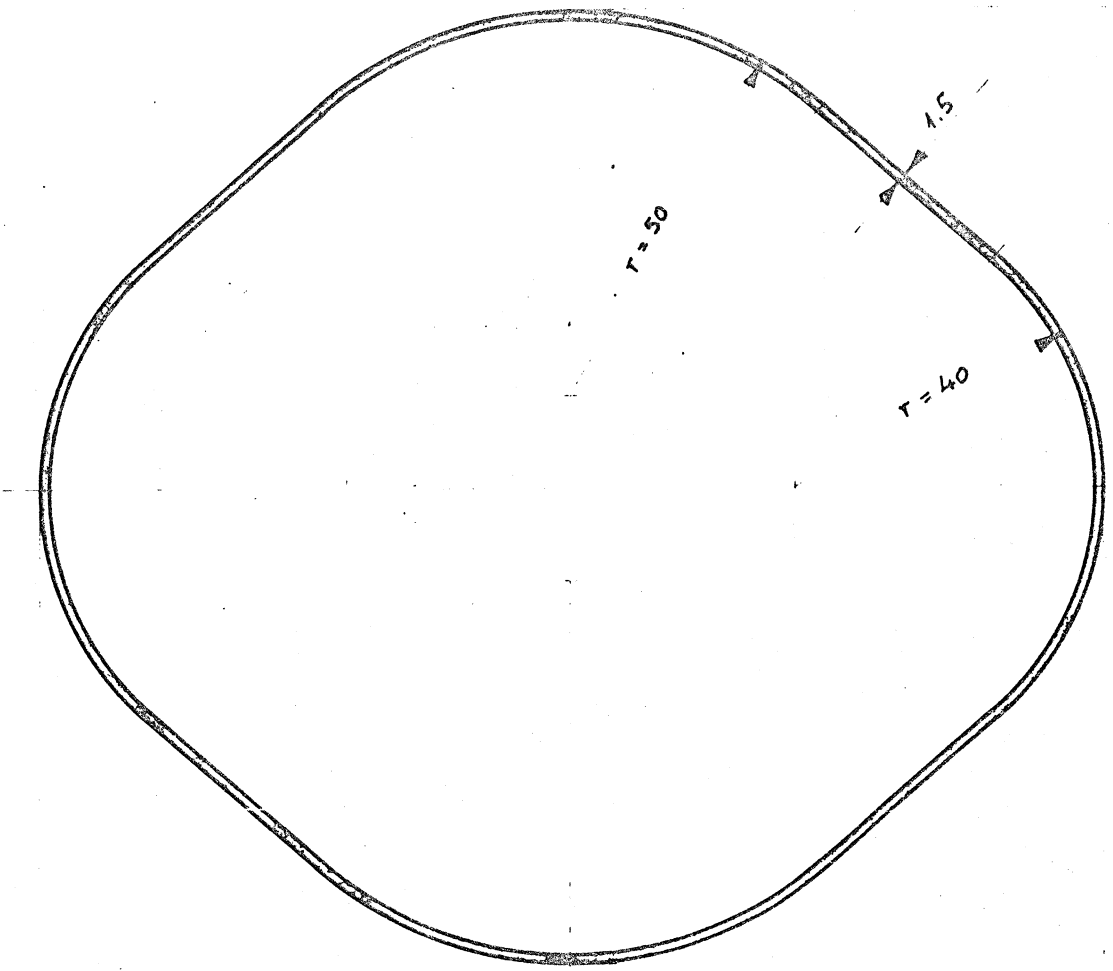
EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH
CERN 1211 GENEVE 23

SI.3.49.1144.4



Nombre de pièces			Designation	Pos.	Matière	Poids	Observations
III	II	I					

Mod.	Date	Nom	Tolérances générales
A			de a +
B			de à +
C			de à -

Etat des surfaces selon VSM 10320
Rugosité en μ VSM
Abréviations VSM 10319

Ensemble | S. Ensemble

Echelle 1:1

UNIQUE VACUUM CHAMBER FOR F & D QUADRUPOLE AND STRAIGHT SECTIONS L3 & L4

Fig. 4

Dossier N°

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SI.3.49.1063.4

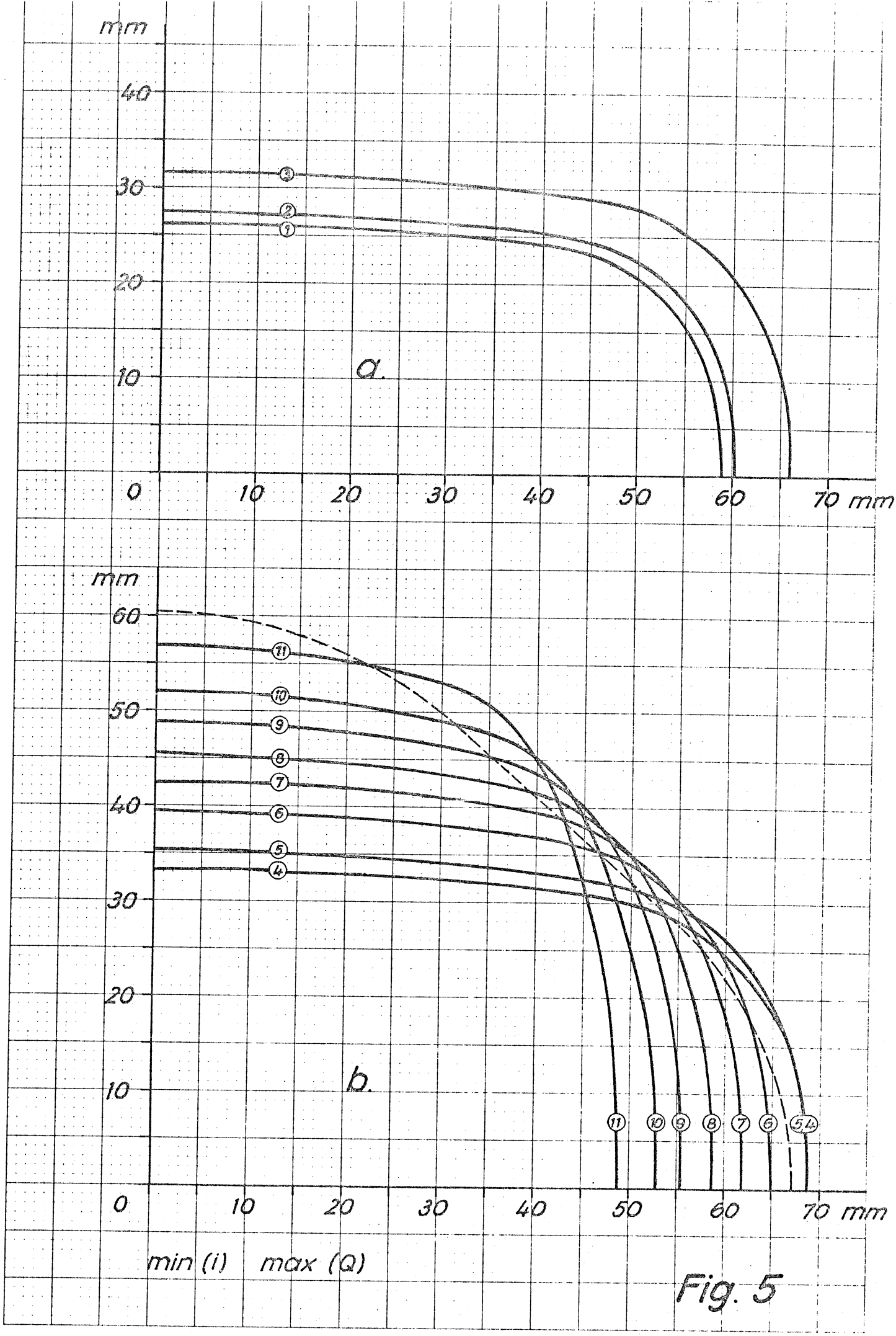
mm
40
30
20
10
0
10
20
30
40
50
60
70 mm
3
2
1
a.
mm
60
50
40
30
20
10
0
10
20
30
40
50
60
70 mm
11
10
9
8
7
6
5
4
11
10
9
8
7
6
5-4
b.
min (i)
max (Q)

Fig. 5

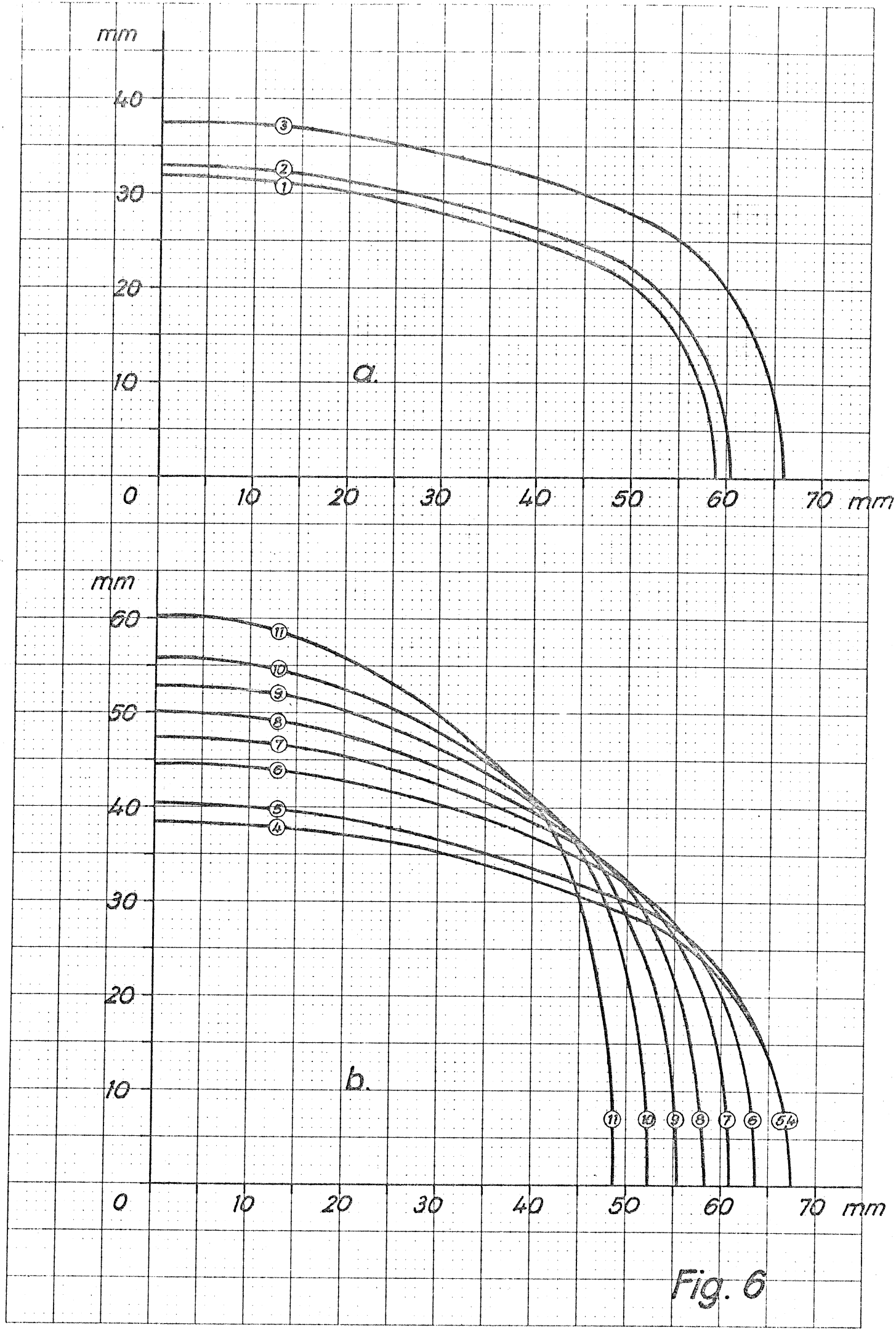
mm
40
30
20
10
0
10
20
30
40
50
60
70 mm
3
2
1
a.
mm
60
50
40
30
20
10
0
10
20
30
40
50
60
70 mm
11
10
9
8
7
6
5
4
b.
11
10
9
8
7
6
5 4

Fig. 6

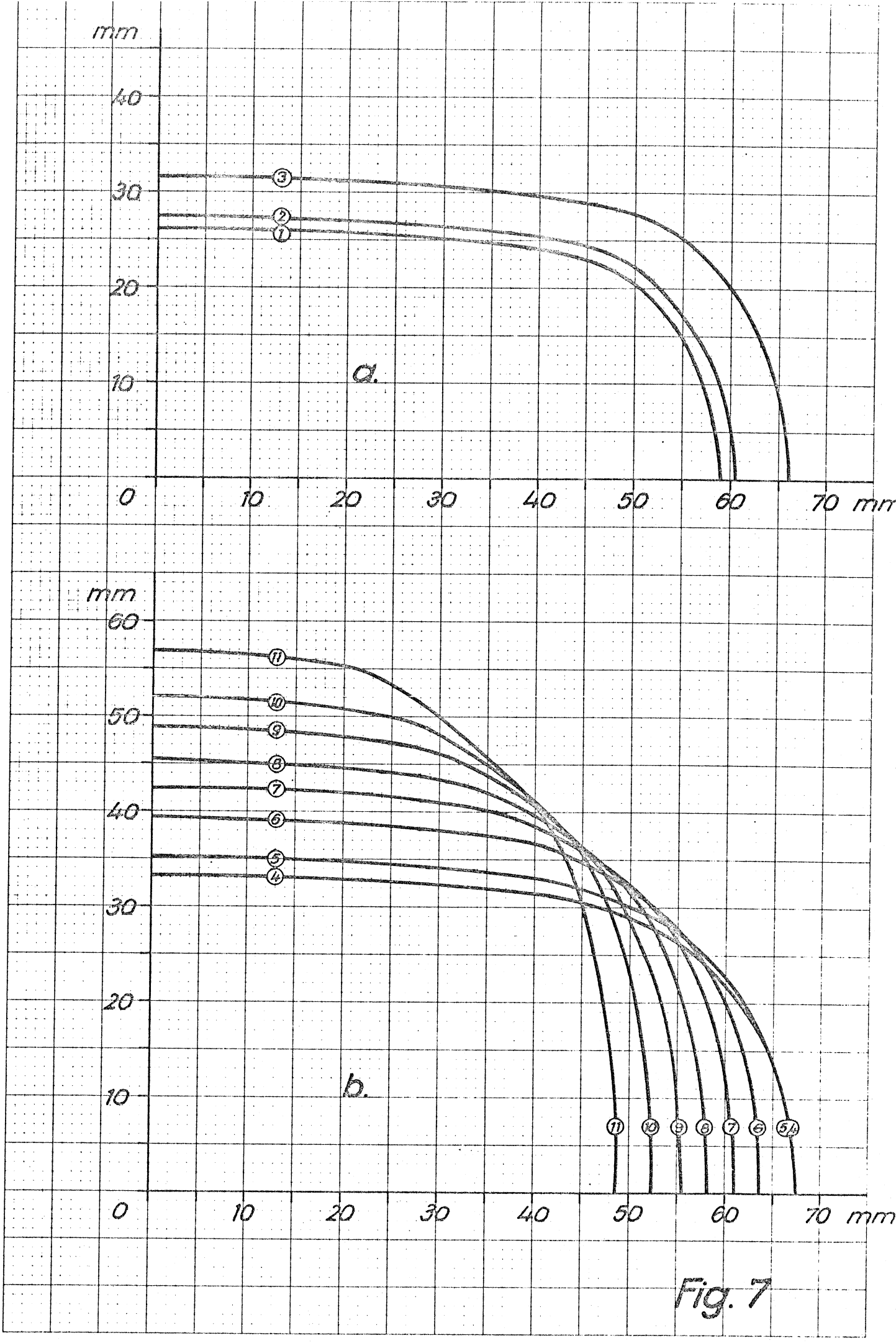
mm
40
30
20
10
3
2
1
a.
0
10
20
30
40
50
60
70 mm
mm
60
50
40
30
20
10
11
10
9
8
7
6
5
4
b.
0
10
20
30
40
50
60
70 mm

Fig. 7