

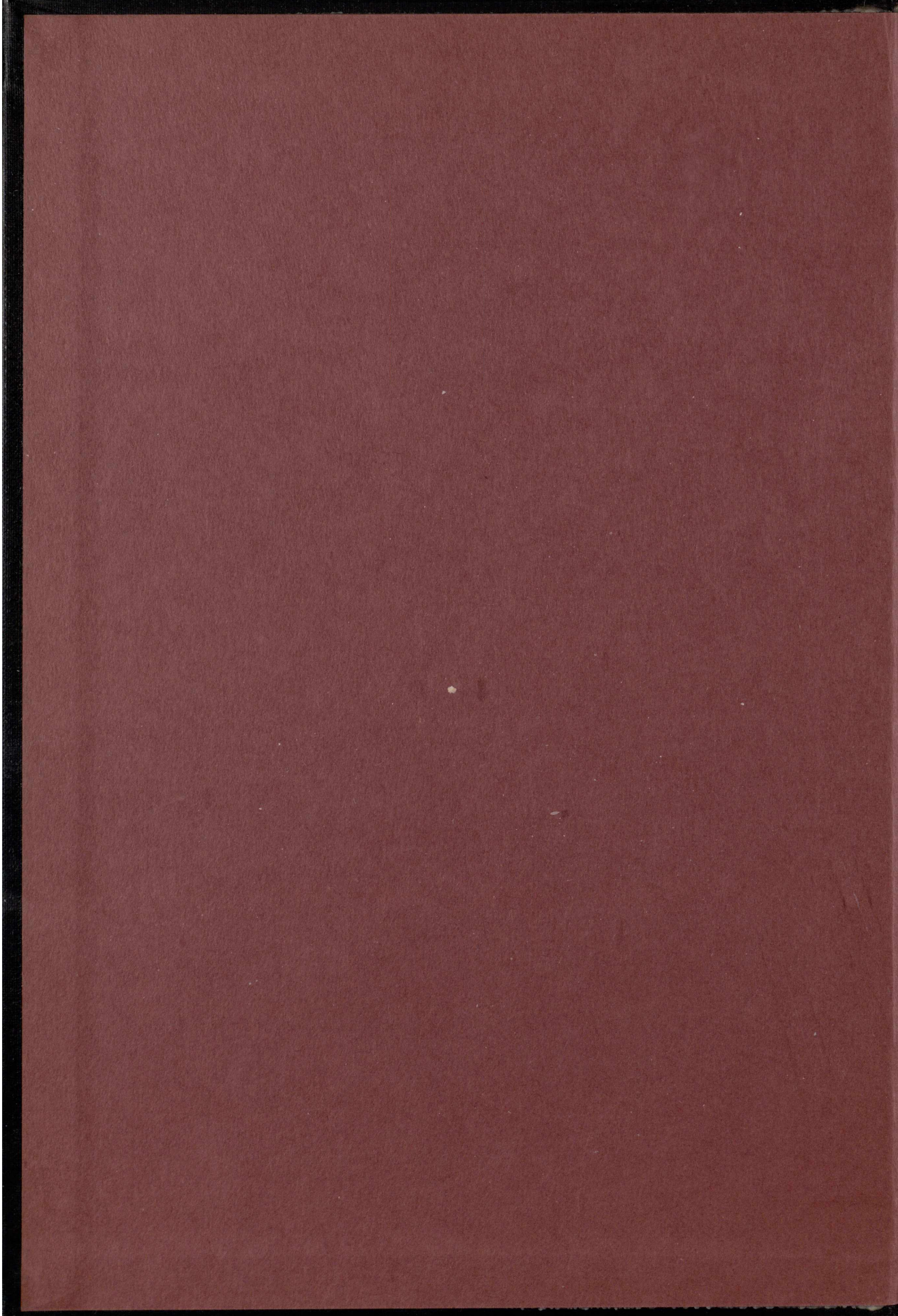
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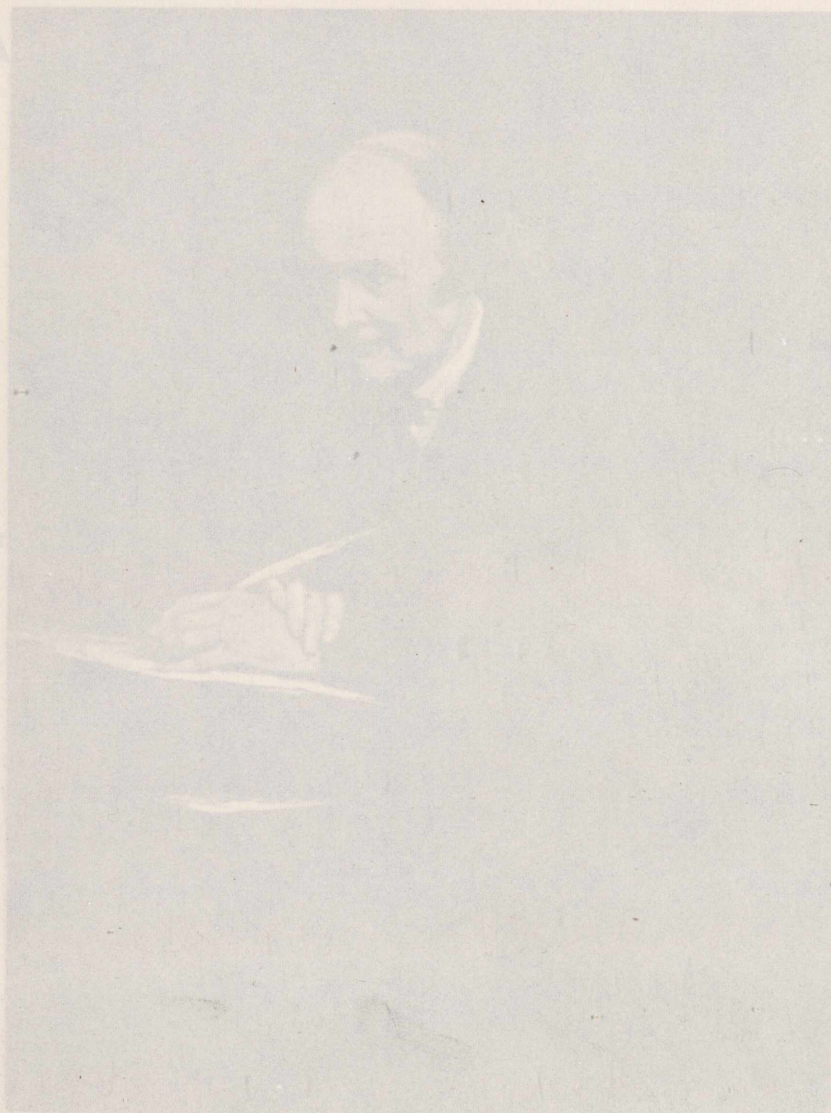
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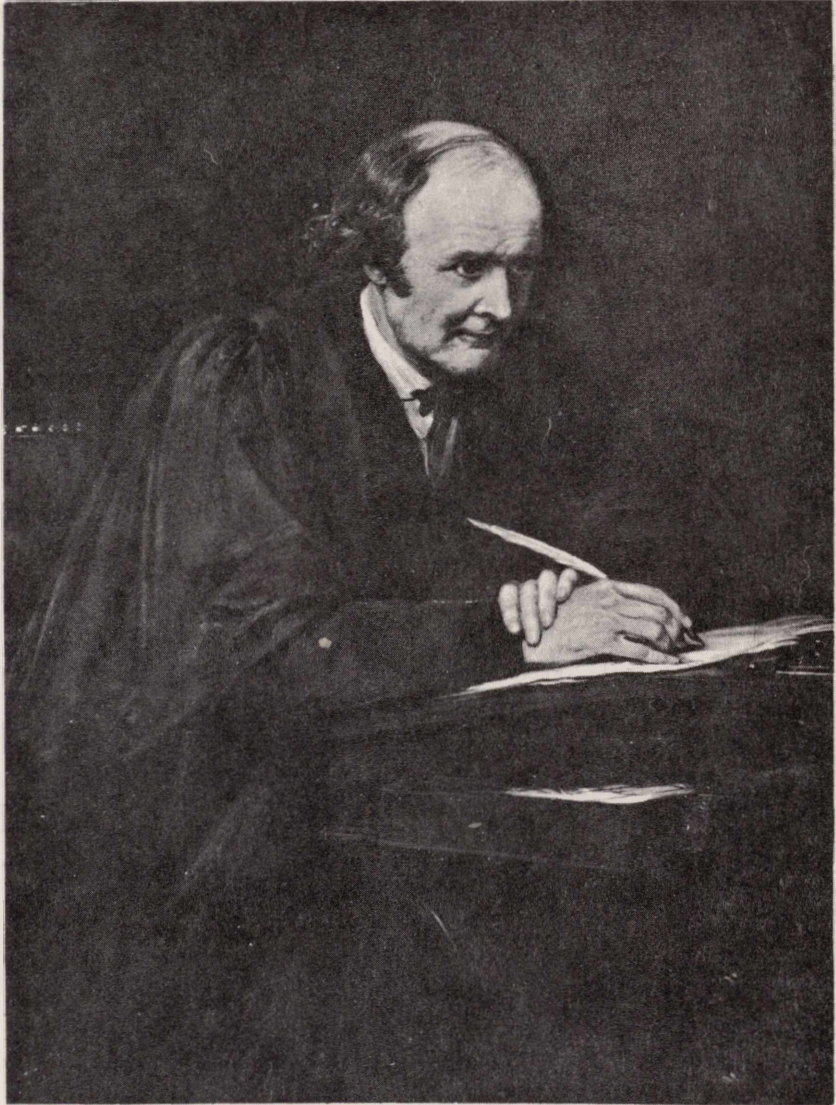
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OF

ARTHUR CAYLEY, Sc.D., F.R.S.,

SADLERIAN PROFESSOR OF PURE MATHEMATICS IN THE UNIVERSITY OF CAMBRIDGE.

VOL. VI.

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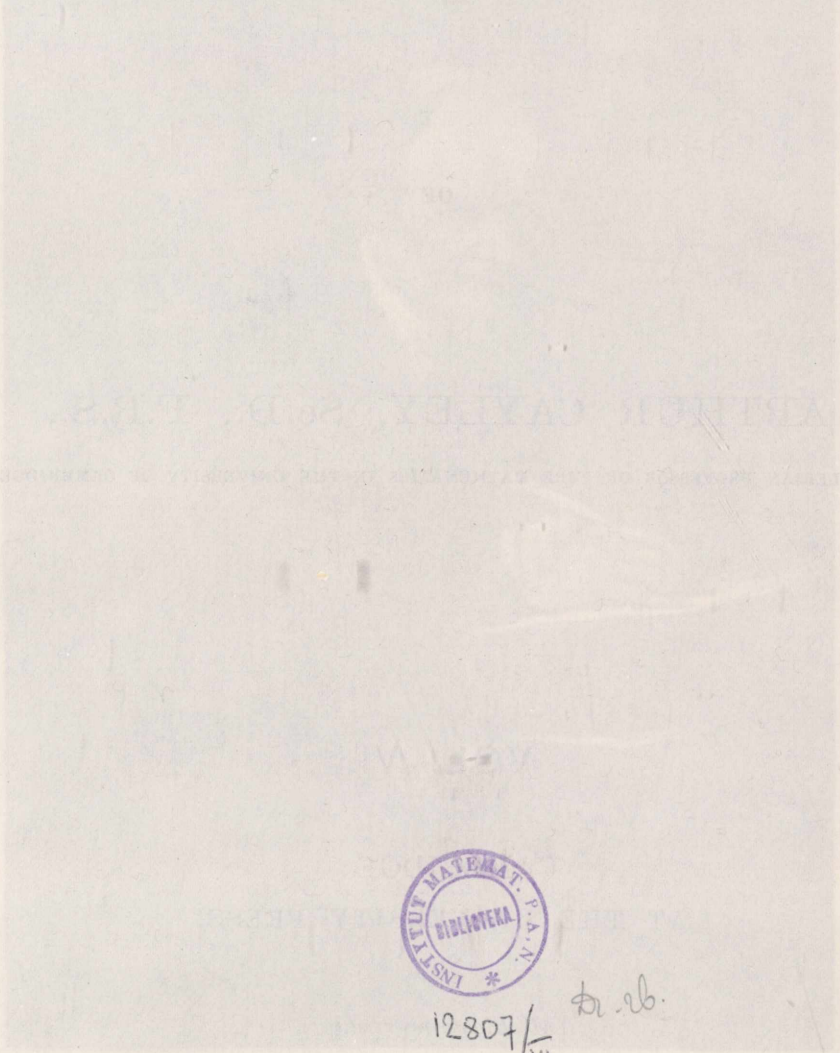
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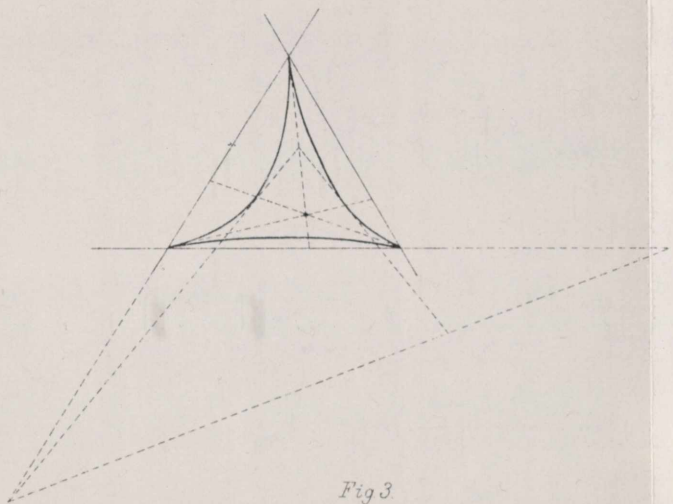


Fig 3

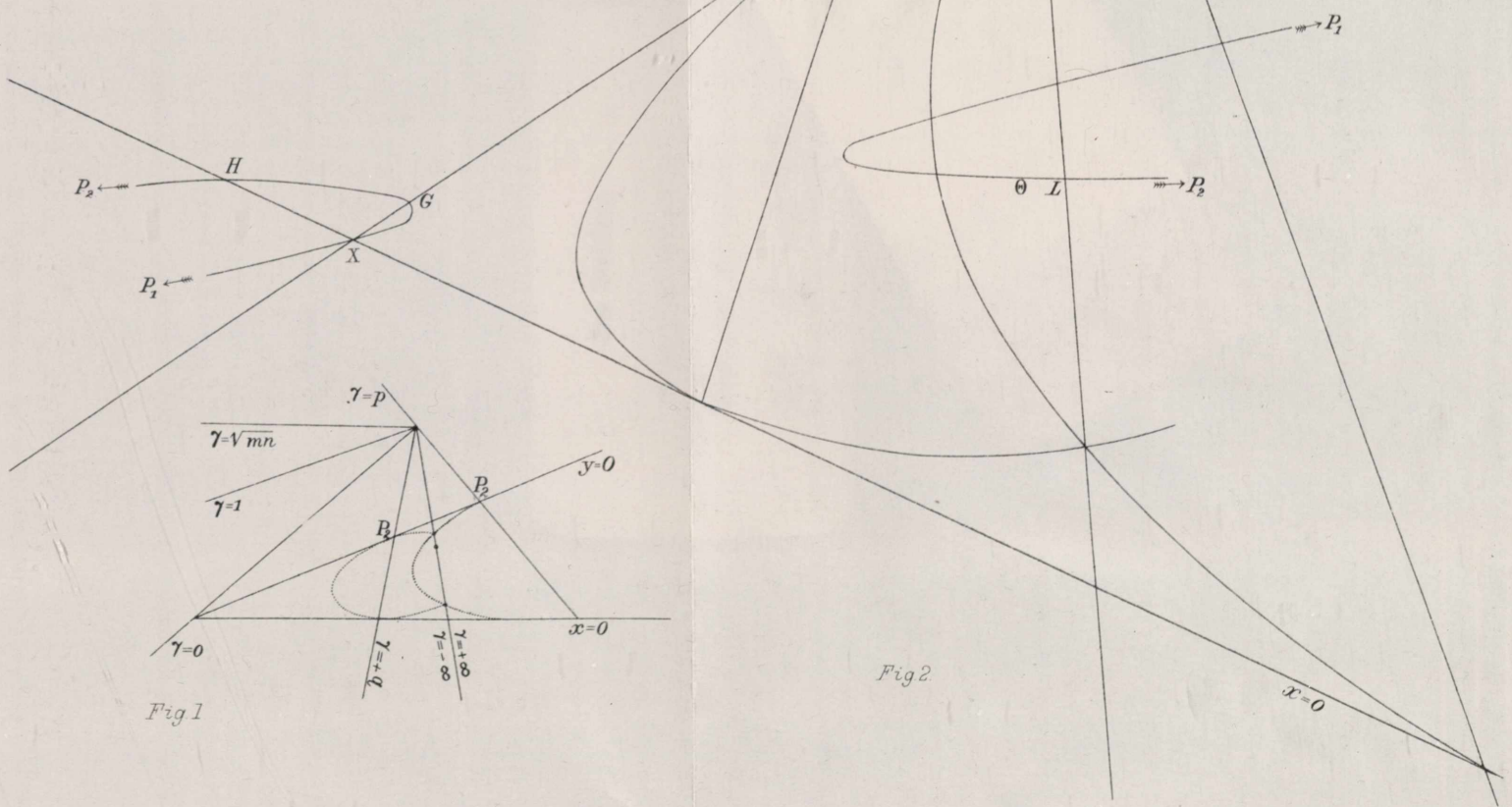


Fig 2

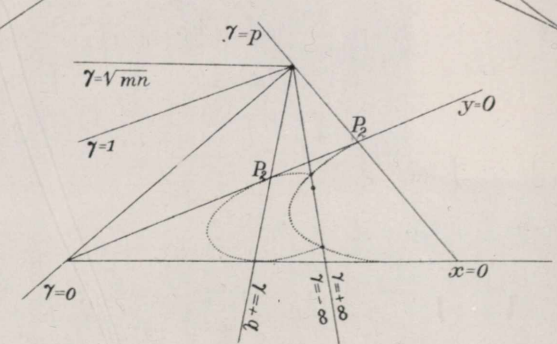


Fig 1

AB AE AG AH AI AJ AMAN BC BF BH BI BJ BN BO CD CF CG CI CJ CK CO DE DF DG DH DJ DK DL EF

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AE	p	h	g	h	p	h	p	r	p	x	x	t	t	r	r	r	t	t	r	m	m	p	t	x	x	p	r	t	p			
AG	p	h	p	h	g	h	p	p	r	t	x	x	t	r	t	r	p	x	t	r	x	r	p	p	x	t	r	t				
AH	h	g	p	p	h	p	h	t	x	h	x	w	t	r	r	r	r	t	m	m	x	t	p	p	x	r	t	x				
AI	g	h	h	p	p	h	p	x	x	z	g	x	x	x	r	t	x	p	p	r	t	t	r	t	r	m	m	x				
AJ	h	p	g	h	p	p	h	x	t	w	x	h	w	t	t	r	x	p	p	t	r	p	r	x	x	p	t	r	r			
AM	p	h	h	p	h	p	g	r	r	t	x	t	x	p	m	m	t	t	r	r	r	t	m	t	r	r	r	t	r			
AN	h	p	p	h	p	h	g	t	t	w	x	w	h	x	m	m	r	r	t	r	r	r	m	t	r	t	r	r	r			
BC	p	r	p	t	x	x	r	t	h	p	h	g	p	h	p	h	p	h	g	p	h	r	x	t	p	x	t	r	t			
BF	p	p	r	x	x	t	r	t	h	g	h	p	p	h	x	h	t	w	x	t	w	t	p	r	x	p	r	t	p			
BH	h	x	t	h	x	w	t	w	p	g	p	h	h	p	p	x	r	t	x	r	t	t	x	r	p	x	r	t	x			
BI	g	x	x	g	x	x	z	h	h	p	p	p	h	t	w	x	h	x	t	w	r	t	r	r	r	m	m	x				
BJ	h	t	x	w	x	h	t	w	g	p	h	p	h	p	x	x	x	g	x	x	r	p	t	x	p	t	r	r	r			
BN	h	t	t	w	x	w	x	h	p	p	h	p	h	g	r	t	r	t	x	p	x	m	r	m	t	r	r	r	r			
BO	p	r	r	t	x	t	p	x	h	h	p	h	p	g	t	w	t	w	x	x	h	m	t	m	r	r	r	r	t			
CD	r	r	t	r	r	t	m	m	p	x	p	t	x	r	t	g	h	p	h	p	p	g	h	p	h	p	h	p	x			
CF	t	r	r	r	t	r	m	m	h	h	x	w	x	t	w	g	p	h	p	p	h	x	g	x	x	x	x	p				
CG	p	t	p	r	x	t	r	p	t	r	x	x	r	t	h	p	g	h	p	x	x	h	t	w	w	t	p					
CI	x	t	x	r	p	p	t	r	h	w	t	h	x	t	w	p	h	g	p	p	h	p	x	x	r	t	t	r	x			
CJ	x	r	x	t	p	p	r	t	g	x	x	g	x	h	p	h	p	h	p	h	p	t	x	w	x	h	w	t	r			
CK	r	m	t	m	r	t	r	r	p	t	r	t	x	p	x	h	p	h	p	h	g	t	x	w	t	w	h	x	r			
CO	t	m	r	m	t	r	r	r	h	w	t	w	x	x	h	p	h	p	h	p	g	r	x	t	r	t	x	p	t			
DE	r	p	x	x	t	p	t	r	r	t	t	r	r	m	m	p	x	x	p	t	r	h	g	h	p	h	h	h	h			
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DJ	t	p	x	x	r	p	r	t	x	p	x	r	p	t	r	h	x	w	t	h	w	t	p	h	h	g	h	p	t			
DK	m	r	t	r	m	t	r	r	t	r	r	m	t	r	r	h	x	w	t	w	h	x	p	p	h	p	h	g	t			
DL	m	t	r	t	m	r	r	r	r	t	t	m	r	r	r	p	x	t	r	t	x	p	h	h	p	h	p	g	w			
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EC	t	h	h	x	w	x	w	t	r	r	r	t	r	m	m	x	p	p	x	t	t	r	g	x	g	x	x	x	p			
EN	x	g	x	g	x	x	x	x	r	x	p	p	t	t	r	t	t	r	r	r	m	m	h	w	x	h	x	t	w	h		
EI	x	h	w	x	h	t	w	t	t	x	p	p	r	r	t	p	x	x	p	r	r	t	p	x	x	t	r	r	t	g		
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GM	t	w	h	t	w	x	h	x	r	m	m	t	r	r	r	t	r	p	x	t	x	p	x	r	p	r	t	x	p	t		
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HL	t	x	r	p	p	r	t	p	x	r	x	p	r	t	x	p	t	t	m	m	r	r	w	w	t	h	x	x	h	w		
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t	r	r	m	m	t	p	r	t	x	h	w	t	p	r	t	r	t	h	p	t	t	x	x	m	r	r	r	r	p	CJ
t	m	r	r	r	t	r	p	x	x	w	h	x	t	r	r	p	x	h	x	p	p	p	g	t	t	x	t	x	CK	
r	m	t	r	r	w	t	x	h	x	t	x	p	r	r	r	x	h	x	p	x	x	z	g	t	t	p	t	p	CK	
g	h	p	r	p	x	w	t	x	x	x	x	w	t	t	r	t	r	t	r	x	p	r	r	x	t	t	r	m	DE	
x	w	x	w	t	p	h	h	p	t	t	r	x	w	t	r	t	r	t	r	x	r	r	p	t	t	x	m	r	DF	
g	x	x	x	p	t	t	r	p	h	h	p	x	t	r	t	r	w	t	x	x	t	t	p	r	r	r	m	DG		
x	h	t	w	t	t	h	w	t	r	x	t	r	g	h	p	m	m	x	x	x	r	p	r	t	x	t	r	m	DH	
x	x	r	t	r	r	x	t	r	t	h	w	t	g	x	x	t	m	h	p	x	t	x	t	r	p	r	r	m	DJ	
x	t	r	x	p	r	t	x	p	t	w	h	x	x	x	p	r	r	h	x	g	p	p	p	x	x	t	t	t	OK	
x	w	t	h	x	t	w	h	x	r	t	x	p	x	h	x	r	r	x	p	g	x	x	p	p	t	t	t	OL		
p	h	g	p	g	h	p	x	r	t	r	t	t	w	t	x	x	m	m	t	r	m	r	x	t	x	r	p	r	EF	
p	h	p	h	x	t	t	r	h	p	p	h	p	t	r	w	t	t	r	p	x	r	r	x	r	r	t	t	m	EG	
p	h	p	h	p	x	h	w	t	t	p	r	t	p	h	p	t	r	r	t	t	r	r	m	x	x	t	p	r	r	EH
h	p	h	g	x	x	x	h	t	t	w	r	t	r	h	p	m	m	r	t	m	r	x	r	p	t	x	r	EI		
p	h	p	g	x	w	h	x	t	r	p	x	t	h	x	x	p	r	r	p	x	t	t	g	p	p	x	x	t	EL	
h	p	h	g	x	t	x	p	w	t	x	h	r	x	p	h	x	r	r	x	p	t	t	g	x	x	p	p	t	EM	
x	x	g	x	p	p	h	p	r	r	t	r	t	r	p	h	m	m	r	r	m	t	p	r	x	r	x	t	FI		
t	h	x	w	t	p	h	p	r	r	m	m	p	h	p	r	t	r	t	t	m	r	r	t	x	x	r	p	FH		
t	w	x	h	x	p	h	g	r	m	r	r	t	h	x	p	x	r	r	p	t	t	x	p	p	g	t	x	FL		
r	t	x	x	p	h	p	g	t	m	r	r	r	x	p	x	h	r	r	x	t	t	p	x	z	g	t	p	FO		
h	t	h	t	w	p	r	t	t	p	p	h	r	m	m	h	p	t	r	r	x	r	p	t	m	r	t	x	r	GI	
p	p	t	r	t	r	r	m	m	p	h	p	p	r	t	m	r	h	p	t	x	x	t	r	r	m	p	r	r	GJ	
p	r	t	p	x	r	m	r	r	p	h	g	t	r	r	x	p	h	x	p	g	p	p	x	t	t	x	t	OK		
h	t	w	x	h	t	m	r	r	h	p	g	r	r	r	h	x	x	p	x	g	x	x	p	t	t	p	p	t	GM	
p	p	r	t	r	r	p	t	r	r	p	t	r	p	h	m	m	p	h	p	r	x	r	r	x	r	t	m	t	HJ	
t	h	t	h	x	t	h	h	x	m	r	r	r	p	g	r	r	p	x	p	t	x	t	p	g	p	x	t	x	HL	
r	p	r	x	p	r	p	x	m	t	r	r	h	g	r	r	x	h	x	t	p	t	x	g	x	p	t	p	HN		
w	t	h	x	h	p	r	p	x	h	m	x	h	m	r	r	g	r	r	t	p	t	x	p	t	x	p	g	x	IM	
t	r	p	p	x	h	t	x	h	p	r	p	x	m	r	r	g	r	r	t	x	t	p	x	t	p	x	g	p	IO	
t	r	m	r	r	m	r	r	r	t	h	h	x	p	p	x	r	r	g	p	p	g	p	t	x	t	x	t	x	JK	
r	t	m	r	r	m	t	r	r	r	p	x	p	h	x	h	r	r	g	x	x	g	x	t	p	t	p	t	p	JN	
p	t	r	p	x	r	t	p	x	r	t	p	x	p	p	x	t	t	p	x	h	h	h	h	h	w	w	w	KL		
x	r	t	x	p	r	m	t	t	x	x	g	g	r	t	t	p	x	p	z	h	h	h	w	w	h	w	h	KN		
r	r	m	t	t	m	r	t	r	x	p	x	x	p	t	l	g	g	h	h	h	w	h	w	h	w	h	KN			
r	m	r	t	t	r	x	p	p	t	p	x	r	t	t	x	p	p	z	h	h	h	w	w	h	w	h	h	KO		
x	x	x	g	g	p	t	p	x	t	r	x	p	r	p	x	p	x	t	t	h	h	w	w	h	h	h	w	LM		
r	x	r	p	x	r	x	p	x	m	r	t	t	x	g	g	t	t	x	p	h	w	h	w	h	h	h	w	LN		
r	t	p	p	x	x	g	g	r	m	t	t	r	p	x	x	p	t	t	h	w	w	h	h	h	w	h	LO			
l	p	t	x	p	r	r	t	t	p	z	p	t	x	p	p	x	x	p	w	h	h	w	h	w	h	h	h	MN		
t	r	x	x	p	x	r	x	p	x	r	x	p	m	t	l	g	g	t	w	h	w	h	w	h	h	h	h	NO		
m	r	r	t	t	p	x	p	r	r	t	t	t	x	p	x	p	p	w	w	h	h	w	h	h	h	h	NO			

EG EH EI EL EM FI FH FL FO GI GJ GK GM HJ HL HN IM IO JK JN KL KM KN KO LM LN LOMN MO NO

Fig 1.

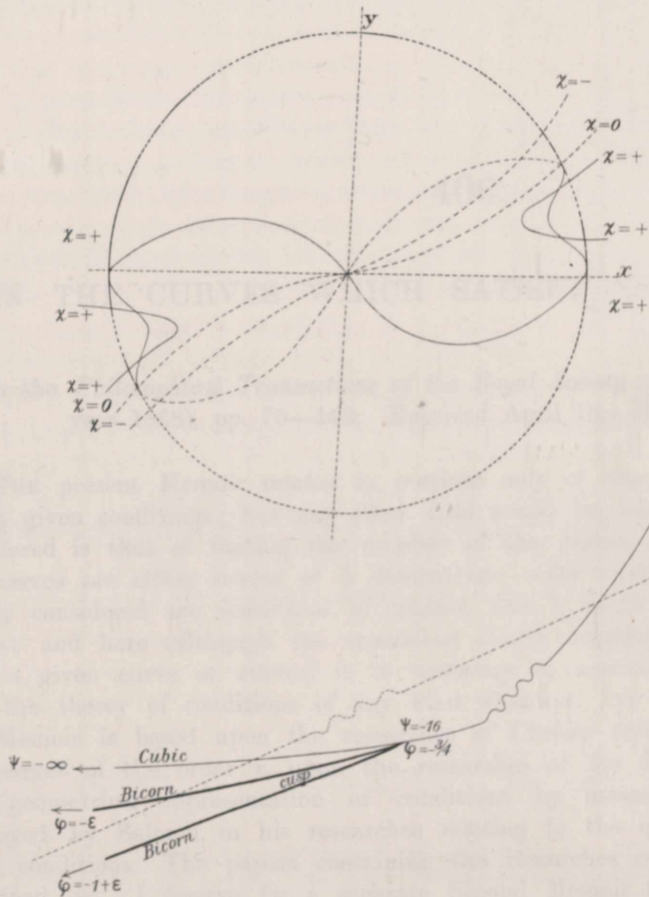


Fig 2.

The lower cusp of the Bicorn is drawn out of its true position which is much further off along the asymptote, the co-ordinates in fact are $x = -76 \frac{27}{32}$, $y = -44 \frac{1}{2}$ (the co-ordinates of the upper or node-cusp being $-1, 1$).

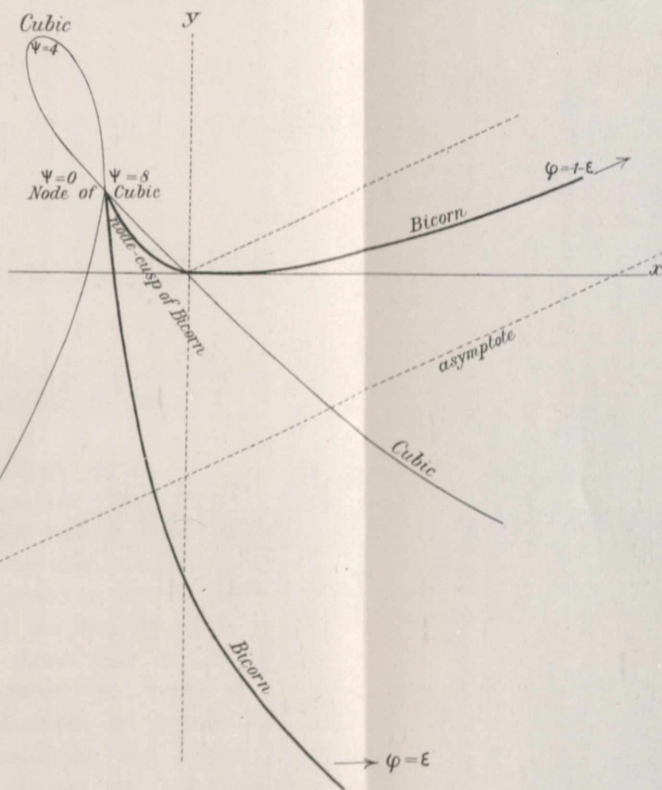


Fig 4.

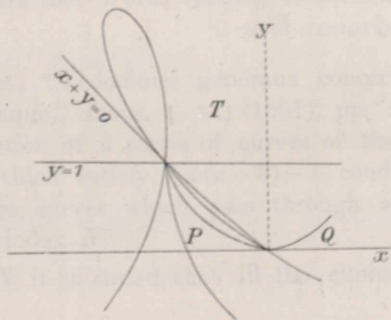
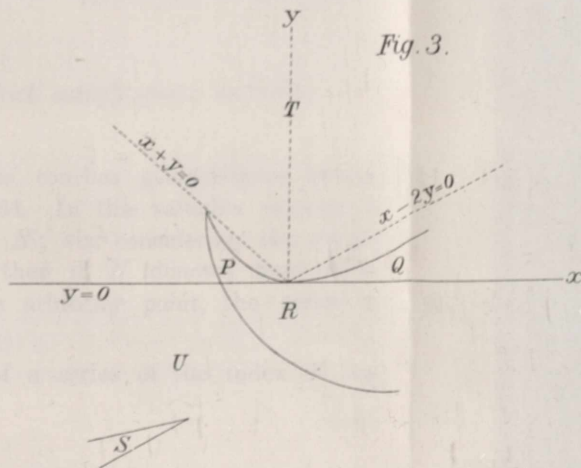


Fig 3.



... (regarding the singularities of the inflexion and the double tangent. We
 are thus led to consider as ordinary singularities in the theory the above-mentioned
 four singularities of the double tangent, the node and the cusp; and we
 know further that any other singularity whatever of a plane curve is compound (as
 a definite number of a certain number of ordinary singularities.

But in the theory of surfaces, starting in the manner with the general equation

$$F(x, y, z) = 0$$
 and a surface, we first investigate the singularities of a certain kind
 which occur, each of these is in general an indeterminate form of a certain kind
 (but there is the new cause of complication that is met with in the case of
 separate forces), but we do not know the analytical expression of these singularities
 and consequently the analytical expression of the curve-singularities which correspond
 to them, the nodal curve and the cuspidal curve. Thus if we attempt to start with
 a surface $(x, y, z) = 0$ having a nodal curve, we can indeed write down the equation
 in its most general form with its complete expression for its complete expression the
 equation $F = 0, G = 0, H = 0$, for, viz. if the curve is such that every surface whatever
 through the curve is of the form $F = 0, G = 0, H = 0$, then the most general
 equation of the surface having this curve as a nodal curve is $(A, B, C, D, E, \dots) = 0$
 but this form is far too complicated to be worked with, and if for simplicity we take
 the nodal curve to be a complete intersection $F = 0, G = 0$ and consequently the
 equation of the surface to be $(A, B, C, D, E, \dots) = 0$ then it is by no means clear that
 we do not in this way introduce limitations analogous to the general theory. For
 some difficulty arises if surfaces, and with the greater force to the cuspidal curve,
 and even if we admit that temporarily with the case of a surface having a given
 nodal curve and a given cuspidal curve, the result in no way solves the problem of
 the more general case of a surface having a given nodal curve and a given cuspidal
 curve. It is to be added that the general nature of the curve has the same
 four singularities, and that that this singularities which correspond most nearly to
 the singularities considered in the theory of surfaces (nodes, cusps, inflexions) in
 the theory of surfaces as extraordinary singularities.

