CONFORMATION OF A HORSE WITH RESPECT TO GAIT AND DRAFT.

By

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The legs of a horse are the natural supports and motors of the body. They are segmented and muscled in proportion to the work required of the particular breed to which the horse belongs. They are situated on the lateral faces of the body in front and behind the centre of gravity, the anterior being the nearest to the centre and consequently bear more weight and having a secondary office that of bearing the brunt of concussion. Their propelling action is not marked excepting where the animal is in a slow pace and moving a heavy load. The segments of the leg gradually diminish in volume from above to below but they are gradual in number, compactness and resistance. This is very well arranged, for a horse would certainly be clumsy from the weight and inactivity through this combination and would also lower the center of gravity.

The posterior members are very different in construction and function to that of the anterior; they bear much less of the brunt of concussion. These members by the inclination of these segments push against the trunk at a given moment where the former are straightened one piece upon the other, thus the angles are obliterated and communicate to the body the needed velocity. These muscles are therefore much larger and numerous than in the fore leg and come more into play when the body is fatigued.

This is not so true in the draft horse because we can easily see by observation that the horse is continually inclined forward when drawing a load.

In considering the different angles of the articulations of the horse's limbs we first must recognize that the line of direction should hold certain relations with a vertical line

passing through the center of movement. We do not mean necessarily that the angle should be well opened but it should also be well located for progression not only for the draft horse but as well as for those used in much lighter work.

When we do not have this condition the columns of locomotion pass over too short space and are not properly carried forward, but elevated and the impulse carried to the trunk is not in keeping with the exertion brought forth by the animal, causing him to do the work in a very unsatisfactory manner.

The anterior members are named according to Goudaux and Barrier in the following order as: the shoulder, arm, forearm, elbow, knee, cannon, fetlock, footlock, ergot, and postern, the coronet and foot, and that of the posterior member the thigh, the counterpart of the arm; the stifle, of the elbow; the leg of the forearm; the hock of the knee.

In considering the placing of the limbs of the horse each limb should be so placed on the body and articulate with the body and the limb so as to get the most possible work expected from that particular individual.

I have made tests of the following classes of horses: the draft--using Percheron mares, common purpose horses which could be used for coach animals or fairly light work upon a farm; standard bred race horses whose gait is a trot. The Percheron mares were first tested in a walk, in a trot, with a heavy load and with a light load. The race horses were tested in a walk and in a trot.

In considering these classes of animals it is well to understand the general confirmation or appearance of each breed of horse we have tested; it will then be easier to understand just what is expected of a horse with his particular form in view.

The modern type of the Percheron breed is short legged, compactly and strongly built, with an active temperament, intelligent head, short, full crested necks, with deep body and wide croup. They should possess an abundance of quality, attractive movement, and style.

The animal should have a regular and straight action with properly set limbs.

The weight should be made up of a desirable quality of bone with plenty of muscle in those parts where strength is hidden and not in places where there is little use in actual pulling power.

The common purpose animals used possessed a fair degree of symmetry and substance, fairly smooth joints and bones. Their size and disposition adapt them for general work on the farm or heavy carriage work in the cities.

Of course we did not find the action desired in the lighter coach or general purpose animals but enough was present to insure a very serviceable animal for these purposes.

The standard bred horse's chief characteristic is speed in either a pacing or trotting gait. The characteristics showed are those of endurance, ambition, and the general features of a road horse. By this we mean the possession of general features represented by an intelligent head and very light neck, low, deep chest, oblique shoulder, long muscular forearm, strong knees,

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short cannons, slim, sloping pastern and feet of good wearing quality, with low hocks that are strongly constructed and clearly defined.

Extreme emphasis is to be laid on the endurance, ambition and high finish. We must also distinguish between the high knee and hock action of the carriage horse and that of the more reaching and the easy action of the trotter or pacer.

The methods used in showing the trail of the horse during his movements in a walk and in a trot, etc., are shown by the method of M. Lenoble du Lul, known as the method of the planes of the ground surface.

"It consists as follows: (shown by I, II, III, etc.) A sheet of co-ordinate paper is used showing an average of the time used and that of the trail of the gait. Only the trail of the gait was used as it was impossible to get a fair test. The left of the columns indicate the trail of the gate, by marking in a known scale the intervals which separate the imprints. The scale was 8 inches to each space.

"The line X Y indicates the direction of movement. We will suppose, for example, that the two feet of the anterior bipeds have left upon the ground the imprints DD' (for the right) and GG (for the left).

"Suppose, now, that the surface begins to glide from right to left at the moment when the foot G commences its contact; this foot, instead of leaving a simple imprint of its shoe upon the ground, will trace a line Pl' so much longer as the contact is

prolonged.

"During the period of contact, what has the opposite foot done? We know that it was advanced after a short period of exchange of contact. As the surface, however, continues to glide during this action, the foot D, which should rest at D', will rest at P' at the instant of the end of contact (1') of G. Consequently, the horizontal projection of each of the points described by the foot D, through the air, instead of being a straight line parallel to the axis of the trail, will be an oblique line 1P'. Then a new transverse line P'1'', will represent the duration of the contact of D' with the ground.

"During the period of contact of D', the foot G, beginning at the point 1', will execute its period of projection and touch at P'', the movement corresponding to the termination of the contact of D', etc.

"It now remains to only trace through any point a vertical line, KL, to be immediately informed as to the respective positions of the two feet with the place where this line intersects the lines of contact and those of projection. If to the notation of the anterior members alone were added that of the posterior, the phenomena would not be more complicated. Likewise the construction of the diagram would be as in cases in which the number of the feet was increased."

The following diagram explains itself by showing the angles of the bones of the various members. We find that the degree of the opening and closing of the locomotory angles has a

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marked influence on the development of speed and it is easily shown by the width of angles and the length of each bone make a marked difference on the speed and power of each individual animal.

Data for each of the figures in the diagram:

(Percheron).

I	Walk	Time	1	min.	20	sec.	Length of step			75.8	in.
II	Trot	"			30	"	"	"	"	109.3	"
III	Load	"	1	"	40	"	"	"	"	59	"
IV	"	"	1	"	20	"	"	"	"	66.8	"
V	Walk	"	1	"	15	"	"	"	"	82.25	"
VI	Trot	"			32	"	"	"	"	116	"
VII	Load	"	1	"	10	"	"	"	"	70.3	"
VIII	"	"	1	"	50	"	"	"	"	55.4	"
IX	Walk	"	1	"	33	"	"	"	"	78.9	"
X	Trot	"			32	"	"	"	"	115.4	"
XI	Load	"	1	"	10	"	"	"	"	77.6	"
XII	"	"	1	"	40	"	"	"	"	63.6	"

(General Purpose).

XIII	Walk	Time	1	min.	2	sec.	Length of step			79.9	in.
XIV	Trot	"			30	"	"	"	"	119	"
XV	Load	"	1	"	5	"	"	"	"	77.6	"
XVI	"	"	1	"	25	"	"	"	"	72.2	"
XVII	Walk	"	1	"	1	"	"	"	"	79.9	"
XVIII	Trot	"			29	"	"	"	"	120	"
XIX	Load	"	1	"	4.5	"	"	"	"	78.5	"
XX	"	"	1	"	20	"	"	"	"	74	"

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XXI	Walk	Time	1 min.	0	sec.	Length of step		78.9	in.	
XXII	Trot	"		29	"	"	"	"	119.5	"
XXIII	Load	"	1 "	4.5	"	"	"	"	79	"
XXIV	"	"	1 "	20	"	"	"	"	73.8	"

(Trotting Class).

XXV	Walk	Time	52	sec.	Length of step			84	in.
XXVI	Trot	"	25	"	"	"	"	131	"

XXVII Load (light wagon) Time 51.5 sec. Length of step 84 in.

XXVIII	Walk	Time	51	sec.	Length of step			85	in.
XXIX	Pace	"	24	"	"	"	"	133	"

XXX Load (light wagon) Time 50.5 sec. Length of step 84.5 in.

This result goes to show the relative difference of the draft as compared to that of the general purpose, and that the trotting horse will show a more marked difference, for we know by general observation that the trotting horse moves much faster than that of the draft or the coach class of horses but is not expected to do the work of either one.

The following data shows the relative difference in the draft, coach, and trotting horse with respect to length of bone and angle:

Anterior Members Fig. XVIII.

Draft Horse No. 1.

Length of each segment---Degree of each angle.

13	105
14	145
23	140
14	120
9	80
	160

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Draft Horse No. 2.

Length of each segment---Degree of each angle.

13.5	108
14	146
22	138
14	119
8-3/4	80
	160

Coach Horse No. 1.

Length of each segment---Degree of each angle.

15	111
18	144-1/2
15	145
13	119
8-1/2	180
	160

Coach Horse No. 2.

Length of each segment---Degree of each angle.

15	112
17	144
15	142
13	120
8-1/2	82
	150

Trotter No. 1.

Length of each segment---Degree of each angle.

11	116
13	166
18	151-1/2
12	118-1/2
8	90
	158-1/2

Trotter No. 2.

Length of each segment---Degree of each angle.

12	118
14	168
19	151-1/2
13	128-1/2
8-1/2	90
	162

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Posterior Members Fig. XVII.

Draft Horse No. 1.

Length of each segment---Degree of each angle.

23	105
12-1/2	145
18	140
11-1/2	118
9	188

Draft Horse No. 2.

Length of each segment---Degree of eachnangle.

23-1/2	106
12-1/2	145
17	141
11	118
8-3/4	188

Coach Horse No. 1.

Length of each segment---Degree of each angle.

21	123
12-1/2	146-1/2
19	139
12	120
8-1/2	86
	150

Coach Horse No. 2.

Length of each segment---Degree of each angle.

22	124
13	148
19.5	138
12.5	122
8-1/2	85
	151

Trotter No. 1.

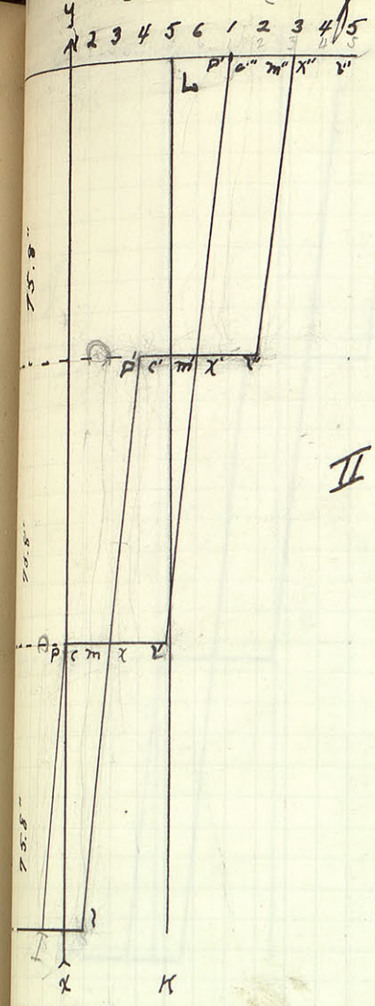
Length of each segment---Degree of each angle.

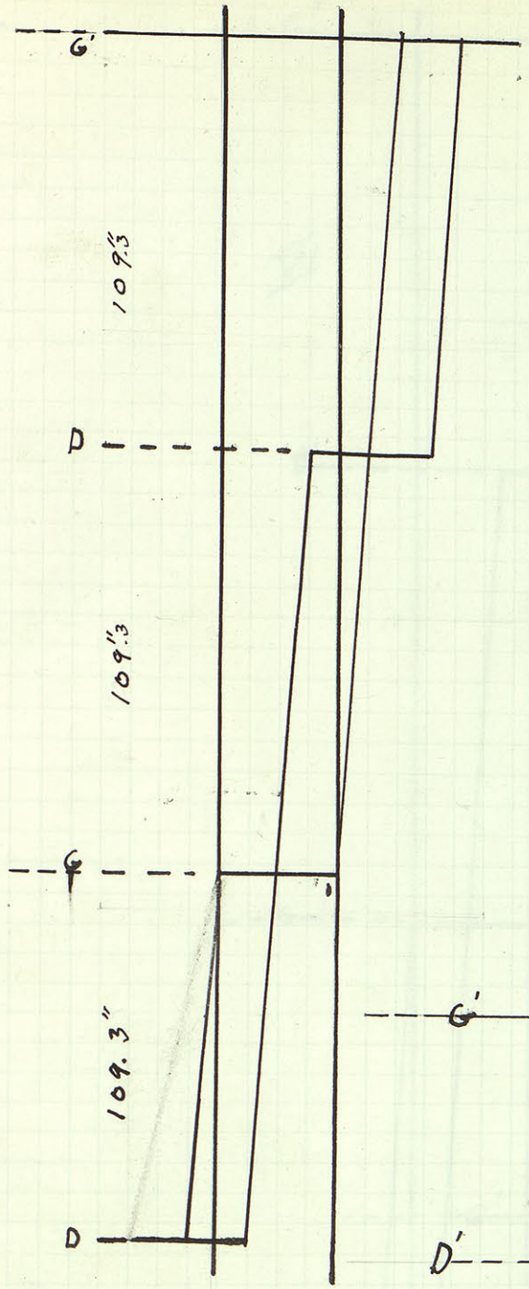
19	106
13	139-1/2
21	152
13	151
8	151
	150

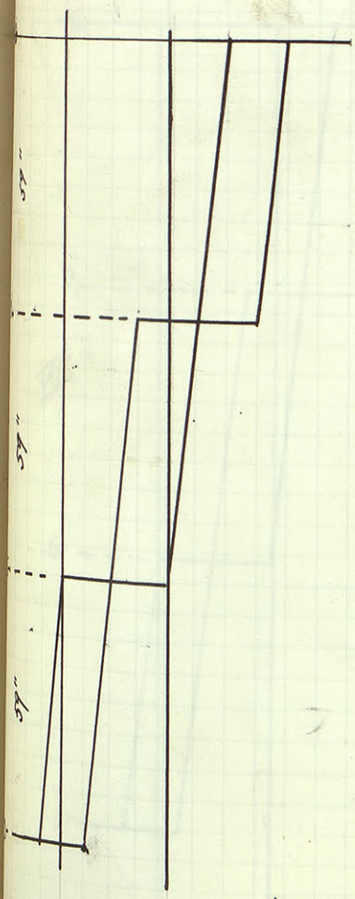
(Trotter Class) But a pacer.

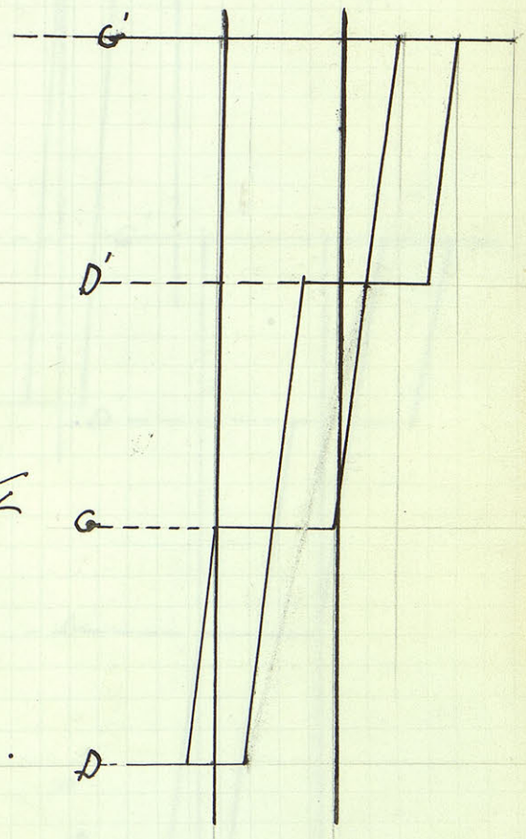
19.5	142

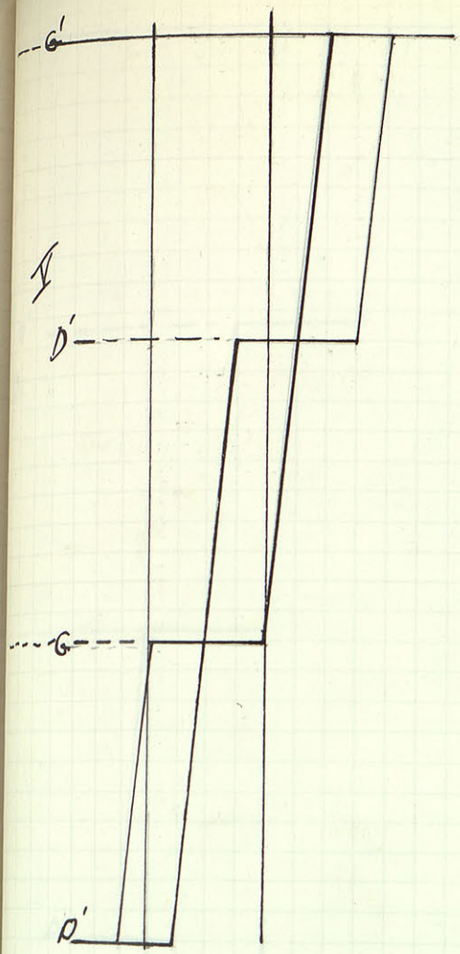
- Record of Tests -

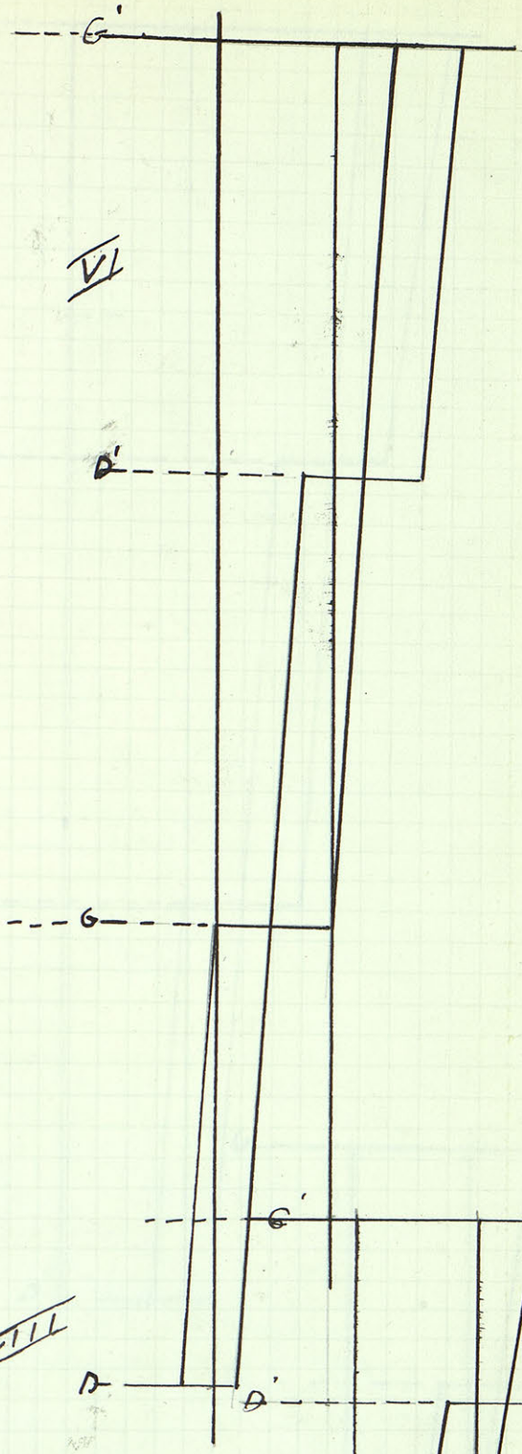


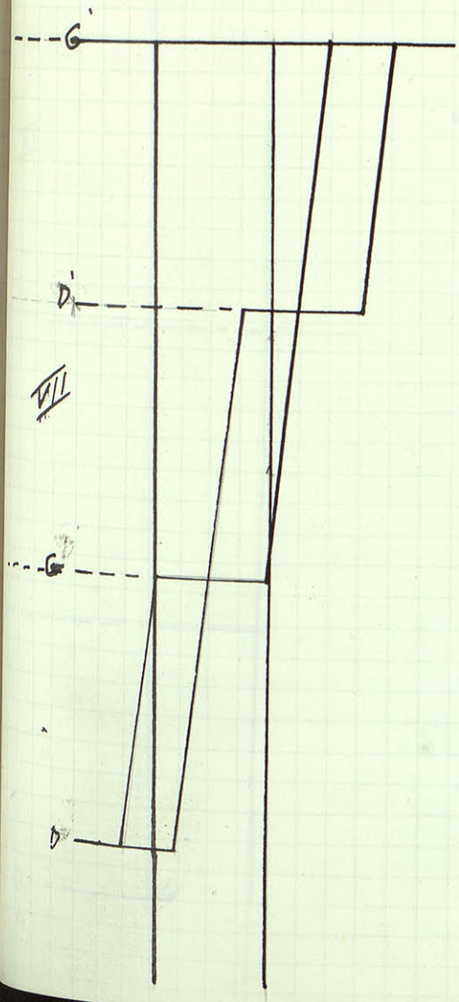


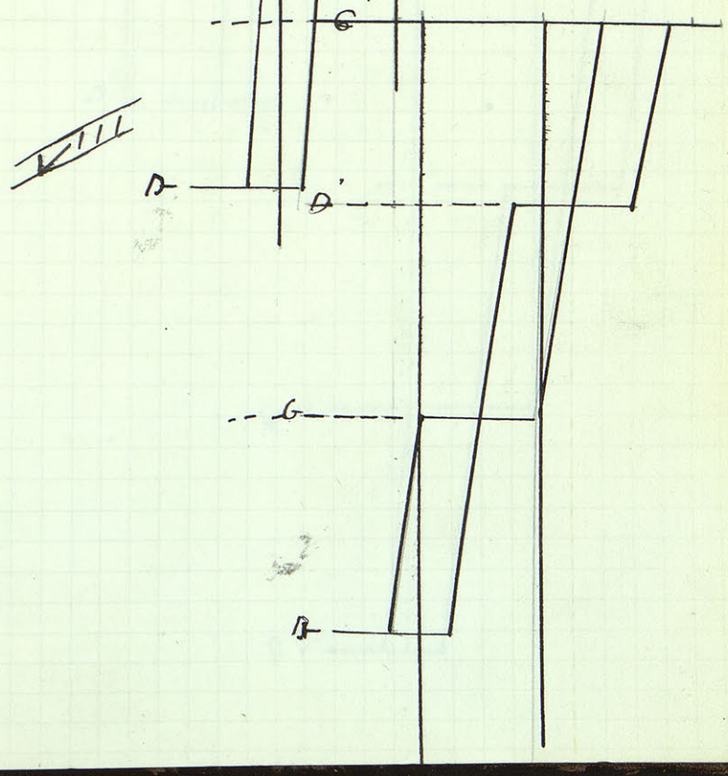


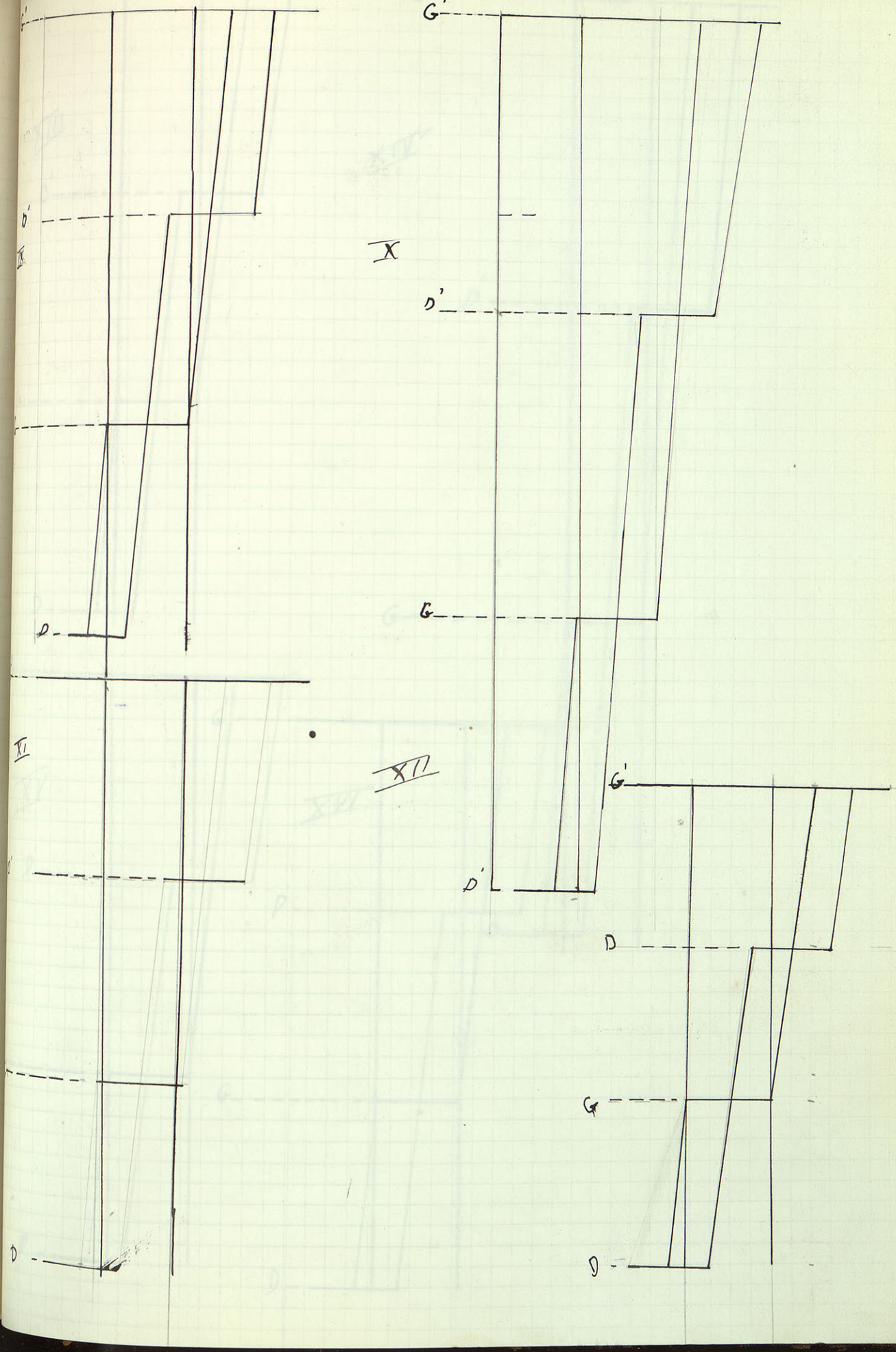


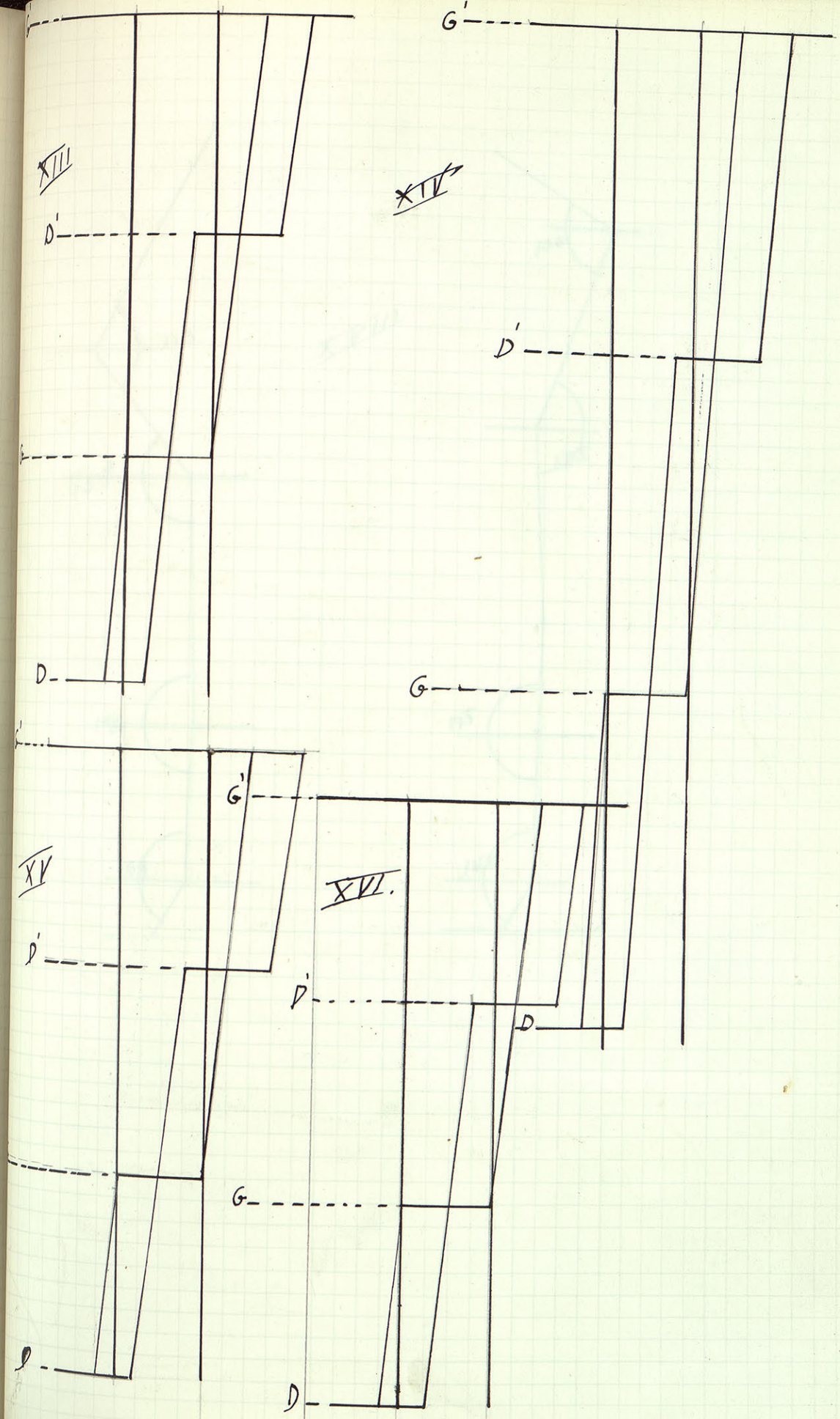

G'
V
D'
G
D'


G'
VI
D'
G


G'
D'
VII
G
D


G'
VIII
D
D'
G
D


G'
D'
IX
D
XI
X
D'
G
XII
G'
D'
D
G
D


XIII
D'
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XIV
G'
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XV
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D'
XVI
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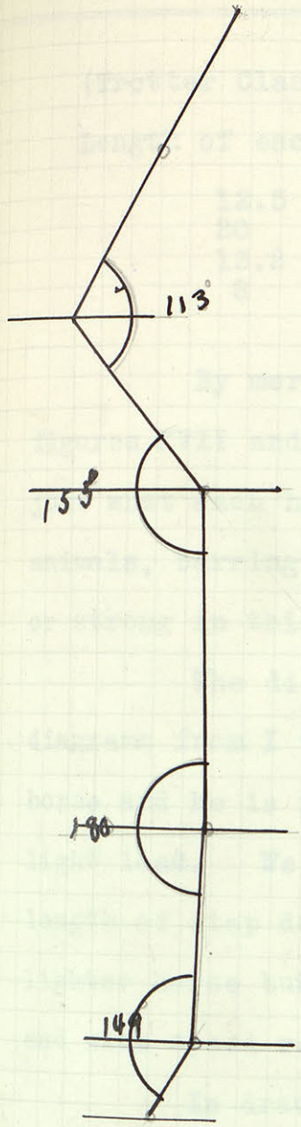
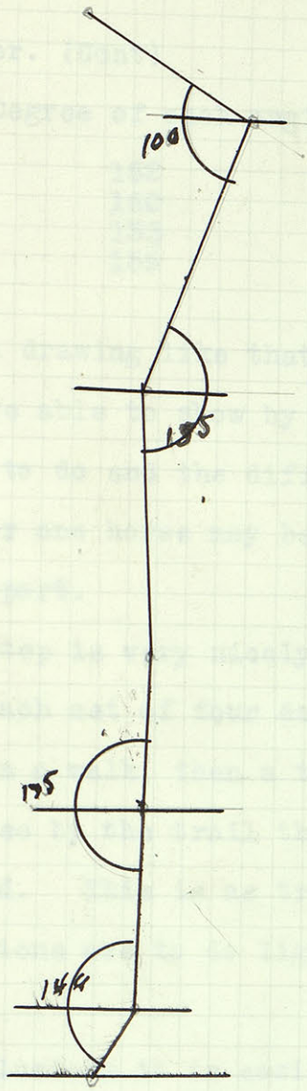
G
D



XVIII



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(Trotter Class) But a pacer. (Cont)

Length of each segment---Degree of each angle.

12.5	152
20	160
13.2	133
8	155

By merely placing a drawing like that shown in the figures XVII and XVIII, we are able to show by the relative figures just what each horse is able to do and the difference between the animals, barring vitality, for one horse may be exceptionally weak or strong in this particular part.

The difference in step is very nicely shown in the diagrams from I to XXX, and each set of four denotes the separate horse and he is first tried in a walk, then a trot, heavy load and light load. We can easily see by the trail the difference in the length of step due to the load. This is as true in the coach and lighter horse but their functions are to do light work in a hurry and with speed respectively.

In drawing our conclusions it is easily brought to mind that we must pick our horse for his work and must be able to tell by his general make-up just what he can do, and if we do not place him at the work to which he is adapted we are apt to waste energy and not obtain a reasonable amount of work at a practical gain.