ANIMAL LOCOMOTION

AN ELECTRO-PHOTOGRAPHIC INVESTIGATION OF CONSECUTIVE PHASES OF ANIMAL MOVEMENTS

BY

EADWEARD MUYBRIDGE

PUBLISHED UNDER THE AUSPICES OF THE UNIVERSITY OF PENNSYLVANIA

PROSPECTUS

AND

CATALOGUE OF PLATES

THE PLATES PRINTED BY THE PHOTO-GRAVURE COMPANY OF NEW YORK

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ANIMAL LOCOMOTION.

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PUBLISHED UNDER THE AUSPICES OF THE UNIVERSITY OF PENNSYLVANIA.

Mr. EADWEARD MUYBRIDGE,

University of Pennsylvania, Philadelphia, U. S. A .:

We, the undersigned, each hereby subscribe for the number of copies written in association with our respective names, of your work on ANIMAL LOCOMOTION; each copy to contain *One Hundred Plates*, as described in the prospectus; at the subscription price of ONE HUNDRED DOLLARS for each copy, payable upon the delivery of the work.

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The numbers on the other side, through which a line is drawn, indicate the SERIAL numbers of the plates I have selected.

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1	41	81	121	161	201	241	281	321	361	401	441	481	521	561	601	641	681	721	761
2	42	82	122	162	201	242	281	322	362	401	442	482	522	562	602	642	682	722	762
3	43	83	123	163	203	243	283	323	363	403	443	483	523	563	603	643	683	723	763
4	44	84	123	164	203	244	284	324	364	403	444	484	524	564	604	644	684	724	764
5	45	85	125	165	204	245	285	325	365	404	445	485	525	565	605	645	685	725	765
6	46	86	126	166	206	246	286	326	366	406	446	486	526	566	606	646	686	726	766
7	47	87	127	167	207	240	280	$320 \\ 327$	367	400	447	487	527	567	607	647	687	727	767
8	48	88	128	168	208	248	288	328	368	407	448	488	528	568	608	648	688	728	768
9	49	89	129	169	208	240	289	329	369		449	489	529	569	609	649	689	729	769
0	50	90	130	170	210			330	370	409			530	570	610	650	690	730	770
1	51	91	131	170	210	$250 \\ 251$	290	331	371	410	450	490	531	570	611	651	691	731	771
2	52	92	132	172	211	252	291			411	451	491	532	572	612	652	692	732	772
3	53	93					292	332	372	412	452	492	533					733	773
	120200	93	$133 \\ 134$	173	213	253	293	333	373	413	453	493		573	613	653	693		
4	54		1.	174	214	254	294	334	374	414	454	494	534	574	614	654	694	734	774
5	55	95	135	175	215	255	295	335	375	415	455	495	535	575	615	655	695	735	775
6	56	96	136	176	216	256	296	336	376	416	456	496	536	576	616	656	696	736	776
7	57	97	137	177	217	257	297	337	377	417	457	497	537	577	617	657	697	737	777
8	58	98	138	178	218	258	298	338	378	418	458	498	538	578	618	658	698	738	778
9	59	99	139	179	219	259	299	339	379	419	459	499	539	579	619	659	699	739	779
0	60	100	140	180	220	260	300	340	380	420	460	500	540	580	620	660	700	740	780
1	61	101	141	181	221	261	301	341	381	421	461	501	541	581	621	661	701	741	781
2	62	102	142	182	222	262	302	342	382	422	462	502	542	582	622	662	702	742	
3	63	103	143	183	223	263	303	343	383	423	463	503	543	583	623	663	703	743	
4	64	104	144	184	224	264	304	344	384	424	464	504	544	584	624	664	704	744	1.1
5	65	105	145	185	225	265	305	345	385	425	465	505	545	585	625	665	705	745	
5	66	106	146	186	226	266	306	346	386	426	466	506	546	586	626	666	706	746	
7	67	107	147	187	227	267	307	347	387	427	467	507	547	587	627	667	707	747	1.00
3	68	108	148	188	228	268	308	348	388	428	468	508	548	588	628	668	708	748	
9	69	109	149	189	229	269	309	349	389	429	469	509	549	589	629	669	709	749	
0	70	110	150	190	230	270	310	350	390	430	470	510	550	590	630	670	710	750	
1	71	111	151	191 -	231	271	311	351	391	. 431	471	511	551	591	631	671	711	751	
2	72	112	152	192	232	272	312	352	392	432	472	512	552	592	632	672	712	752	
3	73	113	153	193	233	273	313	353	393	433	473	513	553	593	633	673	713	753	
4	74	114	154	194	234	274	314	354	394	434	474	514	554	594	634	674	714	754	
5	75	115	155	195	235	275	315	355	395	435	475	515	555	595	635	675	715	755	
6	76	1.16	156	196	236	276	316	356	396	436	476	516	556	596	636	676	716	756	
7	77	117	157	197	237	277	317	357	397	437	477	517	557	597	637	677	717	757	
8	78	118	158	198	238	278	318	358	398	438	478	518	558	598	638	678	718	758	
9	79	119	159	199	239	279	319	359	399	439	479	519	559	599	639	679	719	759	
10	80	120	160	200	240	280	320	360	400	440	480	520	560	600	640	680	720	760	

In the event of the printed blank for the names of subscribers having been detached from this prospectus, subscribers can send their names and instructions entirely in manuscript; these, and the serial numbers of the plates selected, should be in full, and plainly written.

Copies of the catalogue of plates in ANIMAL "LOCOMOTION, and subscription blanks will, upon application, be mailed free of expense to any part of the world.

ANIMAL LOCOMOTION.

PROSPECTUS.

IN 1878 the author of the present work published a few Photographs under the title of "The Horse in Motion;" these were the results of some experiments in California with automatic electro-photographic apparatus, devised by him for the purpose of demonstrating the successive phases of Animal Locomotion. This subject had engaged his attention since 1872, when the first lateral photograph of a horse trotting at full speed was made by him.

The experiments were continued in 1879. Upon their termination the author became convinced that a comprehensive and systematic investigation with improved mechanical appliances, and newly-discovered chemical manipulations, would demonstrate many novel facts, not only interesting to the casual observer, but of indisputable value to the artist and to the scientist. This investigation demanded of necessity so large an outlay of money, and the subsequent publication in its present generous form assumed such imposing proportions, that all publishers not unnaturally shrank from entering the unexplored field.

In this emergency The University of Pennsylvania took the prosecution of the investigation under its auspices, and its liberal assistance has enabled the author to complete his work, which he hereby announces as ready for publication.

THE WORK WILL BE PUBLISHED EXCLUSIVELY BY SUB-SCRIPTION, AT THE PRICE OF ONE HUNDRED DOLLARS FOR EACH COPY.

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ONE HUNDRED PLATES OF ILLUSTRATIONS WILL CONSTI-TUTE A COPY OF THE WORK.

These one hundred Plates, the subscriber is entitled to select from those enumerated in the subjoined Catalogue. It is believed the description given therein of each movement will be found sufficient to enable this selection to be made with intelligent discrimination.

The 781 Plates described in the Catalogue comprise more than 20,000 figures of men, women, and children, animals and birds, all actively engaged in walking, galloping, flying, working, playing, fighting, dancing, or other actions incidental to every-day life, which illustrate motion and the play of muscles.

The figures illustrating the various movements are reproduced from the original negatives by the photo-gelatine process of printing, without any attempt having been made to improve their pictorial effect, either in outline or detail; or to conceal their imperfections.

In the Title of the work, the term "Locomotion" is stretched to its broadest capacity.

The Plates, without margin, vary in dimensions from 12 inches high by 9 inches wide, to 6 inches high by 18 inches wide.

The average area of the Plates is 108 square inches, or about 660 square centimetres; they are printed on linen steel-plate paper, of size 19 by 24 inches, and weight 100 pounds to the ream.

Subscribers desiring a greater number of Plates than the one hundred for which they subscribe, will be entitled to obtain such additions, and at the same proportionate rate of payment; provided they make the selection at the same time that they select the Plates for their Subscription Copy.

Subscribers for two or more Copies have the right of an independent selection of Plates for each Copy.

PROSPECTUS.

Subscribers for SIX Copies of the work,—that is, for 600 Plates,—each Plate being of a *different serial number*, will be entitled to the remaining 181 Plates without additional payment. They will thus have an impression of each one of the 781 Plates.

Each Copy of the work will be enclosed in a Portfolio.

The entire collection of 781 Plates will be enclosed in 8 Portfolios.

Upon receipt of the accompanying blank, duly filled with the necessary instructions, and a remittance of twenty dollars, on account of each Copy subscribed for, the work will be forwarded free of express charges to any part of the United States; the remainder of the subscription to be paid upon delivery.

Subscribers in foreign countries should, preferably, designate an agent in the United States to act in their behalf; or, they will be corresponded with, direct.

All remittances and correspondence to be addressed to

EADWEARD MUYBRIDGE,

University of Pennsylvania, Philadelphia, U.S.A.

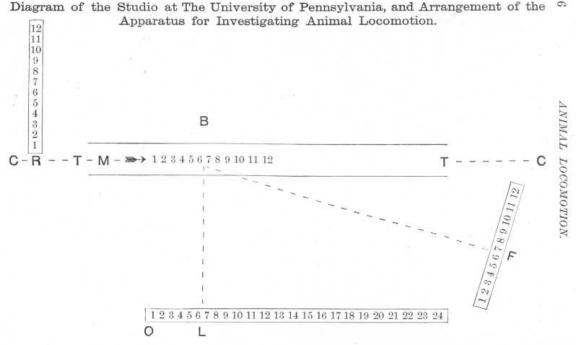


Diagram of the Studio at The University of Pennsylvania, and Arrangement of the $\,$ $^{\circ\circ}$

STUDIO, APPARATUS, AND METHOD OF WORKING.

In the diagram, B is the *Lateral* background; consisting of a shed 37 metres, or about 120 feet, long, the front of which is open, and divided by vertical and horizontal threads into spaces 5 centimetres, or about 2 inches, square, and by broader threads into larger spaces 50 centimetres, or about 193 inches, square.

At C and C, 37 metres, or about 120 feet, apart are "*fixed*" backgrounds, with vertical threads 5 centimetres, or about 2 inches, from their centres, with broader threads 30 centimetres, or about 12 inches, from their centres.

For some investigations, readily distinguishable in the plates, "*portable*" backgrounds are used, consisting of frames 3 metres wide by 4 metres high,—about 10 feet by 13 feet 4 inches,—over some of which black cloth and over others white cloth is stretched, all being divided by vertical and horizontal lines into square spaces of the same description as those of the lateral background.

These portable backgrounds are used when photographing birds and horses, and also wild animals when possible to do so.

L. A lateral battery of 24 automatic electro-photographic cameras, arranged parallel with the line of progressive motion, and usually placed therefrom about 15 metres or 49 feet.

Slow movements are usually photographed with lenses of 3 inches diameter and 15 inches equivalent focus; the centres of the lenses being 15 centimetres, or about 6 inches, apart.

Rapid movements are photographed with a *portable* battery of cameras and smaller lenses.

1%

The centre, between lenses 6 and 7, is opposite the centre of the track T.

For illustrations comprising both "Laterals" and "Foreshortenings," cameras 1 to 12 only are used.

When "Laterals" alone are required, cameras 13 to 24 are connected with the system and used in their regular sequence.

R. A portable battery of 12 automatic electro-photographic cameras, the lenses of which are 14 inches diameter and 5 inches equivalent focus; the lenses are arranged $7\frac{1}{2}$ centimetres, or about 3 inches, from their centres. When the battery is used vertically, lens 6 is usually on the same horizontal plane as the lenses of the lateral battery.

In the diagram this battery is arranged *vertically* for a series of "Rear Foreshortenings"; the points of view being at an angle of 90° from the lateral battery.

F. A battery of 12 automatic electro-photographic cameras, similar to that placed at R, arranged horizontally for a series of "Front Foreshortenings"; the points of view averaging an angle of 60° from the lateral battery.

O. The position of the operator; the electric batteries; the chronograph for recording the intervals of time between each successive exposure; the motor for completing the successive electric circuits, and other apparatus connected with the investigation.

T T. The track parallel with the lateral battery and covered with corrugated rubber flooring.

M. The model, approaching the point number "1" on the track where the series of photographic illustrations will commence.

An estimate having been made of the interval of time which will be required, between each photographic exposure, to illustrate the complete movement, or that portion of the complete movement desired, the apparatus is ad-

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ANALYSIS OF THE PLATES.

justed to complete a succession of electric circuits at each required interval of time, and the motor is set in operation. When the series is to illustrate progressive motion; upon the arrival of the model at the point marked "1" on the track, the operator, by pressing a button, completes an electric circuit, which immediately throws into gearing a portion of the apparatus hitherto at rest. By means of suitably-arranged connections, an electric current is transmitted to each of the 3 cameras marked "1" in the various batteries, and an exposure is simultaneously made on each of the photographic plates, respectively, contained therein. At the end of the predetermined interval of time, a similar current is transmitted to each of the cameras marked "2," and another exposure made on each of the 3 next plates, and so forth until each series of exposures in each of the three batteries is completed. Assuming the operator to have exercised good judgment in regulating the speed of the apparatus, and in making the first electric contact at the proper time, and that the figures 1 to 12 represent the distance traversed by the model in executing the movement desired, the first three photographic exposures-that is, one exposure in each battery-will have been synchronously made when the model was passing the position marked "1" on the track T; the second three exposures will have been made when the model was passing the position marked "2," and so on until twelve successive exposures were simultaneously made in each of the three batteries. This perfect uniformity of time, speed, and distance, however, was not always obtained.

ANALYSIS OF THE PLATES.

Of the broader horizontal lines seen in the plates, the second from the ground is (excepting in special instances

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easily recognized) on the same horizontal plane as the lenses of the lateral battery of cameras hereafter described.

The numbers on the background of the lateral illustrations are 15 centimetres, or about 6 inches, apart from each of their centres.

The plan adopted to facilitate analysis of the various movements may be exemplified by a reference to plate 14.

The model "8" is walking towards the right, the quantity of movement illustrated is two steps, or one stride. Twelve successive phases of that movement were photographed synchronously from each of the three points of view, L, R, and F in the diagram. The interval of time between each of the twelve phases was about one-eighth of a second, or according to the chronograph one hundred and twenty one-thousandth parts of a second (0.120''), the complete movement having been accomplished in about one and a half seconds.

The number of figures on the plate is 36, arranged thus:

								h s		2		Laterals.
1	2	3	4	5	6	7	8	9	10	11	12	
1	2	3	4	5	6	7	8	9	10	11	12	Rear Foreshortenings from points of view on the same vertical line, at an angle of 90° from the Laterals.
1	2	3	4	5	6	7	8	9	10	11	12	Front Foreshortenings from points of view on the same horizontal plane, at angles averaging 60° from the Laterals.

A similar method of arrangement prevails in all those plates which illustrate a movement, as seen simultaneously from each of three points of view.

When the illustrations are, respectively, from one or two points of view only, a system of arrangement is adopted which is considered the most convenient for their especial comparative examination.

The successive phases of movement are usually arranged in the plates to conform with the direction of the first phase illustrated.

If, for example, the motion of the first phase is towards the right, the arrangement of each succeeding phase is thus: $\implies 1 2 3$, etc. If, however, the motion of the first phase is towards the left, the arrangement of the successive phases is thus: etc., 3 2 1.

When two or more distinct series of illustrations are included in one plate, each separate series is distinguished by the letters A, B, C, etc.

Each series, of the plates numbered 520 to 528, inclusive, illustrates a single phase of motion, photographed synchronously from each of six points of view.

In some instances it will be found that the number of phases of motion from each of the respective points of view do not correspond, some being omitted. This arises from the loss of negatives during manipulation. The subject being, perhaps, one of interest or importance, and impossible to duplicate, it has been included in the work notwithstanding the deficiency.

Serial numbers connected with a brace indicate that one and the same series of phases is illustrated in two plates, the laterals being in one plate, and the foreshortenings in another.

Although, as before stated, the broadest interpretation has been given in this investigation to the word Locomotion, it is not assumed that a response to every possible inquiry in this inexhaustible subject will be found in this work.

ANIMAL LOCOMOTION.

MODELS.

A few particulars in reference to some of the human models, will assist subscribers in the selection of their plates.

The greater number of those engaged in walking, running, jumping, and other athletic games are students or graduates of The University of Pennsylvania,—young men aged from eighteen to twenty-four,—each one of whom has a well-earned record in the particular feat selected for illustration.

The mechanics are experts in their particular trades, and the laborers are accustomed to the work in which they are represented as being engaged.

Unless otherwise described the arms of the models in the progressive movements are in a position naturally consistent with the movement.

Each model is distinguished by a number, and may be recognized by that number throughout the work. The male models are numbered with bold-faced type, thus: "45," and the females with light-faced type, thus: "8."

The models 52, 64, 65, and 66 are teachers in their respective professions; 60 is a well-drilled member of the State Militia; 51, a well-known instructor in art; 95, an ex-athlete, aged about sixty; 22, a mulatto and professional pugilist; 27, 28, and 29, boys aged thirteen to fifteen; 42 and 49, public acrobats; 17, 19, 21; 74 to 91, inclusive; 92 and 94 were patients of the University and Philadelphia Hospitals, selected to illustrate abnormal locomotion.

The female models were chosen from all classes of society.

Number 1, is a widow, aged thirty-five, somewhat slender and above the medium height; 3, is married, and heavily built; 4 to 13, inclusive, 15 and 19, are unmarried, of ages varying from seventeen to twenty-four; of these, 11 is æ

slender; the others of medium height and build; 14, 16, and 93, are married; 20, is unmarried, and weighs three hundred and forty pounds.

The endeavor has been in all instances to select models who fairly illustrate how—in a more or less graceful or perfect manner—the movements appertaining to every-day life are performed.

In the column headed "COSTUME," the state of the model with regard to apparel is represented by

- N. Nude. When any one figure is *nude*, the entire series is so classified.
- S. N. Semi-Nude. The model so designated is usually clothed with a light or transparent drapery from the waist to the knees, or to the ground: in some illustrations of the toilet it also includes more or less underclothing.
- P. C. Pelvis Cloth. A strip of cloth surrounds the lower part of the abdomen.
- T. D. Transparent Drapery. The model is attired in a flowing garment of diaphanous texture, which permits the action of the limbs to be seen, and the conformation of the folds of the drapery thereto.
 - D. Draped. Fully clothed.
- B. F. Bare Feet. The costume of peasant girls with the legs below the knees, and the feet bare.

ANIMALS AND BIRDS.

The wild animals and birds were photographed in the gardens of the Zoölogical Society, of Philadelphia, by the courtesy of its Trustees and Superintendent.

Nearly all the horses and other domesticated animals were photographed at the Gentlemen's Driving Park, and are good representatives of their various classes and movements.

ANIMAL LOCOMOTION.

ANGLES OF VIEW.

In the classification of the illustrations into "Laterals" and "Foreshortenings," the term Lateral applies—with a few exceptions—to those figures photographed with the *lateral* battery of cameras, as described in the diagram. And the term "Foreshortenings" is applied to all the figures made from points of view at varying angles from the lateral battery, regardless of the actual position of the model.

The points of view, described as being in their relation to the laterals at the respective angles of 90 and 60 degrees, are strictly speaking not always so, but as close thereto as careful measurement and circumstances permitted. All stated angles of view, as applied to wild animals and birds, are simply approximate.

The terms "Front" or "Rear," as applied to the Foreshortenings, usually refers to the position of the model when the *first* exposure is made in the respective batteries. In the execution of some movements, the model turns completely around before the series of photographs is finished; the latter phases of motion may therefore be included in the column of "Front" views when they are actually "Rear" views. The character of the movement will of itself explain the relative successive positions of the model, and the illustrations afford ample means of determining the angular relationship to all points of view.

MOVEMENTS AND TIME.

In the column devoted to "The quantity of movement," a completed action or a round movement is designated by the number "1." A "round movement" means a movement which, being completed, restores the body and limbs to the approximately relative position they occupied at its commencement. For a horse trotting, or for a man walking, for example, it means the execution of two steps; for a horse jumping a hurdle, or for a man who, when batting, strikes a base-ball, it means the execution of the main object of the particular investigation.

The word approximate is used, because it rarely happens that the execution of regular movements by the most carefully-trained man or animal restores the body and limbs to precisely the same original relative position. When a movement is susceptible of being divided into two parts, of which the second part, with a change of the limbs, is virtually a repetition of the first part; it is not always considered necessary to include the round movement in the illustrations; but in order that the relationship which each one-half of the movement holds to the other half may be understood, five-eighths or three-fourths (designated in the column 5–8 or 3–4) of a round movement is usually illustrated. The quantity of movement given in the column is frequently only approximate to the *exact* quantity.

In the appropriate column, the interval of time between each successive exposure is stated in one-thousandth parts of a second, as recorded by a chronograph with a tuningfork making 100 single vibrations in a second.

The duration of each interval of time between each successive exposure has been carefully examined, and when, from any obscurity in the pen-markings, or from other causes, the exact intervals of time could not be positively ascertained, an average interval of time has been computed, and attention called thereto in the column of reference notes.

It may be stated, as a matter of some interest, that from carefully-executed experiments it was proved at the University Studio that the most rapid exposures were made in periods of time varying from the one two-thousandth to the one five-thousandth of a second. With such exposures

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details of black and of white drapery were obtained. The use, however, of such very brief exposures was deemed inadvisable, and for the illustrations of the movements of large animals was in practice wholly needless.

For photographs of horses at full speed an exposure of the one six-hundredth or of the one eight-hundredth of a second will usually obtain the necessary sharpness of out_{z} line and all essential details.

For slow movements an exposure of the one one-hundredth or of the one two-hundredth of a second will give all desirable results.

REFERENCE NOTES.

1. The interval of time between each phase is an *average* of the intervals of time between all the phases, or an approximation thereto.

2. No record of intervals of time between phases.

3. Isolated phases, photographed synchronously from the various points of view.

4. Successive phases, photographed at *irregular* intervals of time synchronously from the various points of view.

5. The model has a rod attached to the hips to aid the measurement of their oscillations.

In all illustrations of this number the lenses of the lateral battery are on the same horizontal plane as the platform on which the model is walking, or, if ascending or descending, about midway between the two planes of height on which the feet are placed. The backgrounds are those described as "Portable."

6. The lenses of the lateral battery are on the same horizontal plane as the platform on which the model is walking. The backgrounds are those described as "Portable."

RETROSPECTIVE.

7. Isolated phases of motion from a single point of view.

8. A combination of 2 serials, with the same average interval of time between each successive phase.

9. One phase of this series is substituted by a corresponding phase from another series.

10. A combination of 2 serials.

11. Foreshortenings incomplete.

12. Foreshortenings irregular.

13. A double interval of time occurs between phases 2 and 3.

14. A double interval of time occurs between phases 3 and 4.

¹ 15. A double interval of time between phases 4 and 5.

16. A double interval of time between phases 5 and 6.

17. A double interval of time between phases 7 and 8.

18. A double interval of time between phases 8 and 9.

19. A double interval of time between phases 10 and 11.

20. A double interval of time, respectively, between phases 4 and 5; 9 and 10.

21. A double interval of time, respectively, between phases 5 and 6; 7 and 8.

22. A double interval of time, respectively, between phases 5 and 6; 9 and 10.

23. Five of the regular intervals of time between phases 6 and 7.

24. Five of the regular intervals of time between phases 5 and 6.

RETROSPECTIVE.

In conclusion, it may not be irrelevant for the author to remark that a number of his early experimental photographs of animal movements, and his original Title, "The Horse in Motion," were copied, and published a few years ago, in a book which is referred to in the following paragraph, reprinted from *Nature* (London), June 29, 1882. After the full Title of the book is quoted, the reviewer says, "The above is the somewhat long title of a large and important work issuing from the well-known Cambridge (U. S.) University Press.

"Long as is the title, the name of the principal contributor to the volume is left unrecorded there; though, indeed, even a cursory glance over its contents shows how much indebted is the whole question of the mode of motion in the horse to the elaborate series of investigations of Mr. Muybridge."

E. M.

UNIVERSITY OF PENNSYLVANIA, January, 1887.

ANIMAL LOCOMOTION

CATALOGUE

CATALOGUE OF PLATES.

																					No, of Model.		100	Phases 11	of Mo lustrat		t	nt.	ond.	
Der.						Л	10	VI	сM	EN	TS										Males in Bold-faced Type, Females in Light-faced Type.			at An	'oresho agles fr	rtenin om La	gs terals.	Movement.	Time Intervals in One- Thousandths of a Second.	Votes
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5	41																				46	N	8	8				5-8	83	
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	44	4			2	23		-	14	22	\mathbf{x}					5		8	2		29	N	12	10.00	2. 8	12		3-4	54	1.
	**				÷										-					•	55	PC	8			8		1-2	71	
	4.4																÷.				56	PC	8			8		1-2	74	
	5.6				2						<u> </u>							1			26	N	6	6	6.2	6		1-2	88	5
				÷.	8	2				1	2	1	1						88		24	N	12	12		12		1	83	1
	2.4		ê -	3	š.	- 64				-12	3					1			8.8		27, 28	N	12	12	06.3			1-2	48	
	**		5		ġ.	÷.					5	1									1	N	12	12			12	1	95	1
		ri	rh	t I	14	nd	'n	t e	·hi	n	ũ	Ĩ.				1			20		8	N	12		12	12		1	120	
	**							15.08 2.04			0	- 20			est. Sout		1	11	: 		2	N	10			10		5-8	103	
	44	1	ň.	Č.	2	-	1		1576	18	ð	1	1	15	6005	1					4	Ň	10	1.6.6	10		10	5-8	91	
8	**		8	1	ŝ	5	•	1			9	ŝ	1	1		1	6		8.8		6	N	12	12	0.242.01		11773874	3-4	94	8
	**	ie.	Â.	ĥa		1.	. er			1.	in	mi	n	•		8	1				3	N	12		12	12	• •	3-4	99	\$
	**					- C		~~~			n		· · ·	<u>.</u>	1				•		20	N	12		12	1.0	10	1-2	129	1:

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ANIMAL LOCOMOTION.

CATALOGUE OF PLATES.

20		right elbow bent	7	N	12	· · ·		12	1.1	3-4		5
21	44	both elbows bent	7	N	12		2.2	12	1.1	1	106	5
- 22	44	with high-heeled boots on	1	N	12	12	2.2	1. 1.	12	1	93	12
- 23	-14	right hand at chin, high-heeled shoes on	8	N	12		12	12	2.10	1	121	14
- 24	+1	with high-heeled shoes on	8	N	12		12	12		- 1	103	
25	44	а а а	7	N	12			12		1	95	6
- 26	4.6	carrying 75-lb. stone on left shoulder	46	PC	9	10.0	9	. 9		1-2	75	1.1
- 27	44	" ' head, hands raised	46	N	12	12.2		12	13.33	8-4	92	1
- 28	44	" 50-lb. dumb-bell in right hand	46	N	12	1.1	8.81	12	12.33	8-4	99	1
- 29	3.6	¹⁴ bucket of water in each hand .	46	N	12		· · ·	12		3-4	90	1
- 30	11	it it it it it.	31	N	12			12		3-4	97	1.1
- 81	1. 44	" 75-lb, stone on right shoulder .	46	PC		10.0	9	9	0.0	5-8	104	Ľ.
- 32	.66	** bucket of water in each hand .	1	N	12	12	650		12	1	93	
- 88	4.4	" 14-lb. basket on head, hands		100	220		2.2			1.000		10
		raised	1	N	12	Q 24	2.2	2.53	12	1	92	12
84	44	" 15-lb, basket on head, hands										
		raised	7	N	12			11		8-4	89	1
- 35	66	o child (70) on right arm	12	SN	12	12			12	1	102	
- 36	4.6	" child on left arm	93	D	12	1.20240	10 - 10 - 1 1 - 1 - 1 - 1		10000	1	150	<u></u>
- 87	44	left hand holding dress, right hand at face	13	TD	12	0.3	12	12	3.3	8-4	128	15
- 38	44	opening parasol	3	D	12	18.2		12	12.13	1	154	19
- 39	44	hands engaged in knitting	12	TD	12	2.2	12	12	1.0	1 1-2	178	÷.
- 40	44	throwing handkerchief over shoulders .	13	N	12	10.0				8-4	154	C .
- 41	544	flirting a fan	8	TD		12			12	1	115	10
-42	44	pouring water from pitcher	7	N	11	1.77	11		11	9-10		1
-43	6.6	sprink'g water from basin, turn'g around	8	N	8	13.3	8		12	1	191	15
-44	44	taking off hat	23	D	12	김 왕				5-8	87	1
45	44	two models meeting, and partly turning	4.16	D	24		÷ -			2	78	100
46	11	flirting a fan, and turning around	10	N	12	12	2.2		12	ĩ	850	
-47	44	and turning around	7	Ñ	12				110000	i	165	1
48	44	" " bouquet in both hands	5	D	12		(* C)	12		i	172	1.00

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0				3	1	F	oresho	rtening	<u>д</u> я.	1		
Serial No.	MOVEMENTS.		Model.	Costume.	Laterals.	Fre	ont.	Re	ar.	Quantity.	6	S.
Ser			Mo	Cos	Lat	90¢	600	900	600	Quin	Time.	Notes
-49	Walking and turning around rapidly, a sate									1		
- 50	one hand, cane in other " and turning around, carrying buc		43	D	12	22	1.242	12	* *	1	127	
	water in left hand		12	SN	12	12			12	1	172	1.
- 51	" turning around, using sprinkling 1	pot	8	N	11	11			11	î	211	17
-52	" carrying child, turning around; a	nother								1		
	child (70) holding on to dress o	f 93 .	93	D	12	1996		12.3	3.4	1	182	1
-53	" scattering flowers and turning around turning	und .	12	SN	12		12	12		1	367	
-54	" two models (one flirting a fan), i	irm in		1				. and			1.000	
	arm, turning around		1,8	N	12	$(-\infty) = 0$	12	12	4 . 4	1	151	18.
-55 - 56	cutining around, action of aversion		$\frac{12}{12}$	TD	11	14	11	11	10	1	228	18
- 56	" and stooping to lift train " around, 10-lb, basket on h		12	T D B F	$\frac{12}{12}$	12	10	17. X	12	1	162	2
-58	" around, 10-15, basket on h			N	$12 \\ 12$		$\frac{12}{12}$	12	12	1-2	$\frac{219}{174}$	5
- 59	Starting for a run (shoes)		1	PC	12	12	1.4	12		1-2	93	1
-60	Running at a half-mile gait (shoes)	1. 1. I	37 37	PC	10	10	1.11	1.1		5-8	42	
-61	" full speed (imperfect action, shoes)		37	PC	8			8		1-2	36	*
-62	a a a	100	37	N	12			12	1.1	1	41	1
- 63			46	N	10			10		5-8	89	Ľ,
-64			33	N	12			12		5-8	28	1
-65		1	33	N	8			8		1-2	29	÷.
- 66	44		55	N	1.1	14.254	7	14. 14	7	1-2	57	
-67	44. A state of a st	1000	47	N	8	8	10.00	A 14		5-8	56	
-68		1	46	N	- 9	.9				1-2	-88	
- 69	" two models		27, 28		10	10			4.00	1	62	
-70			8	N	8		8	S & .	8	5-8	61	

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ANIMAL LOCOMOTION.

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-71	Running		child (70)			12.23	1.11	7	TD	ius i	14.41	12	12.51	12	1	100	1.12
-72	44	leading	child (70)	hand in	1 hand		1.5	12	TD	12	12		12 8	12	1	93	
-78	Turning :	round	in surprise	and run	ning	away		8	N	5	14.54	5	10 m	5	1	289	10.255
-74	Ascendin	g inclin	e, angle 1 i	n4				36	N	12	12		12		11-2	168	
-75	44	44				an ann an seachadh an seach	2 C I	24	N	9			.9		1	122	
-76		4.4	23331					8	N	12		12	12	2.0	8-4	186	
- 77	4.6	4.4	8888				8.81	8	N	12	10.0	12	12	2.9	1	112	
- 78	44	44	flirting a	fan .	6.6.5			1	N	12	8.8	12	12	8.8	5-8	98	
79	44	44						7	N	12	1.0		12		1	110	5
- 80	22	11	20-1b, bas					i.	N	11	10.0	11	11	0.0	1-2	71	
- 81	44	344	bucket of			h hane	i	1	N	12	12.20	12	12	2.2	1-2	70	
	44	4.6	44	44 14		66	7 × -	8	N	12	2.3	12	12	1.1	1	127	10010
- 83	4.6	4.6	54	11 11	rio	ht ac	- 1	2	Ň	12	0.01	<u>.</u>	12	1.1	î	153	
- 84	44	11	54	11 11	1		1	7	Ñ	12	8.81		12	10	5-8	89	6
-85	44	6.6	(wearing	shoes)				8	N	12		12	12	3.5	8-4	187	
86	24	44	11	11			0.01	3	N	12	0.01	12	12	10	1	103	
- 87	33	4.6	bucket w	ater eac	h han	d (she	(894	8	Ň	12		12	12	2.0	î.	128	
- 88	64	stairs				0.000 (\$0.0000)	~~/	36	N	11	11		11	1.1	î	128	(), (*);
	14	66		211			2.01	39	Ñ	12		1	12	1.1	3-4	84	
$\rightarrow 90$	44	4.6	11111		8.81		10	24	Ñ	10	10		10	1.0	1	132	1525
- 91	4.4	46						22	Ň	12				10	1	86	
92	24	44			2.01		101		N	12			12	2.0	8-4	100	
- 98	55	34					· ·	$\frac{2}{7}$	N	12			12	· · · · · ·	1	110	5
- 94	6.6	14	looking are	und · h	asin ir	hand	8	2	Ň	12	1.15		12	8.8	- î	147	14
- 95	14		a basin in]					8	D	12	5.5		12	1.1	i i	92	
- 96	22		looking rou					7	N	12	3.3		12	1.1	i	239	
-97	Turning t	o ascen	d stairs, wit	h a pite	her a	nd gol	let		-1					1.1	1	ar34/	
	in hand	ls	* * * * * *		ar 2014			8	TD	12	a a	12	12	5.9	1	161	
- 98	Turning a	nd asce	ending stair	s				- 7	N	12	12				1	284	
- 99	-11	44	11 II II					6	N	12	12		0.0	1.1	1	175	
-100		11	11 11		1.			5	D	12	12				1	196	

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ő			2	3	F	oresho	rtening	68.	5		
ul N	MOVEMENTS.	12	um	Laterals.	Fre	ont.	Re	ar.	Quantity.		1.12
Serial No.		Model.	Cestume.	Late	900	60°	900	60°	Quin	Time.	Notes.
-101	Turning and ascending stairs, waving hand	7	N	11		11		11	1	303	
102	Turning, ascending stairs, bucket water in r. hand Turning and ascending stairs, pitcher and goblet	7	N	11		11	1.1	11	1	325	:3
100	in hands	4	N	12	2.2	12	2.2	12	1	295	
- 104	Turning, ascending stairs, bucket water in ea. hand	4	N	12	12.19	12	2.3	12	1	266	
- 105	" water jar on left shoulder	12	SN	12	12		12 2	12	1	446	
-106	" to ascend " bucket water in ea. hand	3	N	12	04 DR	12	10.00	12	1	165	10
107	Turning to ascend stairs, bucket of water and		D	10		10		10		001	
100	broom in hands	4 8	N	12 12	ST (5)	12 12	12.25	12 12	1	221	100
- 108 - 109	Turning to ascend stairs; stooping, lifting a pitcher	26	Ň	12	12 12	12	12		1	206	10
-110	Ascending step-ladder	8	N	11		11	11		1-2	$108 \\ 107$	18
111			Ñ	ii			11	4.4	1-2	95	16
-112		30	N	12	24.00	0000	12	12	1-2	127	1.000
-113	Descending incline, angle 1 in 4	24	N	12	12		14		1-2	84	100
114	Descending incline, angle 1 in 4	36	Ň	12	12	90 A.	12	3.3	1	103	10
115	" with hands clasped in front	30	Ň	12	12	52	1.0	5.5	1-2	90	i.
- 116	" one hand on chin	8	Ñ	12	12	• •	12.2	12	1	128	1.
-117		1	N	12	12			12	î	91	
118	и и	7	Ñ	12	1.44		12		î.	109	1.5
119	" right hand on breast (shoes)	ŝ	N	12	12			11	i i	129	1.3
120	" " bucket of water in right hand .	2	N	12			12		11-2		
-121	at at a transformer and the	1	N	12	12			12	1	105	
- 122	41 11 11 11 11 11 11	8	N	12	12	51		12	11-2		
123	" " 20-lb. basket on head, hands										1
	raised	1	N	12	12	1000	1. 1.	12	3-4	- 91	1.0

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ANIMAL LOCOMOTION

-124	Descending	incli	ne, 20-lb. basket on head, hands raised	8	N	12	12			12	11-4	124	
-125	63	stairs		36	N	12	12		1.00		7-8	92	
-126	4.4	64		22	N	11	1.2		12		1	65	19
-127	44	11		24	N	6	6		6		5-8	109	10 10
-128	6.6	44	hands clasped	7	N	12	12	12.43	3.3	14114	1-2	75	1.6
-129	6.6	4.6		2	N	12			12		3.4	-99	
-130	66	44		$\frac{2}{7}$	N	12	1.		12		1	110	5
-131	44	44	waving hand	6	N	12	12				1-2	159	
-182	8.6	166	turning to look around, and	<u> </u>	122		1.22				(3 R)		
202			waving hand	7	N	12	12	10.10	a. s.	2011	1	221	0.0
-133	4.4	44	throwing handkerchief over										
			shoulders	18	N	11	11			11	1-2	101	
-134	22	22	with basin in hands	3	D	12	12		1.1		1	89	8.8
-135	44	66	and turning ; lamp in right hand	15	D	12	1000 1000			1.4	1-2		
-136	66	6.6	full demijohn on shoulder	39	N	12	12		12. 2		1-2	68	2.2
- 137	44	2.2	turning around	57	N	12	11				1	174	6.8
- 138	¢.¢	22	turning; pitcher in left hand .	1	N	12	12			12	1	178	x = 5
-139	25	44	<i>щ</i> а, г	14	D	11		11		11	1	234	
-140	44	44	looking around and waving fan	5	D	12	12			1.	1-2	161	
-141	66	44	turning and flirting fan	5	D	12	12				1	326	0.2
-142	66	44	" dress caught	$\frac{5}{4}$	D	10	10				1	396	2.5
-143	£ 6	44	" cup and saucer in r. hand	8	TD	12		12	12		1	181	2.2
-144	11	4 6	" basin in hands	4	N	12		12	2.2	12	1	182	8.8
-145	4.6	66	" bucket water in r. hand	4	N	12		12		12	1	121	
-146	" "	4.1	" water jar on l. shoulder	12	S N	12	12		4.14	12	1	151	
-147	66	4.6	11 11 11 F. 11	3	N	12		12		12	1	163	
-148	44	46	" carrying bucket of water							357-E) 			
			and broom	4	D	11		11		11	1.	212	16
-149	64	4.0	stooping to lift a pitcher	8	N	12		14.00		12	1	189	2.2
-150	11	44	" lifting pitcher, turning	8	N	8	+0.45	8		8	1	424	

°.			2	2	Fo	reshot	rtening	ζ8.	ŝ		
Serial No.	MOVEMENTS.	Model.	Costume.	Laterals.	Fro	nt.	Re	ar.	Quantity.	10.	
Ser		Mo	Cos	Lat	900	609	90°	60°	Qui	Time.	1
151	Descend'g step-ladder, turn'g around, rock in hands	26	N	10		à	10		1	185	
152	Jumping; running straight high jump (shoes)	37	PC	12	12				1	87	
153		37	P C	12			12		1	63	
154		26	N	12			12	2.2	1	125	
155	44 44 44 44 44 44 44 44 44 44 44 44 44	8	N	12	12	a - a	2.3	12	1	103	
156		4	D	20	· ·	104	· •	4.4	1	105	
157	" twist " " (shoes) , .	37	P C	12	12				1	152	
158		37	P C	12			12		1	160	
159	" broad jump (shoes)	37	PC	12	12				1	95	
160		37	P C	8			8		1	161	
161	" standing high "	40	PC	12	2.2			12	1	139	
162	" broad ("	40	P C	12	1.4	1.17		12	1	156	
163	" " (shoes)	37	P C	12	12				1	156	
164	" pole vaulting	46	N	11				11	1		
165	4 4	46	N		12			12	1		
166	" over man's back (leap-frog)	54	N	12	12	1.5			1	146	
167	" boy's " " "	28	N	10	9		2.2	2.2	1	109	
168	44 45 45 46 46 e.e.e.e.	27	N	12	12	: 2	190 B.	2.1	7-8	87	
169	14 14 14 14 14 14 14 14 14 14 14 14 14 1	29	D	18			1. al		1	107	
170	" from stone to stone across a brook	12	SN	12	12			12	1	119	
171	Stepping up on a trestle; jumping down, turning	8	N	12		12	12		1	289	4
172		12	TD	12		12	12	2.5	1	290	4
173	Ascending steps and jumping off	4	D	24	1		1.	1.1	1	234	
174	Running and jumping with skipping-rope	12	S N	12	12		a a 1	12	11-2	104	4
175	Crossing brook on step-stones with fishing-pole										

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ANIMAL LOCOMOTION.

-176	Crossing brook on step-stones, with fishing-pole and basket	7	N	10		10	-	10	1-2	83	
177	Crossing brook on step-stones, with fishing-pole		100	1880	(**)	18 M	1				
	and basket	7	N	10		10		10	5-8	118	
-178-	Stepping on and over a trestle	7	N	12			12		1	243	6
-179	Stepping on and over a rock, a basket on head,	12	SN	12	12			12	1-2	129	
-180	right hand raised	12	N	12			12	14	1-2	242	6
-180	Stepping on and over a chair	-12	SN	12	12	8.145	14	12	1	169	0
	W over a fence		N	12		8.15	1.12	$\frac{12}{12}$	4	88	15 (5)
182	Urawing on hands and knees	8			12	8.5	1.5	12	1		5.5
183	$\left\{ \begin{array}{ccc} Walking on hands and feet \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ $.8	N	12	3.5		1.1.1.1	10	1	106	* *
184	1 " " " " "	8	N	* *	12	2.2		12	1	106	
185	Hopping on left foot	12	SN	8	1.4.5	8	8	100	2	141	(#) (£)
186	" " right foot	82	N	12	12	10.00	0008	12	2	81	$\tau \to \infty$
187	(Dancing (fancy)	12	TD	12	1000	$E \in \mathbb{C}$	1.10	1.1	1	277	5.5
188		12	TD		1.00	12.25	12		1	277	× × -
189	(" "	12	TD	1.1		12	1.1.1		-1	277	
190	Dancing (nauten).	12	SN	12		12	12	1.14	1	192	1.1
191	" (fancy)	12	S N	12	1.04	12	12	1.14	1	244	$(\mathbf{x}_{i}, \mathbf{x}_{i})$
192		12	TD	12	1.00	12	12	1.01	1	211	× ×
193		12	TD	12	12	8.6		12	1	200	× ×
194	- Kells gala concerns a size as a side	7	TD	10		10		10	1		4
195	Waltz	7	N	12		12			1-2	146	
196	¹¹ two models	1, 8	N	12	12		4.14	12	1-2	207	1
197		58, 7	D	24	1.24	8.15	34.54	100	1	81	10.00
198	Courtesying	14	D	11		11	4.07	11	1	246	10.00
199	" fan in right hand	5	D	12		w	12	2014	1	211	×
200	" kissing hand and turning around	7	BF	10		10		10	1	220	
201	Taking 12-lb. basket from head, putting it on the	1.1	1000	16.1				100			
	ground.	1	N	12	12		5.5	12	1	158	2.2
202	Dropping and lifting handkerchief	7	N	11	1.1		11		1	223	18

CATALOGUE OF PLATES.

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Serial No.	MOVEMENTS.	Iel.	Costume.	Laterals.	Fre	nt.	Re	ar,	Quantity.	5	ž
Seri		Model.	Cost	Lat	900	600	900	60°	Qua	Time.	Notes.
03	Bending over a trestle with water-jar	8	N	12	12			12	1	850	
04	Stooping to pick up ball	6	N	12	12				1	167	
)5	Carrying and stooping with vase	12	TD	12		12	12		1	273	1
60	Stooping to pick up ball		12122		1.01.01		100	1.1	1.7		
	it on the ground	8	TD	12	12	2.2	2721	12	1	220	12.15
7	Stooping and lifting train	93	D	12	2.1	100.00			1	204	0.8
8	Stooping and lifting train Dropping a fan and stooping to lift it	98	D	12	12.1	2.2			1	155	
9	Stooping and lifting a handkerchief	5	D	12	12	2.2	1.0		1	345	0.0
0	" " dress; a fan in left hand	4	D	12	1000	Ĉ Ĉ	12	1.1	1	218	C C .
1	" " hand ['] chief; parasol in l. hand	14	D	12			122	10.2	1	237	8.2
2	Dropping broom and lifting bucket of water	4	D	11	12.3	11		11	1	272	17
8	Lifting and emptying basket	1	N	12	12	a 2		12	1	232	
4	" child (70) from the ground, turning around	12	SN	12	12	0.0		12	1	311	
5	Placing child (70) on the ground, child running off	12	SN	12	12	2.2		12	1	290	
6	Bending to fill water-jar; placing jar on head	8	TD	12	12			12	1	876	
7	Stooping, lifting, and carrying 30-lb, basket	7	BF	12		12	1.	12	1	200	12.2
8	" and lifting full demijohn to shoulder	39	N	12	12				1	237	8.8
9	" broom and sweeping	7	N	12		2.2		10	1	825	1
20	" " handkerchief and turning .	2	N	12			12		1	178	34 - SE
1	" " 12-lb, basket to head	1	N	12	12			12	1	245	
2	" water-jar to head and turning	7	N	12			12		1	273	1
13	" " basin, wiping it, and turning	8	N	8		8		8	1	359	
4	" " water-jar to head	4	N	12			12	1.1	1	263	10
25	Removing water-jar from shoulder to the ground .	4	N	12		1.	12	0.2	1	582	1.10
26	Removing water-jar from shoulder to the ground										
	and turning	6	N	12	12	1			1	498	

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ANIMAL LOCOMOTION.

- 227	Lifting cloth from the ground, placing it around shoulders, and turning	4	N	12	à.,	12	1	12	1	368	
-228	Turning and lifting water-jar from the ground	6	N	12	12	2.1		1.12	1	297	4.1
- 229	Placing basket on the ground and turning	1	TD	12	12	43.43	34 G4	12	1	328	
-230	Lifting 30-lb. basket from ground to head, turning	7	BF	12		12		12	1	282	2.2
-231	Stooping to arrange train and turning	5	D	12			12		3-4	165	
-232	a a lift a a a a	12	SN	12	12			12	1	196	
-233	Lifting shawl, putting around shoulders, turning .	8	TD	12	12			12	1	271	
-234	Lifting and emptying basin of water and turning	7	BF	12		12		12	1	469	12.2
-235	Turning and removing water-jar from shoulder to										
	the ground	7	N	12	1000		12		1	278	1
-236	Placing chair and sitting down	31	N	12	12				1	183	
-237	Sitting down on chair and opening fan	7	N	12			12		1	281	
-238	Sitting on chair, crossing legs, drinking from teacup	8	N	12		12		12	1	270	
239	Two models; one standing, the other sitting, cross-			12.20		100.5		020	1.5		
	ing legs	10,11	N	8	8	2.2	S 3	8	1	330	
240	Sitting and flirting a fan	5	D	9	1000	1010	9	100	1	492	
241	Placing chair, sitting and reading	5	D	12	12				1	307	1
-242	" " " flirting a fan	12	TD	12					1	364	
243	" and sitting, parasol in left hand	8	D	12			12		9-10	296	
244	Sitting, crossing legs, filling goblet from pitcher	8	N	8		8		8	1	384	12.2
245	Two models, turning around, sitting on the ground	10.11	N	12	12		1. 12	12	1	350	
246	Placing chair, sitting and flirting a fan	12	TD	10	10	1000	S	10	1	241	14
247	Sitting down, placing feet on chair	8	N	9	12		0.04	12	1	291	
-248	Sitting down on the ground	12	SN	12	12			12	1	232	
249	Rising from chair	31	N	10	10				1	92	
-250	" " stooping and lifting hand'chief .	31 5	D	12	12				1	312	
251	Kneeling on left knee, basket in l. hand, and rising	8	N	12		12	1. 1.	12	1	286	12 2
252	" " right knee and scrubbing the floor .	8	N	12		12	34.57	12	1	834	2. 2
253	" elbows on chair, hands clasped	12	TD	12		12	12		1	364	1
-254	11 11 11 11 II	8	N	12		11		11	1	291	11

CATALOGUE OF PLATES.

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.0.				1	F	oresho	rtening	<i>ζ</i> 8.	*		
Serial No.	MOVEMENTS,	Model.	Costume.	Laterals.	Front.		Rear.		Quantity.	·0	100
1.1.1.4			Cop	Lat	900	60°	90°	600	Qui	Time.	Watou
$\left \begin{array}{c} 2556\\ -257\\ -258\\ -258\\ -258\\ -260\\ -260\\ -260\\ -266\\ -266\\ -266\\ -266\\ -266\\ -266\\ -267\\ -277\\ -277\\ -277\\ -277\\ -277\\ -277\\ -277\\ -277\\ -277\\ -277\\ -278\\ -280\\ -28$	Arising from kneeling and turning Lying on the ground and reading Arising from the ground and walking off Lying on a couch and turning over on side Arising from couch and stretching arms. Getting into hammock. "out of hammock. "out of hammock. "out of bed and preparing to kneel. "out of bed and preparing to kneel. """" Turning and changing position while on the ground """""""""""""""""""""""" Arising from the ground. """"""""""""""""""""""""" Arising from the ground. """"""""""""""""""""" """""""""""""""""""""	8 8 39 39 47 47 8 8 8 8 1 7 7 20 4 8 25 30 30 30 30 30 30	NNNNNNNNNNN ^D NNNNNNNNNNNNNNNNNNNNNNNNN	$\begin{array}{c} 12\\ 12\\ 10\\ 10\\ 10\\ 10\\ 12\\ 12\\ 12\\ 12\\ 12\\ 12\\ 12\\ 12\\ 12\\ 12$		$\begin{array}{c} 12\\ 12\\ 12\\ 12\\ 12\\ 12\\ 12\\ 12\\ 12\\ 12\\$	10 10 10 10 12 10 10 	$\begin{array}{c} 12\\ 12\\ .\\ .\\ .\\ .\\ .\\ .\\ .\\ .\\ .\\ .\\ .\\ .\\ .\\$	$1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\$	$\begin{array}{c} 179\\ 340\\ 106\\ 198\\ 264\\ 245\\ 245\\ 297\\ 387\\ 290\\ 387\\ 290\\ 387\\ 290\\ 387\\ 37\\ 290\\ 387\\ 381\\ 161\\ 103\\ 85\\ 47\\ 58\\ 120\\ 783\\ 81\\ 112\\ \end{array}$	

ANIMAL LOCOMOTION.

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5.7.1
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1
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69 C
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124
2
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E.
50
24
1.71
<u></u>
100
24
24

281 Base-ball; catching and throwing 30 N 157 | . . 282 N 10 11 6.6 10 66 30 10 8-4 150 NNN 12 288 12 11 62 16 111 3-4 77 30 12 _\$ 284 11 66 11 12 11 201 30 ÷. . 12 -285 12 11 42 11 15 170 30 ÷ . 9.3 . . NN 12 286 24 throwing 12 105 25 2.12 . . - 287 11 running and picking up ball . 11 11 75 26 NN ____288 10 10 30 108 16 - 1a ____289 Cricket: round arm bowling 12 12 2 69 -290N 44 over 44 12 12 $\mathbf{2}$ 66 69 2 N - 291 12 12 2 11 batting ; drive 69 V 2 - 292 N 11. back cut 12 12 2 69 21.23 -29311 N 11 44 44 69 12 12 2 21.2 N - 294 Lawn tennis; serving . . . 10 10 2125 101 . -29544 44 15 D 8 8 8 8-4 210 -296D 66 12 15 8 8 8 . . - 297 12 24 15 D 87 8 8 170 . . - 298 44 11 15 D 7 7 168 -299 D 24 Playing with a ball 15 7 ÷ ς. ÷ N 12 Foot-ball; drop kick 63 10 8 238 11 × * 10.10 --- 801 N 12 punt 63 11 11 141 11 Picking up a ball and throwing it - 302 N 12 12 39 146 --30312 11 11 44 8 N 12 12 10 178 11 --304N 25 11 7 10 10 10 310 11 îi. 12 TD 12 12 11 12 12 218 -30622 11 11 7 TD 12 12 11 12 320 ÷ + • • -30712 Throwing an iron disk N 12 30 184 . . × 81 ___ 308 N 11 44 the hammer. 11 24939 N - 309 44 14 8 8 117 35 N - 310 Putting the shot 68 12 12 12 2 811 N 12 111 . . 22

Xiii

		×.	(8.	tening	reshor	Fo	- 22	*	1.41	warved game wars a second second
*	Time.	ntit	ar.	, Rear.		Fro	rah	Costumo.	el.	MOVEMENTS.
Notes.		Quantity.	600	000	60 ⁰	90°	Laterals.	Cost	Model.	the silvens.
)	890	1	2.4			12	12	N	39	P Heaving a 75-lb. rock
	145	1		10			10	N	46	4 20-lb. 4
	160	1	1.1		÷ .+	10	10	N	46	44 44
E a a	104	1	1.1.	12.10	- 2	12	12	N	35	6 40 - 41 - 41 - 12 - 12 - 12 - 12 - 12 - 12
	- 96	1	10.12	12	× •	0.00	12	N	35	£ 44 44 44 44 44 44 44 44 44 44 44 44 44
	489	1	12	1.000		12	12	P C	52	" " 75-lb. "
	119	1		1.00		12	12	PC	42	Lifting " "
	182	1	1. 2.		÷ ÷ .	12	12	PC	42	Heaving " "
	325	1	2.1		* *	12	12	PC	52	Lifting 50-lb. dumb-bell
4	14.1	1	$x \in C$		÷ 63	1.1	24	PC		A, lifting 50-lb. dumb-bell; B, posing
	398	1	$\times 3^{\circ}$	10.1	× 41	12	12	PC	42	Lifting and letting down two 50-lb. dumb-bells
	488	1	1.5 10	12		(e) (e)	12	PC	42	, """"""""""""""""""""""""""""""""""""
	308	1	1.1	1.000		10	10	PC	42	Curling 50-lb. dumb-bell, model § length
	856	1	1. 1.			12	12	N	39	Lifting and holding two 50-lb. dumb-bells
1.	283	1	1.1	12	· · ·	1.1	12	N		Lifting 50-lb. dumb-bell at arm's length
	30.33	1	1.14	12	12	24-30	12	N	68	Rowing
	2.5	1	1.1	12	12	$ A_{i},A_{i}\rangle$	12	N	68	8 ¹⁰
	167	1	1. 10	12	3. A.	19030	12	PC	52, 53	Boxing; (shoes)
	.98	1	10.15	12	1.1	2.5	12		52,53	eross-counter (shoes)
	176	1	1.1	10		8.8	10		52,53	" stop for cross-buttocks (shoes)
	163	1	19 P.	12	÷ 4	2.1	12			" eross-buttocks (shoes)
	96	1	$\mathbf{v}_{i} \in \mathbf{v}_{i}$	12	8 X.	1.81.82	12			53 knocking 52 down (shoes)
	188	4	$\mathbf{x}_{i} \in \mathbf{x}_{i}$	12	8.80	$\epsilon \cdot \epsilon$	12			with gloves (shoes)
1	115	1	8.10	12	* *	1.00	12	PC	52, 53	5
2	1.1	1	1.5	1.55	• .•	1.1	12	PC	64,65	$\int f$ open hand f
2, 1		1	9		. 9	1.1	 • 1 	PC	64,65	Company "opping and participation

- 338 Boxing; open hand (shoes) 64, 65 P C 12 217 . . . - 339 10 41 41 41 64,65 P 217 11 9 64, 65 P C 44 12 __ 340 11 64 11 162 4..... 21 - 44 11 -34164,65 PC 8 8 162 11 . . -34264 64,65 PC 8 8 64 -343N 12 Striking a blow (left hand) 22 124 12 _____844 22 22 (right hand) . N 112 22 -345Wrestling; lock 46,68 N 12 2 . . * . ÷ . . 1.16 . . - 346 11 46,68 N 12 12 2 24 1.11 10.00 -347Græco-Roman N 12 2 54 46.68 . . - 348 14 11 N 2 46.68 12 12 -34966, 67 PC 12÷. . . 12 PC 66,67 6 4,11 11.14 "Fix" and "unfix bayonets" - 351 11 60 PC 11 11 4 -352"Shoulder," "order," and "carry arms" PC 60 11 11 11 4 -353"Support arms" and "arms port" PC 9 9 9 60 - 354 "Carry arms," "parade rest," and "trail arms" . PC 11 11 11 бо 4 -355On guard, walking and turning around PC 12 12 12 161 60 . . -356Kneeling, firing and rising PC 8 7 6 287 24 60 a 14 -357 Lying prone and firing PC 8 8 8 316 60 - 358 Lying on back and firing PC 8 бо 8 8 319 . . 12 -359PC 12 12 60 92 - 860 12 PC 12 136 42 _____361 44 W PC 12 12 136 42 -362Back somersault N 14 14 182 1.8 33 12 12 N 12 -36312 34 100 1,8 14 M 14 N _____864 Hand-spring over man's back 12 12 20 151 100 1.0 (a. 1947) 12 _____865 Head-spring, a flying pigeon interfering PC 12 42 85 . . . _ 366 PC 12 1237 107 . .. 12 367 Kicking a hat 13 N 12 12 169 . . _ 368 10 Acrobat descending stairs on hands 42 PC 10 405 . . S 32

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CATALOGUE

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PLATES

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.0.				4	F	oresho	rtenînş	ps	16		
Serial No.	MOVEMENTS.	Model,	Costume.	Laterals.	Fre	ont.	Re	ar.	Quantity.	101	÷.
Serl		Mo	Cos	Int	90°	60°	900	60°	Qui	Time.	Notes.
369	(First ballet action	46	N	12	1.0	12 20			1	239	1.
70	1	46	N		12		1.00	12	1	289	
71	Acrobat, vertical "press up"	42	PC	12	12				1	388	
72	horizontal "press up"	42	PC	12	12	1.1			1	475	
178	" "press up" from chair	42	PC	8		10 O	8	1.1	1	363	
174	f Blacksmiths, two models, hammering on anvil)	59,61	PO	12	1.2.2	3.3		13.3	1	133	
375		59,61			1.1	12		12	1	133	
76	Blacksmith, hammering on anvil, two hands	44	N	12		2. 21	12		3-4	128	a
377	Blacksmiths, two models, hammering on anvil	44,45	N	12	1.1		12		1-2	122	
78	Blacksmith, hammering on anvil, two hands	бі	PC	10		10		10	1	135	1, 25
79	Carpenter, planing a board	59	PC	12		12		12	1	126	
80	" sawing "	59	PC	8		8		8	1	93	
81	Mason, laying a brick	48	PC	8		8		8	1	211	
82	Lifting a log on end	39	N	10	2.2	10	1.000	10	1	226	a a
83	Lifting a log on shoulder	39	N	12	a 20	12	1000	12	1	254	24.114
84	Heaving a log from shoulder	39	N	9	9				1	140	
85	Farmer, using a pick	41	N	12	12				1	198	
86	Miner, "	57	D	24		2.2			1	189	i
87	Miner, "Farmer, using a long-handled shovel	41	N	12	2.2	12	12	1.1.1	1	884	S 8
88	" " spade	41	N	12	2.2	12	12	10.10	1	853	S - 54
89	" scattering seed	41	N	12	2.10	(\mathbf{x}, \mathbf{x})	12	8.43	1	-98	S 18
390	" mowing grass	41	N	12	1 A A	A. 16.	12		3-4	138	
391	34 40 16 16 18 18 18 18 18 18 18 18 18 18 18 18 18	41	N	12	12				8-4	125	
392	Dragging a garden roller	39	N	12			12	Q 2	1-2	67	
393	Pushing	39	N	12		1	12	2.2	1-2	78	
394	Turning a crank handle	47	N	12	12.2		12		1	186	· · ·

XV.

12 200- 395 1247 . . N - 396 Pounding with a mallet 9 9 2601 39 . . . N 12 Lifting 75-lb. stone on shoulder 1 364 _ 897 47 1 10 m . . . N 12 12 198 Lifting bucket of water to empty it 41 1 N 12 12 W--- 899 Emptying bucket of water 20939 N - 400 14.6 44 12 12 20241 - 401 11 N 12 12 1 222 12 41. 66 $\mathbf{2}$ 2 2 . . S N 402 11 8 12 12 12 1 301 u basin . . D 24 118 - 403 11 4 bucket " 1.1 - 404 11 - 44 24 D 12 12 12 1 212 - 44 4 . Carrying hod of bricks up a ladder . . . -405PC 8 8 8 1 - 2172 59 TALOGUE . . N 12 285 -406Two models, 8 pouring bucket of water over 1 1.8 N 407 44.11 24 8 11 64 44 1.8 1212 1 285. . . . -408Two 44 14 11 8 . 1.8 N 9 3 1 487 44 9 . . -4098 N 12 12 12244Pouring basin of water over head 8 N 12 1 335 410 Stepping out of bath-tub, sitting down, wiping feet 12 12 7 N 11 298-411Lifting a towel while sitting, and wiping feet . . . 11 11 1 OF . . . 8 N - 412 443 Washing, wiping face, and turning 9 9 9 S. 4 . . 8 N 546 - 413 Pouring water in basin and washing face 8 8 8 1 N 213 8 12 12 12 _ 414 a 14 N 7 __415 Toilet; preparing to put on clothing. 10 10 188 -41664 putting on dress 13 N 12 12 12 3-4 241 __417 66 1 S N 12 12 12 344 sitting and putting on stockings 8 N 12 12 455 _ 418 44 44 44 24 44 12 12 9 12 12 297 -419 6.2 stooping, throwing wrap around shoulders . 1 -42011 rising from chair, and putting on cloth-12 SN 1212 238 12throwing handkerchief around shoulders . 12 S N 12 12 12 215 -42122 - 422 44 putting on shoes, and rising from chair . . 2 D 9 9 495. . . 12 -42344 " boots, " 11 11 44 12 SN 12 12 285S 6 ۰. -42422 rising from chair, and putting on shawl . . 3 D 12 12 217 2 .

PLATES

ė.				1.2	F	oresho	rteninį	c8.			
Serial No.	MOVEMENTS,	Model.	Costume.	Laterals.	Fr	ont,	Re	аг.	Quantity.	÷0	3
Serti		Mot	Cost	Lat	900	600	900	600	Qua	Time.	Notes.
26 " bri 27 { " tw 28 { " tw 29 " tak 30 " tak 31 " 32 Washing c 33 Wringing c 34 Hanging c 35 Ironing cl 36 Making u 37 Setting do 38 " 39 Spreading do 39 Spreading do 39 Spreading do 34 Carrying v 42 Stooping, a 43 Drinking f 44 Two model 45 Two model 46 Filling pit 47 Two model	ting on dress and turning around . shing her hair and walking off . models, 1 disrobing 8 . 1 1 8 8 . 1 1 8 8 . 1 1 8 8 . 1 1 8 8 . 1 1 1 8 1 . 1 1 1 1 8 1 . 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	$ \begin{array}{c} 7 \\ 1,8 \\ 1,8 \\ 1,8 \\ 1,8 \\ 13 \\ 1 \\ 8 \\ 8 \\ 8 \\ 8 \\ 8 \\ 3 \\ 8 \\ 8 \\ 3 \\ 8 \\ 4 \\ \end{array} $	NNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNN	$\begin{array}{c} 8\\ 12\\ 12\\ 12\\ 12\\ 12\\ 12\\ 12\\ 12\\ 12\\ 12$	· · · · · · · · · · · · · · · · · · ·	$\begin{array}{c} & 12 \\ 12 \\ 12 \\ 12 \\ 12 \\ 12 \\ 12 \\ 12$	12 12 12 12 8 12 8	$\begin{smallmatrix} 8 \\ 12 \\ 12 \\ 8 \\ 12 \\ 12 \\ 12 \\ 12 \\ 1$		$\begin{array}{c} 322\\ 843\\ 307\\ 470\\ 274\\ 274\\ 274\\ 276\\ 285\\ 199\\ 244\\ 295\\ 812\\ 208\\ 818\\ 818\\ 818\\ 818\\ 818\\ 252\\ 2211\\ 164\\ 154\\ 350\\ 260\\ 260\\ \end{array}$	

XVIII

- 449	Feeding a dog	8	N	12	1.	12		12	1	222	8.8
-450	Feeding a dog			10						0.01	
473	and drinks	1,8	N	12		1.1			1	321	
451	Two models, 8 brings cup of tea, 1 takes cup	1.0	N		10			10		001	
452	Two models, 8 kneels, drinks from water-jar in	1, 8	18		12	10.00		12	1	821	* *
402	hands of 1, and both walk off	1,8	N	12				1 0		410	
453	Two models, 8 kneels, drinks from water-jar in	1,0	74	1.4	2.5	31.51		: : : : : :		410	31.35
300	hands of 1, and both walk off	1,8	N	1.1	1. 2	12	12	1. 2011 - 1.	1	410	
454	Taking 12-1b. basket from head and placing it on	1,0	-24	1.1	1.1	14	1.4			410	: :
101	the ground	7	BF	10		10		10	1	211	20
455	Throwing self on heap of hay	7	BF	9		9		- 9	î	230	
456	Raking hay	7	D	12		12		10	î	215	
457	Stepping on chair, and reaching up	3	D	12	12				- î -	263	
458	Lifting handfuls of hay, turning, throwing it down	7	BF	10	1.	10		10	1	212	S .
459	Stepping on chair, reaching up, and descending .	1	TD	12	12	100		12	1	365	12.2
-460	Carrying jar on shoulder and basket in hand, and										
	placing them on the ground	7	BF	12		12		12	3-4	274	
461	Opening a parasol, and turning around	12	TD	12		12	12		1	151	
462	Pouring libation on ground, drinking from goblet.	12	TD	12		12	12		1	832	
463	Reaching up, stooping, and turning around	7	TD	12		12		12	1		2
464	Two models, 16 chasing 4 with a broom	4, 16		16		1. 12			1	81	
-465	$\left\{\begin{array}{ccc} \text{Two "} & \text{ehild, 70 N, bringing bouquet to 12} \\ \text{"" " " 70 N, "" " 12} \end{array}\right\}$	70, 12	S N	12	10.00	\mathbf{x} \mathbf{z}	34374		1	291	4.4
-466	1 12 / 11 11 11 11 11 11 11 11 11 11 11 11 1	70, 12	SN	\mathbf{E}	12	$\times \infty$	10.54	12	1	291	
-467	Child, walking	72	N	12	1.00	$(\underline{x}(-\underline{x}))$	12	10.00	1	67	18 (A)
-468	" " " · · · · · · · · · · · · · · · · ·	71	N	12	12	2.15	1.42.4	120	1	85	3.8
469	" running	70	N	12	*). *	8.3		10.1	2	97	2.42
470	¹¹ 70 N, running after a man	51	D	12	1.0			10	1	57	1
-471	WINNING ON MANUAS BUNE BUICES	70	N	12 12	12	\$1.55		12	2	169	14 Q
-472	uproduced a state state state state	70	NN		1 × 1	\mathbf{x}	10	12	1	206	× ×
-473	" walking up-stairs	70	N	12	10.00	× •	12	10.00	1	161	

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MOVEMENTS. 4 Child, walking up-stairs, kneeling, reaching for va 5 "getting up on chair	. 70 . 72	ZZZ Costume.	8 Laterals.	90°	ont. 60°	90°	ear. 60°	quantity.	Time.	Notes.
 Child, walking up-stairs, kneeling, reaching for va "getting up on chair "sitting down on the ground stooping, lifting a goblet, and drinking 	use 70 . 70 . 72	NN	12		600	1000	1000	dus	-	Not
 ⁵ "getting up on chair	. 70 . 72	N		2.3	a 21	10.5	19	1.1	10.5	
 getting up on chair	. 70 . 72	N	8				1.44	1	348	12
 sitting down on the ground	. 72	N	E 10.000 L	X 61	w w	8	8	1	260	23
7 's stooping, lifting a goblet, and drinking .	. 70	1.4	12	10.0	$x \rightarrow x$	12	1. 1.	1	105	14
O IT AND A THE PARTY AND A PAR		N N	8	8		1.00	8	1	335	
8 "sprinkling water over some flowers	. 70	N	8	8			8	1		1.18
9 "getting up from the ground		N	12	12				1	119	
0 " walking and crawling up-stairs		N	12		3.5		12	1	208	1
1 " lifting a doll, turning, and walking off		D	12	12.20	2.2	1.4	1. 1.	1	182	
2 A, walking; B, ascend'g stairs; C, ascend'g inclination		N	36	10 AC	8.8	1000	1.14	2.12	1.4.1	
8 A, lifting basket; B, running, waving handkerchi	ef 3	D	20				1000	S	2.1	
 A, sweeping; B, dusting a room	. 8	D	20	10.10	10 B					
B 11, drinking while lying on the ground	. 10,11	N	12	12	5.2		12			
6 A, lawn tennis; B, ascending a step; C, descendin	112						100	10.00		1.2
a step; D, ascending a ladder	. 102	N	44	10 m	$\times \times$	14334	+ - +3	3 X	$> \infty$	1
the ground; C, walking; D, running		D	28	2	2	2	2			2,
8 A, lawn tennis; B, dumb-bells; C, walking		-			- 74		~	1.4	10 X	100
hands; D, ascending stairs	. 96	N	48	120-22	12.12	4.64	1.00	3.2	0.0	
A, ascending incline; B, ascending incline wi 50-lb. dumb-bell; C, descending incline; D, d	th	-			12.30	1.525	5122		2.0	
		N	44							- 8
0 A, sitting down; B, sitting down; C, sprinklir		11	22	1.00	1.6.16				* *	1.9
water; D, stooping for cup and drinking		N	48							1.0
1 A, hammering at anvil; B, hammering at anvi		~ 1		20.35	5.5		*: *)	12.12	2.2	1.8
C, using hatchet; D, sawing a board		N	40				1.00	20.00	10.00	1.8

XX

492	A 103, rowing; B 96, row					έ.		1.161	N	24	$\mathbf{r} \in \mathbf{r}$	12	4.4	• 9		81	÷.		- 2
493	Miscellaneous phases of th							7	N	1	11.4	7		7		÷.	1.0		- 3
494	11 11	** .	1.00			÷ .		7	SN	10	1000	10	· ·		1.1	1	1.41	- 11	1.3
495		£4		1		8.4		7	SN	10	10000	10		10	÷.				- 3
496	11 11 11							7	TD	- 9		- 9		* 9	L .				
497	22 22 22	144			÷.	01		7	SN	10		10		10	L.,		1.	1	
498	66 - 66 - 66	(44)	625697	-2	8	0.3		7	N	10		10		1.2		8.	18.	21	
499	Raking and packing hay .	3 13 11 2		13	8	8 J		7	N	8	12 2	8		8		8	1	81	
500	Various movements with							7	N	10		10	1.00	10		÷.	1.2		
501	Miscellaneous,-stooping,							7	N	12		12		12	Ľ.			÷.	
502	miscentineous,-stooping,	Kuccung	1 010	• •		* *	- 10	7	TD			9		9	<u> </u>	÷.	*	1	
502 503	11 11	5.40X		15		e	2.0	1	TD		10.00	6	10.5	6	1	18		1	
		etc						17	BF	10	3 2	10	1.00	10	1	35		8	
504	Ascending and descending	stairs .	1.1	17		• •	18	1 .	1.00	10				10	1			•	
505	Bricklaying					÷ ;	1	48	PC		2.2	.9	1.14	1.11	14	14		-	
506	54					90 B		48	PC	10	10.0	10		10	÷.	82	180	•	
507	Carpentering					8.9	1.0	59	P C	8	1. 6	8	1.14	8	÷.	24		÷.	
508	Shoeing a horse			1.00			1.0	62	N	10	1.6.10	10	10.04	10	b	\simeq		*	
509								62	N	- 6	1. A.	6	1.00	6	۰.				
510	f Contortions on the groun	id		Ξ.			٦.	49	PC	24		÷ .							
511	1			12	2	5.5	1	49	PC		24	12				S	1		
512	" on rings						1	49	PC	11	11	2.0		18			12		
513	Getting on and off table .		100.01	10				7	TD	10	2.2	10		10			IQ.		
14	Feeding a dog							8	N	5		-5		-5	<u> </u>	0	Ľ.	<u></u>	
15	Ascending and descending	stairs o	ta .		1		. *	7	TD	10		10		10	1 C		1		
516	Miscellaneous movements	with a w	nut on	di.		1		+	BF		15.53	- 9	100	10	1	1	1	5	
517	in accounteous movements	WILLI H V	C4			5.1		1	BF	8	12.2	8	1.1	8	1	1	1		
	State					• •	. *	15	D	8		8		8		8		*	
518	Sitting down, rising, etc.				-	5.1		15		27.5 F	1.1	- 81	1.04	~	÷.	141	14	*	
519 520	A, throwing disk; B, ascen A, 98 and 100, wrestling;	B, 98 and	100	W	rest	tlin	gr:	95	N	30	1043	94 - 40 	24223	*C.4	×.	÷.	*	*	
	C, 99 and 101, wrestling without gloves	: D, 99 a	nd 10	и,	sp:	TTII	ng		N	8	4	4	4	4					

•

XXI

6	and a second state of the second s	2.2.2	3	1	F	oreshot	rtening	8.	1	222	
Serial No.	MOVEMENTS.	Model.	Costume.	Laterals.	Fre	ont.	Re	sar.	Quantity.	e de la composición de la composicinde la composición de la composición de la compos	100
Seri	a sector present in the sector of the	Mo	Cos	Lat	90 ⁰	60°	900	600	Qua	Time.	Notes
521	A, walking; B, ascending step; C, throwing disk; D, using shovel; E, using pick; F, using pick.	95	N	12	6	6	6	6		5 25	3
522 523	A 97, jumping; B 98, hand-spring; C 98, somersault; D 99, somersault; E 99, spring over man's back. A, striking a blow; B, throwing disk; C, heaving	97-8-9	N	10	ð	5	5	5	÷ r	• •	3
524	a 75-lb. stone; D, throwing a ball; E, throwing disk; F, heaving 75-lb. stone	99	P C	12	6	6	6	6	1.1		3
024	step; C, ascending step; D, lawn tennis	1	SN	8	4	4	4	4	1.1	2.2	3
525	A, descending step; B, ascending step; C, descend- ing step; D, ascending step; E, wav'g hand'chief	1	N	10	5	5	5	5			0
526	A, lifting ball; B, emptying bucket of water; C, kicking above her head; D, striking with a stick;		-1					, č	11		
	E, stumbling; F, lifting 50-lb. dumb-bell	1 -	N	12	6	6	6	6	2.12	2.10	8
$527 \\ 528$	A, B, C; 1, spanking child 104	1	N	6	3	3	3	3		• •	2
	child 104, hand in hand; E, running with child 104, hand in hand	1	N	5	- 5	5	5	5			3
529	Various poses	68	N	10		10			8.2	12.13	ŝ
580	" " " · · · · · · · · · · · · · · · · ·	46	N	10	10	10		1.2.5		3.5	3
531	⁴	7	N	11	1.1	11	1.4	11	8. 9	1.1	8
532	Movement of the hand; drawing a circle :	51		12	12	$\times +$	6.00	(\mathbf{x}, \mathbf{x})	1	124	(4)
588	" " clasping hands	51		12	12	\mathcal{X}	1.4		1	131	
534	" " lifting a ball	51	10.10	12	12	2.8	100	100	1	175	1
585	" " beating time	51		12	12				1	168	
536	" " hands changing pencil .	51		12	12				1	178	

xxii

ABNORMAL MOVEMENTS.

	ABNORMAL MOVEMENTS.		10. I	Ú . 1		(° - 1	1 1	1	1	1	
87 38	Single amputation of leg; hopping with crutches . Double amputation of thighs; boy; A, moving for-	82	N	12	12	5/5	2.2	12	1	121	
~	ward; B, getting on chair; C, down from chair.	94	N	36	1.00		3.3	22	1	9.3	2
89	Infantile paralysis; child, walking on hands and feet	92	N	12	2.00		1202	10.00	1	\$ 20	2
40	A, bow-legs; boy; B, spinal caries; girl, walking .	90,91	N	24					1		2
11	Multiple cerebro-spinal sclerosis (choreic); walking	21	N	11		11		11	1	222	18
12	" walking	17	S N	12			12		1	115	
3	Spastic gait (hysterical); walking	19	SN	12			12		1	157	
4	Artificially-induced convulsions; A, B, C, while			10000				1000	1.1		
	lying	1	N	-86	2.15	8.10	19104	1.11	a 2	150	1
15	Artificially-induced convulsions; A, B, while			1							
	sitting	1	N	24		1 m - 10	1000	1.000	10 X	180	1
6	Locomotor ataxia; walking	87	N	12			12		7-8	117	6
7	Hemiplegia; walking with crutch	81	N	12	÷	1	12		1-2	227	2
18	Lateral sclerosis; A, B, walking	86	N	24	12	1	11		8-4	124	1,
19	Epilepsy; walking	79	N	12	12.5	122-22	12	10.00	8-4	- 90	1
50	Locomotor ataxia; walking; A, arms down; B,	1.6.7									
	arms up	84	N	20	10.00	· ·	20	0.00	1	164	1
51	Epilepsy; walking	78	N	12	12			1. 1	2	214	
52	Hemiplegia; walking with cane	76	N	12	12				1	128	14.1
13	After traumatism of head ; walking	75	N	10			10		5-8	122	12
54	Locomotor ataxia; walking	83	N	11	1 2 2	1.1	11		9-10	118	Q. 1
55	Muscular atrophy of legs; adult; A. B. walking.	89	N	24	10.00	4.47	P		1	124	1
56	Local chorea; A, B, while lying	74	N	22	× - + 5		1000	10.00	10.14	52	1
57	" A, B, C, while standing	74	N	-36			1.1.1	1.0		48	1
58	Paraplegia; partial; walking	80	N	12			12		11-2	87	1.0
59	Disseminated sclerosis; walking with cane	88	N	12	12	2.2		12	7-8		2
50	Locomotor ataxia; walking	85	S N	12	2.2	2.2	12	2.1	1	108	6
51	Hydrocephalus; walking	77	N	12	12	$\times \pi$	1.69	10.00	1	213	3.1
62^{-1}	Lateral curvature of spine; walking	89	N	12	10.0	Se	12		8-4	62	10.0

CATALOGUE OF PLATES.

XXIII

			1	F	oresho	rtening	28.	4		
		ANIMALS AND MOVEMENTS.	Laterals.	Fre	ont.	Re	ar.	Quantity.	e e	·*
		HORSES,	Lat	900	60°	900	60°	Qua	Time.	Notes,
3	{ Hauling	; broken log chain; dark-gray Bel, horse Dusel, , γ	12				·	1		$\frac{2}{2}$
5	j	dark-gray Belgian horse	12			0.0	14 14	1	04104	2
	J	·· ·· ·· ·· · · · · · · · · · · · · ·		20.00	12		8	1		22
	8 1	$\cdots \qquad \cdots \qquad$	12		· ·	2.2	1.1	1	24-03t	2
	1	n n n n	14.2		12		12	1	2.10	2
	**	" " " Hansel	16	94 (M)	1.1	5.5	1.1	1	51	
	**	11 11 11 11 1 1 1 1 1 1 1 1 1 1 1 1 1	2.5	24.18	12	(# . %)	12	1-3	.111	1.1
		light-gray mare Johnson	12	(X, S)	12	10 X	$(\mathbf{x}_{-}) \in$	1	95	1.20
	**	near being punch, ngno-gray mare,	$\frac{12}{12}$	88 - 88 -	$\frac{12}{12}$	18.16	3.00	2.16	75	1.1
	Walking;		24	0.0	12	2.3	10 10	9-10		· •
	watking ;	a a a a a a a a a a a a a a a a a a a	24		12	1.1	12	8-4 5-8	42	1.1
	44	" light-gray horse Eagle	12		14	12		1-2	52	
		saddle; irregular; white horse Clinton					8.8	1-2	56	+ +
	44	bareback; dark-gray Belgian horse . Dusel		1.1	12	1.1	12	1-2	55	P
	11	saddle; white horse Elberon	12		12		12	1	126	
	2.2	" thoroughbred bay mare Annie G	12	12	<u>.</u>		2	1-2	44	1
	44	bareback; rider, 43, nude; light-gray			2002	15 8	10 N.	202	1	0.0
		horse Smith	12			12	· · ·	3-4	63	2.4
	2.6	saddle; rider, 43, nude; light-gray								
		horse Smith	12			12	× 4.	10.00	82	
	**	saddle; female rider, nude; gray horse Tom	12	12				1	102	
	£4.	" irregular; brown mare Beauty	12			12		1-2	52	
	.44	sulky; light-gray mare Katydid	12	1. 1.		12	2.2	3-4	62	
	6.6	42 [°] ¹⁰ 41 [°] 41	12	12		12.2	2.2	3-4	70	

87 88	Walking;	; sulky; sorrel mare \ldots \ldots Nellie Rose \ldots 12 \ldots 12 \ldots 12 \ldots 12	1-2 5-8	54 82	÷.
89		(single foot); bareback; white horse . Clinton	1	52	
				0.5	
90	nude: w	(single foot); bareback; rider, 106, white horse	1	55	
91	Racking ((pacing); saddle; brown horse Pronto 20	1	26	
92	11		1	51	
98	66		1	59	
14	11		11 - 2	74	
5	6.6		11 - 2	76	
36	Trotting;		3-4	45	
97	11	bareback ; dark-gray Belgian horse Hansel 20	8-4	85	
18	6.6	saddle hay horse Daisy	1		2
19	11	bareback : dark-grav Belgian horse . Dusel	1-2	56	
0	6.4	bareback ; dark-gray Belgian horse . Dusel	1-2	52	
01	6.6	saddle; brown mare Beauty 12 12	1	52	
)2	4.4	bareback ; rider, 43, nude ; light-gray	8-4	43	
)3	12	horse	0-T	40	
		horse Smith 10 10	8-4	45	16
)4	64	saddle ; white horse	1	46	1
5	6.6	sulky; bay horse Reuben 12	1-2	51	
06	66	""""""""""""""""""""""""""""""""""""""	1-2	34	100
07	4.4	" mare	5-8	17	
08	44	4 sorrel mare	5-8	23	
99		" bay mare Lizzie M 24	5-8	19	
10	11	" gray mare	11-2	70	
11	44		1 1-4	52	
12	54	" bay horse Dercum 12 12	8-4	47	
13	6.6	⁴⁴ sorrel mare Nellie Rose	7-8	47	
14	44	" breaking to gallop; sorrel mare Flode Holden 24		21	

VXX.

.0			For	eshor	tening	5H.	2		
Serial No.	ANIMALS AND MOVEMENTS.	Laterals.	Fron	t.	Re	ar.	Quantity.	16.	.68,
Ser	HORSES.	Lat	900	600	900	600	Qui	Time.	Notes.
$615 \\ 616$	Canter; bareback; dark-gray Belgian horse Hansel	20					1	36	1
-610	 saddle; bay horse Daisy bareback; rider, ro6, nude; white horse Clinton 	24 12	2.2.2	35.	* *	:* :*;	1	1 20	2
618	areback; Fider, 100, nude; white horse Clinton	12	12	. *	• •	• •	1.1.1	56	
619	" saddle; brown horse Middleton	12		÷.	12	14 (4) (4)	1 1 -4	$\frac{67}{74}$	
620	ii thoroughbrod hay mare Annie G	1.9		24	$12 \\ 12$	9 X	1 1-9	49	#20
621		12		- 3	1.4	(* 18) (* 18)	1	-19 -56	190
622	" " rider, 43, nude ; gray horse Smith	12	2022	े. 	12	8 B.	1	55	1:13
623	" bareback; rider, 43, nude; gray horse . "		12 2 2	1	12	5.5	î	51	
624	Gallop; saddle; bay horse	12		3	1.00	2.2	11-12		2
625	" thoroughbred bay horse Bouquet	22				2.2	1	22	
626	" " mare Annie G	16			0.0	2.3	1	31	
627	14 14 14 14 14	0.0			2.2	2.0	1	28	
628	¹⁷ bay horse	. 20			. •		3-4		2
629	" bareback; Belgian draught horse Hansel	1		12	÷ .	12	11-4	95	
630	" saddle; gray mare Pandora	1		12	2.2	12	1	42	
631	ii thoroughbred bay horse Bouquet	12		а,	2.2	x = x	7-S	44	
632		12	12 .		x. 8	$\times \infty$	3-4	33	10
633	66 66 66 66 e e e e e	12	a a a		12	$\times \times$	7-8	87	
634	" " gray horse Dan	1.00		8	0.5	8	1	64	
635	The second secon			12		12	1	42	•
636	Jumping a hurdle; saddle; preparing for the leap; bay horse	20				8.0			2.1
637	Jumping a hurdle; saddle; clearing, landing	1.1							
638	and recovering ; bay horse Daisy Jumping a hurdle ; saddle ; bay horse	20							2

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639 640	Jumping a hurdle; saddle; bay horse Daisy .	• •	20		1.1		· ·	1		2
641	Jumping a hurdle; saddle; knocking over hurdle	• •	20	1.1	* *		1.1	1	• •	~
041	and landing; rider 105; gray mare Pandora		12					1.11	64	
642	Jumping a hurdle; saddle; rider, 105, nude;			1.0	1.1		1.0			1
0.1=	grav mars Pandors		20					10	60	
- 643	gray mare			100		1.2.2	1 * *	· · · ·		1
010	ing ; rider, 105, nude ; gray mare Pandora		12	0.0	N 23	1.2.2	3.3	1.1	60	1.0
- 644	Jumping a hurdle; saddle; clearing and landing;	<u> </u>	1	1.1	1.0	1.	10.0			1
	knocking over hurdle; rider 105; gray mare . Pandora	5 - 2	1.1	100	8	1	8		149	
645	Jumping a hurdle; saddle; clearing and landing;		1.1	1° °			1			
	rider 105; gray mare		1		8		8		155	
646	Jumping a hurdle: saddle: rider, 105, nude:								1005	
	gray mare	2.5	1.12	2.2	12	2.1	12	1	122	14
647	Jumping a hurdle : bareback : rider, 105, nude :		1.00							
	grav mare	a 14	1.1	3. 2	12	2.1	12	1	120	14
648	Jumping over three horses : A, B : chestnut horse Hornet .	÷ - 2	24	S	· · ·	1 m m	1	1400		2
649	A, Hornet, rocking; B, Eagle, rolling barrel, etc		18	Se . 10		× 1			3 ×	2
650	Walking with a bucket in mouth: light-grav						10.1			
	horseEagle .	÷ .	12	1.1			199.90		78	34.5
651	horse	11	12	12.2	2.2	1.1	12.3	1.2.2	12.12	
652	A, B, C, D, E, horses rearing, etc.	÷ 1	- 80	10 B			(a) a)		N. 81	
653	Walking; saddle; lame, right front foot; horse . Buckskin	8.3	12	10.00	1× ×	12	$\times \times$	1	116	
654	Walking; saddle; lame, right front foot; horse. Buckskin		12	12		10.11		1	104	
655	Walking; saddle; spavin, right hind leg; horse. Gazelle.		12			12		1	-99	
656	Walking; free; ossification of cartilage, right			1.000					Sec.	
0.114-1	front foot; horse	2.5	12	12	2.2			1	101	
657	Rolling a box; pony	2.5	12	18 K		8.5	2.2	1	2.12	2
			1							
			1							-
			L							

xxvii

No.		2	Foresh	ortenings.	8	
Serial 2	ANIMALS AND MOVEMENTS.	Laterals.	Front.	Rear.	Quantity.	.0
Ser		Lat	90 ⁰ 60 ⁰	900 600	Qun	Time,
658	Mule; A, kicking; B, kicking Ruth	16	-	****	. {	A, 62 B, 65
- 659	" A, B, bucking and kicking Ruth	16			1	A, 91
660	" miscellaneous performances Denver	26			1	B, 90
661	" A, B, a refractory animal Ruth	24	1.1.1.1.1	1.1.1.1.1	1.5	3.3
662	" A, B, " " Denver	-24				
663	44 A. B. 44 44 44	24				-4.74
664	" various performances; at a table, etc "	30		10000		1.1
665	Ass; walking; bareback; a boy riding Jennie	12			1	94
666	" " saddle; a girl riding Zoo	20			1-2	36
667	" " a boy " "		2242	12	1	82 .
668	" ambling; irregular; saddle; a boy riding . "	8	A 4 4 4	8	1	87 .
669 670	O_x ; walking	16	1.2.2 0.3	8.8.8.8	1-2	48
671		12	12	10 1 1	8-4	128
672	" trotting	$\frac{12}{16}$	88338	12	5-8	$\frac{115}{56}$.
673	Sow; walking	12	12	2.2.2.2.2	1	77
674	u u	12		19	5-8	67
675	" trotting	16			1	31
676	Goat: walking	16		100180	1-2	48
677	" " in sulky	12	12		8-4	51
678	" trotting, in sulky	12	12		1	44 .
679	" galloping	24	1.1 1.1	1.1.1.1	11-4	29 .
680 681	Orex; galloping	10	2222	14.2 4 4	1-2	14.14

XXVIII

F	alle	inia w de	er:	A b	nek	an	1 di	ie -	B	tw	0.4	10	2.2.	tr	tor	tir	10.	071	11.	mi	no	24 16	110						10.00	
1	11				s and																				1	01	0.0	12	1	69
	22		11	14	11		11			pi															1	2	10.3		1	52
	344		"	4.4	- 64	ci.	rou	n	f i	loe	3	03	â	on	in	cr.			50 -				- 1-		- 51	1	1 ° °	12		71
	66		64	11	44	.0	44	1		44	0.P	0		., P		0	÷.	8				1.				2	12.5	12.78		75
	66		11	A. 1	B, bt	iek	. 11	ıd -	orre	an a	od	i d	be	82	(ce	11	őn	in	÷.			16				31	12.2	2.1		
	44		ü i	buel	s and	1 0	TOU	n c	Pr i	loe	A 1	VI	ri	on	8.1	110	ve	me	nt	8		12					12.0			-90
	14				gal																	12			1.		12.0			
F	lk:	trot				111.4						1	١.,	1		Ξ.	÷.	2	2			20					l	2.0	3-4	32
	11	gall	opin	12°				ς														20							1	27
	66	ne ne	16	îr	regu	lar		5			2	-	1			G.	÷.	2	2			8					12		1-2	59
	11		ii.				1				12	2			1		12	2	1			8				3	8	S \$2	3-4	51
ł	llan	d; t	otti	ng	24.3	a 6	1.83	10	- 11	- 24	1	140	i.			1			2	23	1	12			1.0		14.54	a a	3-4	10.0
1	inte	lope				2.1		10		2.4	4	(\mathbf{a})					14	-	2	100	0.04	12					3×1	4.14	3-4	1.00
	- 4	£1.50		Hop			-	10.1		ene.	\sim	+	÷	1			×		÷		0.0	12					(\mathbf{x}_{-})	· · ·	1	1.25
I	Buffi	ilo;				ł.		100	•			-					5 m.	-				24							1	65
	14			opín														-	•	•		16							1	29
0		; wa																-	2	200		10				4	N 14	4.4	1-2	1.00
	<u>.</u>				d ga								2	11				8.,	5	÷.		10		e e	15	1	(A	1.3	1.5	417.00
1)og	; WB	lkin		nteri				nas	tit	<u>ان ا</u>		$\pm i$	÷.			Dr	ea	d.	•		1 ·	• -	• • •		2	$(\mathbf{x}_{i},\mathbf{x}_{i})$	12	1-2	$\mathbf{x}_{i} \in \mathbf{x}$
	-				nast	tf .	(18)	•	•				\mathbf{x}	-63	•	14	1			•	• •	1.	• -	•		2	(H. (H)	12	1	100
	44 55	tro	tting	g;;	11	3	5.85	${\mathbb T}_{i}$	1		13		5	1		12.	a.		٥.	211		1.5.		•	13	2	3.3	12	11.0	110
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	ü		122		broy		rac	ing	; n	011)	nd			+			Ik		1	Υ.	• •	10		• •		-	10	1.1.1	11-4 11-2	1000
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	•••												*	*		1				•		12	812	* . ; *	1.5	0.00	12	2012	2	49

XXIX

5											-	- 2	F	oresho	rtening	28,	1		
ONT HHITOS	ANIMALS AND M	OVE	ME	NT	s.							Laterals.	Fr	out.	Re	ar.	Quantity.	10.	
100											4	Lat	900	600	900	60 ⁰	Qui	Time.	1000
2	Dog; jumping hurdle; mastiff .	4.5	Ŀ.		0		D	rea	ď			1.1.	1.4	12	1. 10	12	1		
8	" turning around, etc.; setter											12		12	12			174	
4	" aroused by a torpedo; masti	ff .					. SI	nit	h			12						95	0
5	Dogs; three, tugging at a towel .					Ike	2, M	Ing	gi	e, e	te.	12					0.01		ß
6	Cat; walking; change to gallopin			2			1		-			24			2.2			81	
7	" trotting; " " "	ĩ .		2	1				2			20	1. 1.	1.	2. 1.		1.1	- 80	2
8	11 11 11 11 11		2	14	100		12		4	20.2	- 2	24			14.14			35	
9	" galloping		×					×				20		10.00	Se 12		> 2	28	÷
9		÷ .							5			24		+0.00	1.4		1.1	17	
I,	Lion; walking													9			1-2	76	
2	4 4	4.4						2	-			12					3-4	75	١.
8	" " turning around		÷.				1.2		2	2.	1			12	12.12		1-2	114	
1	56 65 66 54	2.5	- 62				12		2	20.5		4.12		1.242	12		1-2	119	2
5	44 14 44 14 -	a 18	1	*			14			80.		1.10	1.004	i e care	04 Del	12	1-2	136	
6	" and lioness; walking			\sim	\mathbf{c}	•			ж.	2.1		12	1.00	ie ie	A 14	1.00	3. 10	114	
7	Lioness; walking; lion; lying do	wn.			5.5				*	÷. •	1.	12			(A. 14)		1-2	125	
8									8			12					3-4	125	
9	Tigress ; "				11		- 9		2			12		1.	S		1-2	75	
0	" turning around	4.4		4	403			4	1	2.7		1.14		12	N 6.	4.1	1-2	119	ŝ
1	Jaguar; A, walking; B, turning a	rou	nd					æ	÷			24					- {	A144 B129	
2	Elephant; walking										1	16			5.5		1	63	1
8	¹ a a a a a a a a a a a a a a a a a a a		÷.	-					5	0.1		24			1.1		11 - 12	36	
4	Elephants; two, walking	14	਼	1	1			÷.	2	31			12				1-2	92	
5	· · · · · · · · · · · · · · · · · · ·				2			2		91					12		1-2	86	
8	Egyptian camel; racking								0			16				1.1	1-2	24	

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737	Bactrian camel; walking
738	· · · · · · · · · · · · · · · · ·
789	CERTINAL DECEMBER OF A REPORT
740	" " (young), galloping
741	" " A, walking; B, racking
742	" A, racking; B, galloping
743	Guanaco; galloping
744	Raccoon; walking; change to galloping
745	" " and turning around
746	Capybara; walking 1-2
747	Baboon; walking on all-fours
748	u u u u $11-2$ 42
749	" climbing a pole
750	Sloth; walking suspended on a horizontal pole
751	Kangaroo; walking on all-fours; change to jumping 11
752	jumping
753	a jumping
754	10 1 00
104	······································
	BIRDS AND MOVEMENTS.
755	Pigeon; flying
756	124, 121 ,
757	" " "
	Cockatoo: flving
759	
760	11 11-2 16
761	
- 762	
763	

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d No.	BIRDS AND MOVEMENTS.
Serial 7	BIRDS AND MOVEMENTS.
764	Fish hawk; flying
765	Vulture; flying
766	
767	⁴⁴ ⁴⁴
768	" "
- 769	American eagle; flying 10 10
770	" " near the ground
771	
772	Ostrich; walking
778	" running
774	Adjutant; walking
775	" flying run
776	Storks; swans, etc., A, B, C
777	"etc., A, B, C, D
778	" A, B, C
779	⁴⁴ swans, etc
780	⁶ ⁶ ⁶ ¹
781	Chickens; scared by torpedo

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ANIMAL LOCOMOTION.

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