

# THE CENTURY ILLUSTRATED MONTHLY MAGAZINE



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## THE HORSE IN MOTION.\*



16 17 18 19 20

FIG. 1.



17 18 19 20 21

FIG. 2.



18 19 20 21 22

FIG. 3.

THOSE curious in such matters were much interested, a few years ago, by the circulation of a few sets of photographs, taken at the private race-course of Governor Leland Stanford, of California, by Mr. Muybridge, a photographer of San Francisco. The consecutive positions of the legs in the stride of a running horse, as revealed by these photographs, seemed ludicrous and almost impossible. Indeed, it required the combination of the positions given by the reproduction of the pace in the zoetrope to convince the skeptical that the analysis of the movement was correct. The testimony of the zoetrope, and, later, of the zoopraxiscope, has silenced all skepticism, and one can no longer hesitate to concede the truth and simplicity of what, at first, seemed complicated and absurd. Since the first appearance of these photographs, the processes for securing them have been much improved, and Mr. Muybridge's public and private representations, here and abroad, have been received with the greatest favor. Meissonier, who has made a specialty of the action of the horse, is announced as an adherent of the new theory, and it is said that he has recently modified a painting in conformity with it.



22 23 24 25

FIG. 4.

While great credit is due to Mr. Muybridge for the ingenuity and skill with which he has applied his art to the production of these

pictures, they would not have been taken, nor could the world have had the full benefit of them which it now receives, but for the intelligent liberality of Governor Stanford, who, at much cost and with no chance for pecuniary reward, has carried the investigation to great lengths, and who now presents its results in a large quarto volume, containing more than a hundred plates, which bear over a thousand figures of animals in motion. These illustrations are accompanied by an elaborate essay, in which Dr. Stillman explains their application to the locomotion of quadrupeds, of horses especially.

The method by which these photographs have been taken—the result of years of experiment—is substantially as follows: At one side of the track is a long building arranged for photographic work, containing a battery of twenty-four cameras, all alike and standing one foot apart. On the other side of the track is a screen of white muslin and a foot-board. The screen is marked with vertical and horizontal lines, and the foot-board bears numbers indicating separate intervals of one foot each. The instantaneous shutters of the cameras are operated by electricity, and their movement is governed by such powerful springs that the exposure is estimated to be about one five-thousandth of a second. The contact by which the shutters are sprung is made by the breaking of a thread drawn across the track at about the height of the horse's breast, there being one thread for each camera. In his flight through



24 25 26 27 28

FIG. 5.



27 28 29 30 31

FIG. 6.



29 30 31 32 33

FIG. 7.

\*"The Horse in Motion, as Shown by Instantaneous Photography, with a Study on Animal Mechanics. Founded on anatomy and the revelations of the camera. In which is demonstrated the theory of quadrupedal locomotion. By J. D. B. Stillman, A. M., M. D. Executed and published under the auspices of Leland Stanford." Boston: James R. Osgood and Co. 1882.

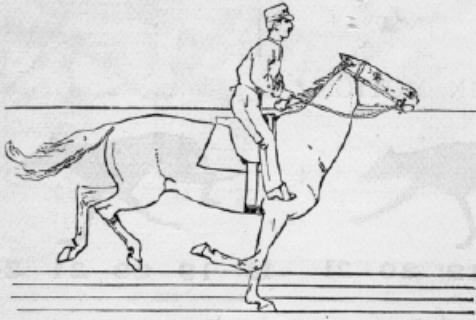


FIG. 8.

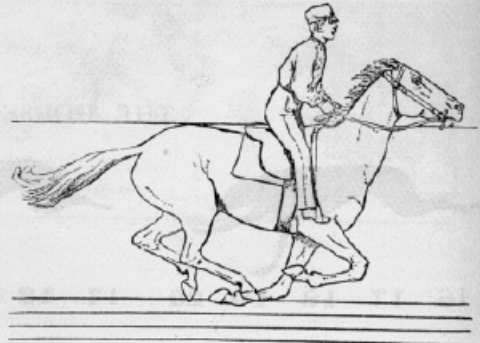


FIG. 9.

the air, therefore, he brings each of the twenty-four cameras to bear upon him at the moment when he passes in front of it, and that camera represents his position at that instant. The series of representations indicates the consecutive positions at each of the twenty-four feet covered by the instruments. In a series showing a horse trotting at speed the spokes of the sulky are shown as distinct lines quite to the felloe of the wheel, indicating an extremely short exposure. In a fast run, the tufts of the horse's tail, as it waves with his stride, are clearly marked. The distinctness of the silhouettes thus produced is well illustrated in Figures 1, 2, 3, 4, 5, 6, 7, showing a hound running with a stride of twenty-one feet. These and the other silhouettes illustrating this article are copied from heliotypes taken from the original photographs.

The illustrations 8 to 18, which follow, are not absolute reproductions; but in drawing them the greatest care was taken to preserve the outlines of the original. Their essential correspondence with the photographs of an animal running at speed show they may be taken as an unquestionable analysis of that gait. It is to be understood that the horse is at full speed, and that the illustrations here given represent alternate photographs of a series of twenty-four; that is, that they represent positions at intervals of two feet.

The eleven cuts cover a trifle more than one stride, the supporting fore leg in the last being a little further to the rear than in the first. In Figure 8 the whole weight is borne by the left fore leg, the pastern of which is nearly horizontal, and which is nearly under the center of gravity. The hind feet are about twelve and fifteen inches from the ground,

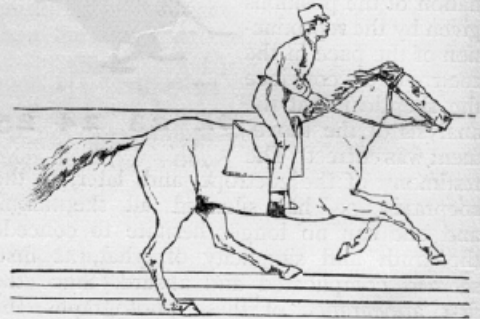


FIG. 12.

and the croup and withers are about two inches below the gauge line. Figure 18 shows this supporting foot just before leaving the ground. The extreme lengthening of the leg, by straightening the angles between the shoulder and the forearm, has raised the body about an inch nearer to the gauge line. The effect of that thrust, and of the straightening

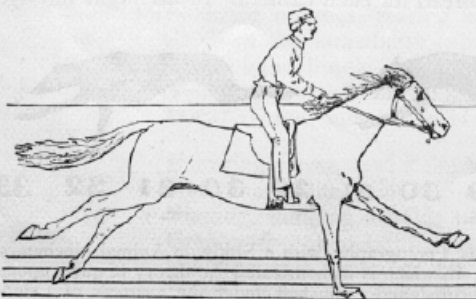


FIG. 15.

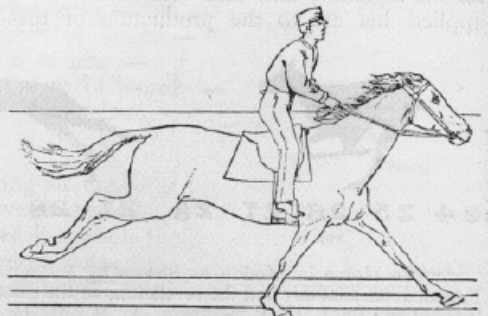


FIG. 16.

