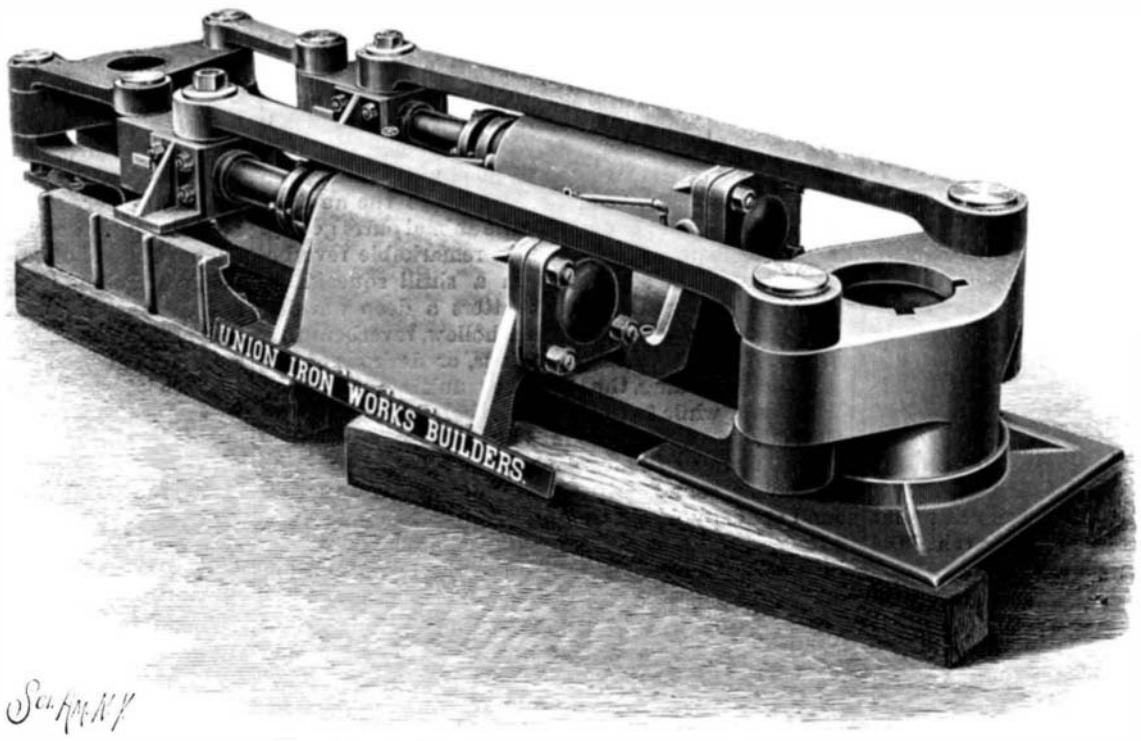
ENGINES OF THE MONTEREY.

(*Continued from first page.*)

6 inches diameter, the starboard one being right and the port left handed.

The condensers are cylindrical, of composition, and have about 3,850 sq. ft. of cooling surface in each. The circulating pumps are centrifugal, with a capacity of 5,000 gallons per minute each, and connections for working as wrecking pumps. Each condenser has two vertical single-acting air pumps, 14⅜ inches diameter by 15 inches stroke, driven by a compound engine with a fly wheel at each end of shaft. There is a valve in the exhaust pipe from each low pressure cylinder, to shut off the connection to the condenser and permit it to be used as an auxiliary condenser when the main engines are stopped. The engines are fitted with starting valves, a steam-actuated throttle, and a combined steam and hydraulic reversing gear, so that they can be handled with ease, and there are the usual auxiliary engines.

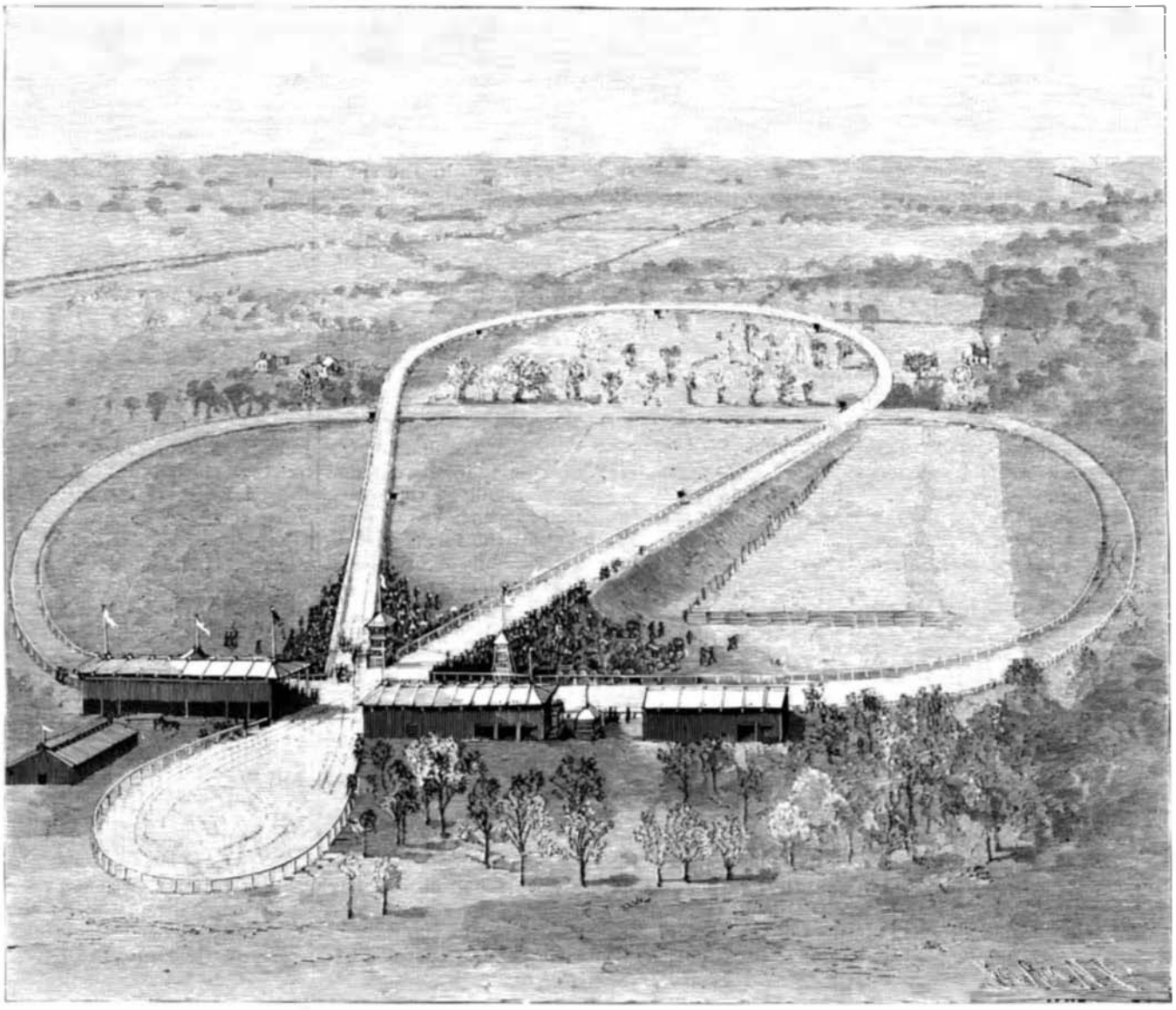
In order to reduce the weight of the machinery to the lowest limit the engines have been made as light as possible, and about three-fourths of the required boiler power is supplied by coil or tubulous boilers. Four boilers of the latter class, to give a collective horse power of 4,500, were contracted for with Charles Ward, of Charleston, West Va., after careful trials. The two cylindrical boilers with which the vessel is also to be supplied are fitted to work at 160 pounds, and are designed to give sufficient steam for ordinary uses, for propelling the vessel at ten knots speed, while the coil boilers enable steam to be raised in less than half an hour in sufficient quantity to give seventeen knots. The total weight of the boilers is reduced about one-half by this combination of the two systems.



STEERING GEAR OF THE MONTEREY.

THE STOCKTON, CALIFORNIA, RACE TRACK.

Our illustration presents an effective comparison of the kite-shaped and the ordinary oval race track. Each track is a mile long, the start and finish on the kite-shaped track being just before the crossing of the tracks toward the small loop, the mile covered by the large loop being divided into eighths. The kite-shaped track at Stockton was opened last year, and some of the world's best trotting records were made thereon during the season. Sunol made the world's record of a mile in 2:08¼; Palo Alto made the world's stallion record of a mile in 2:08¾; Arion made the world's record for two-year-olds of 2:10¾, and Frou Frou for yearling champions of 2:25¾. The kite-shaped track is conceded by horsemen generally to be 2 to 3 seconds faster than the oval track, the straightaway dash at the start being a third of a mile, and there being also one-third of a mile of straight track to the finish. The view of the race from the grand stand is not as good, however, the relative positions of the horses not being so well defined and their action not so readily distinguishable, as they are, for so large a portion of the race, going almost directly away from or coming almost directly toward the observer.



THE KITE-SHAPED RACE TRACK. STOCKTON, CALIFORNIA.

Dangers of Arsenical Soap.

As several cases (one fatal) of poisoning by arsenical soap have come to my notice, I think a few words on its dangerous properties might not be amiss.

The common white arsenic of commerce (oxide of arsenic) when mixed with some animal matter, as the fat in soap, fat skins, or any other albuminoid substance, forms one of the most, if not the most, dangerous poisons known, the ptomaine of arsenic, as follows: All flesh and fats after a short exposure to air begin to decay. One of the products of decay is a cadaveric alkaloid, called a ptomaine; the decay sufficient to form ptomaine might not be noticeable.

Now when you make arsenical soap you probably take some cheap soap that has been made out of half putrid fat, mix your arsenic with it and cork it up. Now this corking up seems to favor the formation of the ptomaine, or keep it from evaporating, as it has always been noticed that matter that has been exposed to the air and then closed up contains more ptomaine than those just exposed to the air. This ptomaine as soon as it forms unites with the arsenic and forms ptomaine of arsenic.

The poisonous qualities of arsenic and the ptomaine of arsenic might be compared to 1 and 100, besides which the following must be considered: That there is no antidote for the ptomaine, while peroxide of iron, or iron rust, is one for arsenic; that it is volatile and can be inhaled, while arsenic is not; that it can be absorbed through the pores, while the little arsenic it would be possible to absorb would act only as a tonic, while the ptomaine acts only as a virulent septic poison in all cases; that the lye in the soap favors the entrance of the poison by softening and more or less removing the epidermis of the skin.

Many taxidermists have remarked the effects of arsenical soap. I find the following by Maynard:

"It is a fact to which I can bear painful testimony that they are, especially when applied to greasy skins, poisonous to the extreme. I have been so badly poisoned when working on the skins of some fat water birds that had been prepared with arsenical soap as to be seriously ill."—*The Oologist.*

Multum in Parvo.

The electric railway plant at Ottumwa, Iowa, contains some distinct and quite novel features. The plant not only generates the power for the operation of the electric cars, but also supplies electric light for the city and furnishes steam heat to those desiring it, the exhaust steam from two 150 horse power engines supplying most of the steam used for that purpose. The steam is carried in mains of 10, 8, 6, 5 and 4 inches in diameter, according to the number of customers probable on the line. These pipes are wrapped with asbestos boards and incased in pine logs bored out, leaving an air space surrounding the pipe; the logs being tapered at the ends and driven solidly into each other. These mains aggregate about 2¼ miles in length and are placed about 5 ft. below the surface.

The system requires an initial pressure of 16 pounds, which produces a pressure of from 8 to 9 pounds at the extreme limit. This of course throws a back pressure on the engines, but as they are of ample power to do all the work required of them, no difficulty is experienced from this cause. In weather in which the exhaust steam does not supply sufficient heat live steam is automatically turned into the mains and retained at the proper pressure. The *Railway Review* says this is the third year that this plant has been in operation and it has proved very satisfactory to all parties connected with it.

Natural History Notes.

An Albino Lobster.—A curiosity was recently found in a boatload of lobsters that was brought from New Brunswick waters to Eastport, Me. The strange crustacean was like all the others except in color, being of a bluish-white—one of the rare and remarkable albino lobsters. It was packed carefully in seaweed and sent to Washington, where it is to become a part of the exhibit of the United States Fish Commission. Only one other white lobster has been taken in these or any other waters, it is believed, and that specimen was captured some time ago by a fisherman at Welchpool, Campobello, N. B. The Eastport specimen was twelve inches in length, and as lively as any lobster in the lot.

Artificial Coloration of Birds.—The distinguished naturalist Dr. Sauermann has published in the *Gazette de Francfort* a series of very curious observations touching the artificial coloration of birds. The fact is recognized, says he, that Canary birds fed on Cayenne pepper insensibly change color and pass from yellow to red. Cayenne pepper, in addition to a tinctorial substance, contains an irritating principle and an oily matter. When these two latter principles are extracted through maceration in alcohol, the pepper loses its coloring property upon the plumage of the birds; but if olive oil be added to the product of maceration the coloring action reappears. It is inferred from this that the oily part of the pepper is the necessary vehicle of the color. Experiments made upon wholly white hens have given an identical result. These hens possess the property of foreshadowing a change in the temperature by a very marked change of tint. The yolk of their eggs is of a very bright red. The same experiment has been tried with the root of the alkanet (*Anchusa tinctoria*), with the result of a production of violet red.

The Generation of Oxygen by Plants has been studied by Henri Jumelle (*Compt. Rend.*, cxii., 1462) at very low temperatures, and he finds that carbonic acid is decomposed at low temperatures, at which respiration has completely ceased, by plants the vitality of which is not affected by a high degree of cold. Thus the assimilation of atmospheric carbonic acid gas is effected in the light at —35° and —40° C. by *Picea juniperus* and other coniferæ, and by lichens like *Evernia prunastri.*

The Comb of Scorpions.—Messrs. Brongniart and Gaubert recently presented a paper to the French Academy of Sciences on the pectiniform organ of scorpions, the function of which has up to the present been considered enigmatical, and which Mr. Blanchard, in 1853, supposed to play a part during coupling. Some direct observations by Mr. Andre Mares having fortified this hypothesis, Messrs. Brongniart and Gaubert proceeded to a study of the anatomy of the comb, which was found by them to constitute, in addition, an exciting organ. In fact, from the nerve that traverses the comb start branches that run to each tooth of the comb, on reaching the extremity of which the nerve is completed by a ganlion formed of a bead-like string of cells, each provided with a large nucleus. The nerve fibrils pass between these cells and terminate, each of them, in a conical eminence. They are provided with a large nerve cell before reaching the external edge of the chitinogenous layer, which is very thick at this point. According to the authors, it results from this structure that the combs of scorpions serve also as organs of touch. In walking the animal is capable of moving them, and makes use of them to ascertain the nature of the ground.

Life among Birds.—The distinguished German biologist, Weismann, has pointed out that there is less exact knowledge on this subject than might be expected, considering how many in number are the ornithologists and the ornithological societies. Small singing birds live from eight to eighteen years. Ravens have lived for almost one hundred years in captivity, and parrots longer than that.

Fowls live from ten to twenty years. The wild goose lives upward of one hundred years, and swans are said to have attained the age of 300. The long life of birds has been interpreted as compensation for their feeble fertility and for the great mortality of their young.

From the small island of St. Kilda, off Scotland, twenty thousand young gannets and an immense number of eggs are annually collected; and although this bird lays only one egg per annum, and is four years in attaining maturity, its numbers do not diminish. Obviously, as Weismann observes, such birds must reach a great age, or they would long ago have been exterminated.

Language of Elephants.—The language of the elephant is as well understood by the East Indians and those who have to do with the animal as if the communication were made in their own tongue, though, curious to relate, the sounds in India and Ceylon have different meanings attributed to them. When enraged an elephant utters a shrill cry through the trunk, which may be taken as a warning. A sportsman engaged in hunting elephants had approached a large tusker, when he found to his chagrin that he had dropped his ammunition, so that he could only lie concealed and feast his eyes upon the huge animal. His disappointment was partly compensated for by observing the elephant informing the herd that danger was lurking near it. Communication was made in the following way: The tusker was feeding, and moved slowly around until it suddenly came below the concealed sportsman, when, with its wonderful scent, it immediately recognized the presence of its enemy. Then it stopped feeding, raised the tip of its trunk cautiously, and, in a low, suppressed, but penetrating tone, uttered with its lips the sound "prut," which it repeated so that it somewhat resembled the twittering of a bird. The sound would hardly have been noticed had not the sportsman been near at hand; but it was immediately understood by the herd, which moved quickly but silently away, followed by the sentinel.

Pleasure is often expressed by elephants in an excruciating squeak, far from pleasurable to the auditor. When satisfied and contented, the animal purrs gently. Fear finds expression often in a remarkable reverberating roar, and sometimes in a shrill squeak. A thoroughly enraged elephant utters a deep warning sound in the throat, and often a hollow, reverberating, rumbling sound. When suspicious, or desirous of giving a slight warning, the tip of the trunk is tapped upon the ground, while from the trunk there issues a volume of air which at times sounds like a sheet of tin being rolled. Young or baby elephants express their wants by singular sounds uttered by the throat. Another sound made by wild elephants is produced by striking the sides forcibly with the trunk. That elephants use these and other sounds as methods of communication or as language there can be no doubt.

The Migratory Locust and its Changes of Color.—Such is the title of a memoir presented to the French Academy of Sciences by Mr. Blanchard in the name of Mr. Kunckel d'Herculais. The varied colors that locusts exhibit have been attributed to distinct local varieties. The author of the memoir shows that these colors are successively exhibited by the same individual at various periods of its development, and that they succeed each other at the same time as the moultings. They are connected with the properties of special pigmentary substances which are modified under the influence of the light, and with other external causes. The young are greenish-white, but under the influence of light they become brownish and change to black. At the second moulting rosy colorations appear, especially upon the sides of the body; at the third, the rosy tints augment; and at the fourth they predominate, but give place to yellow tints. The same is the case after the fifth and sixth moulting, and the adult insect appears in a livery of the most delicate rose color. Upon the whole, says the author, it may be stated that in the periods that precede and succeed moulting the pigment of the insects is of a rose color, and that this pigment changes tone, passing successively through various shades to finally reach yellow. The appearance of the yellow tints of the young and adults is, therefore, in reality a consequence of aging. What is worthy of remark, and what well shows that these modifications in the color of the pigments are the expressions of histolysis and histogenesis taking place at the time of moulting and metamorphosis, is that after each of these phases the acridians void rose-colored excrements. The tegumentry exuriæ left after each moulting are colorless in all the parts that are not black; the black spots or markings are alone indicated. The action of light is manifest. Young migratory locusts reared in the shade never acquire the bright lemon yellow tints of their fellows reared in bright sunshine. It is to be noted that the yellow or adult acridians submitted to rapid desiccation by fire or immersed in alcohol become red again. We have here a phenomenon of dehydration which causes the primordial tints to reappear.

Time Sense in Animals.—Time sense is very highly developed in domestic fowls and many wild birds, as well as in dogs, horses and other mammals, which keep an accurate account of days of the week and hours of the day, and have, at least, a limited idea of numerical succession and logical sequence. A Polish artist, residing in Rome, had an exceedingly intelligent and faithful terrier, which, as he was obliged to go on a journey, he left with a friend, to whom the dog was warmly attached. Day and night the terrier went to the station to meet every train, carefully observing and remembering the time of their arrival, and never missing one.

Meanwhile he became so depressed that he refused to eat, and would have died of starvation, if the friend had not telegraphed to his master to return at once if he wished to find the animal alive. Here we have a striking exhibition of time sense as well as an example of all-absorbing affection and self-renunciation likely to result in suicide.

Mexico to Build the Tehuantepec Ship Railway.

It is reported that the government of Mexico has made a contract with Mr. E. L. Corthell, the well known engineer of Chicago, Mr. Hampson, formerly of Fairfield, Ia., and Mr. Stanhope, an English resident of the city of Mexico, to complete the railway across the Isthmus of Tehuantepec, between the Atlantic and Pacific oceans, which was begun by an English company some time ago. The government has two millions of dollars in hand for this work, which it is said will be given to Mr. Corthell and his associates as a subsidy, together with the right to organize a company, issue securities, and build the terminals, and the two harbors for the largest class of vessels. Mr. Corthell has been in the employ of the Mexican government for several years, and is just completing the extensive jetties at the harbor of Tampico.

Military Ballooning.

A new impetus to ballooning will doubtless result from the following successes of the Germans on the Russian frontier, given in reports telegraphed from St. Petersburg to the New York papers. We think it is probable there is considerable exaggeration in the statements here made as to the special movements and navigation of the balloons.

The presence of balloons over the forts and encampments in Poland is becoming more frequent than ever, and this fact is causing much indignation among Russian army officers, who are helpless to prevent military secrets from becoming known to the German officers, who are known to be taking observations from a height that places them beyond the reach of any bullets aimed at them. One of these balloons from the German frontier recently appeared at Kovno. It hovered above the fortress there until the officer in command became so greatly exasperated that he ordered some of the soldiers to fire at the balloon and, if possible, to bring it to the ground, but the soldiers were unable to hit the big silken bag.

The range was too great, and the powder burned in the attempt was useless. The Germans continued their observation, in no way bothered by the firing, and when they had concluded they returned whence they came. The impression grows stronger daily that the Germans have at last solved the long-studied problem of aerial navigation. These balloons that have appeared over various places in Poland are under perfect control. They move in any desired direction, and the wind currents have no perceptible effect upon them. In fact, in at least one instance, it is known that the balloon sailed directly against a strong wind. Some of the observers accounted for this on the ground that the upper current in which the balloon moved was in an opposite direction from the current nearer the earth.

This argument was rendered fallacious in a very short time by the balloon stopping over the military camp at Dombrowice, and then maneuvering to obtain positions from which the camp could be studied in detail. The motive power employed and the means adopted for steering are utterly unknown, but all the facts in connection with the appearance of these balloons go to show that they are under absolute control. The possibilities of a perfect system of aerial navigation are thoroughly understood by Russian officers, but they are absolutely helpless to guard against them. It is the fact of this utter helplessness that renders their indignation more deep and bitter.

A few nights ago the inhabitants of Warsaw were startled by an intensely bright light that fell from the sky upon the city. All eyes were turned upward, but nothing could be seen save a path of light that ended in a small focus. Many people in their excitement thought it was a comet in close proximity to the earth, and were greatly frightened. Suddenly the ray of light swept in another direction, and when their eyes became accustomed to the darkness that followed, they could see far up in the sky a balloon. Then it dawned upon the people that it was an electric search light that had caused the brilliant illumination, and that the Germans were continuing their observations of the Russian defenses with its aid. The balloon remained over the city until 1 o'clock in the morning, when the light was extinguished, and the balloon, heading westward toward the frontier of Prussia, disappeared.

Later another balloon was seen over the Proushkorff railway station. It remained stationary for a time, and then started in the direction of the fort works near Kelets, where it hovered awhile, when it returned across the frontier.

Reports of similar occurrences have been received from Sosnovitzy and other places along the frontier. The balloons come from Prussian Silesia in the night time and project the rays of powerful search lights in every direction. The balloons, which were at a great height, remained stationary sometimes for the space of 40 minutes, and would then proceed in any desired direction. There is no doubt that the steering apparatus, whatever it is, is admirably adapted for its purposes, for the balloons apparently answer to it as readily as does a vessel to her helm.

Russian officials hold that with manageable balloons the whole system of warfare will be changed. It is self-evident that none of the present fortifications would be able to withstand an attack from above them. Shells could be dropped with almost unerring certainty, and no city could defend itself from an enemy far up in the air beyond the reach of any missile. Even modern cannon, with their great range, could not at present be used against balloons, for the reason that gun carriages have not been made that will allow of a perpendicular elevation.