

those who are not familiar with the appearance of a whale.

The approximate measurements were as follows: Length over all, 50 feet; width of tail, 10 feet; thickness through the body, 12 feet; length of jaw, 17 feet. The captors believed that he was one of the rorqual species, which is said to be common on the Pacific coast, and to have a habit of entering inland waters; but, judging from the photographs, it seems to bear more of the characteristics of the humpbacked whale, so called by whalers on account of the peculiar shape of the dorsal fin. This species is distinguished also by the great length of the pectoral fins, and the fact that while the body is black, these fins are white, both of which characteristics are present in this specimen, as will be seen in the front view, which shows these fins extended. It is true the rorqual has the skin of the throat and underbody seamed with deep longitudinal furrows, but this is also a mark of the humpbacked whale, and is present in this specimen. These furrows appear on the fold of skin which in the engraving is seen pressed out under the left side of the lower jaw. Further marks that establish its species are the comparatively shallow upper jaw and the peculiar knoblike swellings which ornament or disfigure it.

The most interesting engraving is the wood cut which shows the interior of the mouth. The upper jaw is provided with a continuous row of closely packed whalebone blades, which are pendent from the roof of the mouth, and terminate in fine, long, brushlike ends. When the mouth is closed the fringed ends of the whalebone lie in the channel-like space between the tongue and the sides of the lower jaw.

These act as a strainer when the mouth is open, and serve to retain the crustaceans and small organisms which form the food of these fish. The mouth is first filled with water, and then, as it is closed, the water flows through this natural sieve, leaving the nutritious matter behind. The expulsion of the water is completed by the raising of the tongue, which lies within the deep cavity of the lower jaw, against the roof of the mouth.

It should be stated that when the whale was being towed to the harbor it made a desperate resistance, and a veritable tug of war occurred between whale power and steam power, in which for a while the boat was held stationary. A glance at the huge tail and broad fins accounts for the high speed which the whale attains, and it is interesting to note that the flukes of the tail are very similar in shape to the latest type of propeller blades on a modern steamer.

THE BRAMBEL ROTARY ENGINE.

Last November the press of the country was informed by special telegrams that Mr. Grant Brambel, of Sleepy Eye, Minn., had invented and patented a rotary engine for which he was offered at that time £320,000 (\$1,600,000) from an "English syndicate." It was reported that the whole amount of the purchase money was paid over in cash and deposited in Chicago banks by the inventor. There are a number of variations of the story, of which the following is an example, the clipping being taken from the Chicago Daily Tribune:

"The engine does away entirely with the crank motion of the steam engine, a most desirable, but to all intents and purposes an impossible thing to do. The engine uses its own

plunger for a cutoff. The engine is steam tight, and requires no ring packing. It can be made marine type, and of course can be either simple or compound.

"It is not a cheap machine, although it costs very much less than the ordinary engine. It weighs less and occupies only a fraction of the space of the old style engine. Mr. Brambel says: 'When anyone can build a fifty horse power engine that may be carried around in a hand satchel he has something that is very valuable, particularly when that engine is adapted to

letters of credit were verified by the inventor to-day when I called on him."

It is evident that the gentleman from Sleepy Eye is a very wideawake young person, and we take pleasure in publishing herewith an extract from his specification in which he describes the operation of the device. During the prosecution of the case some four patents were cited, one of which quite closely resembles the Brambel invention, and seems to depend upon the same general principle of operation. The extract reads as follows:

"Having described the construction of the improved motor, the operation thereof, briefly stated, is as follows: When the throttle valve is turned to admit steam or other motive agent to one of the inlet ports, said agent enters the cylinder adjacent to one of the expansion chambers, 25, and is thus admitted to one of the chambers or recesses in the piston. The expansion of the steam gives the impulse necessary to carry the piston in the direction indicated by the arrow (sic) in Fig. 2 a sufficient distance to bring the succeeding recess or chamber into the field of the incoming steam, the first named chamber being meanwhile exhausted at 12. The reversal of the motor is accomplished by moving the lever, 13, to cause the admission of steam through the other inlet port.

"It will be understood that in practice various changes in the form, proportion, and the minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of this invention.

"What I claim is—

"In a rotary engine, the combination of a cylinder having opposite heads provided with registering extended bearing boxes, inwardly divergent steam inlet ports communicating with the interior cylinder at their inner ends and a common valve casing at their outer ends, a cutoff and reversing valve arranged in said casing, a rotary piston arranged in the cylinder and provided with peripheral pockets adapted to communicate with steam chambers at the inner ends of said ports, registering cross-sectionally semicircular grooves formed in the contiguous faces of the piston and cylinder heads concentric with said bearing boxes, said grooves combining to form cross-sectionally circular lubricating ducts, a shaft mounted in said bearings and fixed to the piston, and lubricating devices in communication with the bores of said bearings, whereby lubricating material is adapted to pass between the ends of the piston and the cylinder heads and accumulate in said lubricating ducts to form packing to prevent the exhaust of steam or the passage thereof from one pocket to another of the piston, substantially as specified."

It had not been our intention to describe or notice in any way the above mentioned invention, but we are in receipt of so many inquiries from correspondents and so

many requests for copies of the patent that we have decided it was best to state the facts of the case and publish reproductions of the patent drawings and copy the salient features of the specification and the claim.

We have not written to Mr. Brambel for any light on the subject of his valuable patent. We learn, however, that he is a telegraph operator, and we imagine that possibly his vocation may have something to do with the



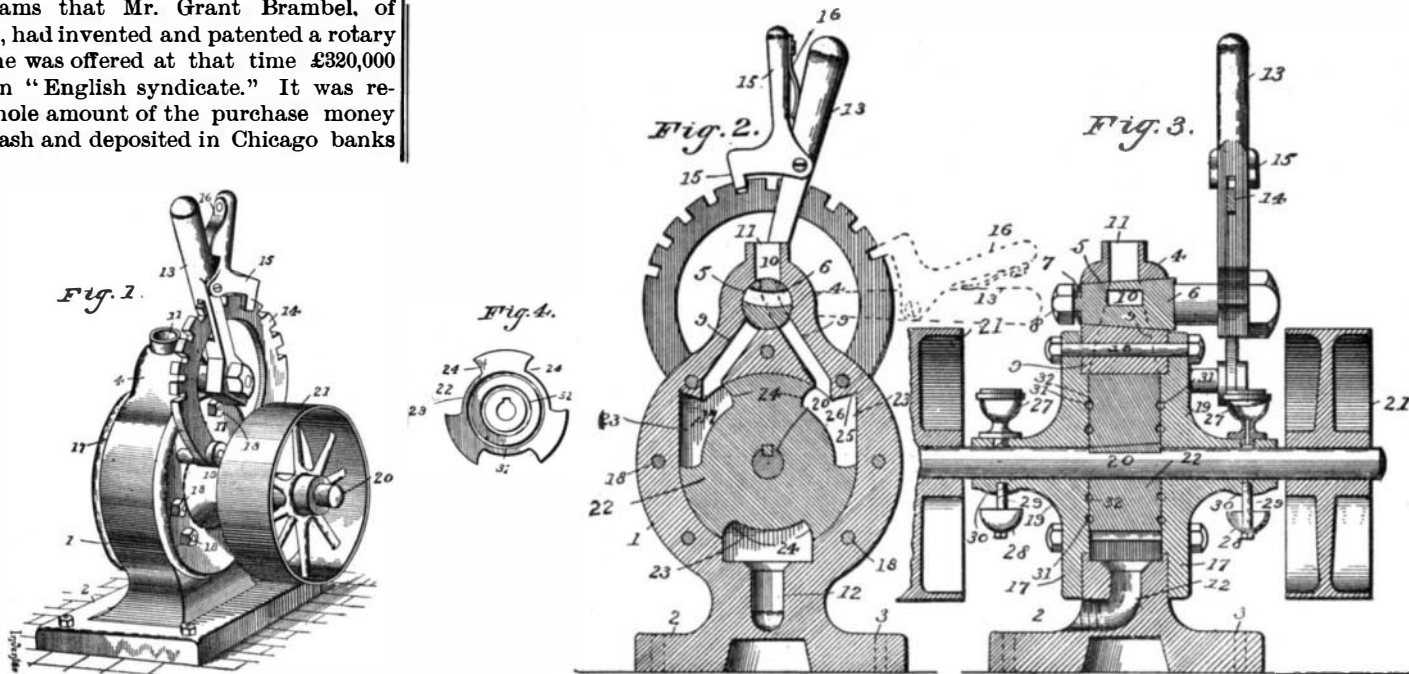
A FIFTY FOOT HUMPBACKED WHALE—VIEW SHOWING GREAT SIZE OF TAIL—TEN FEET FROM TIP TO TIP OF FLUKES.

any and all kinds of work wherever power is used. The Brambel engine of fifty horse power, weighing less than a hundred pounds, may be attached to the end of the armature of a dynamo and all the belting done away with, or a Brambel engine not larger than a common saucer could be attached to a creamery separator, and set it whirling at the rate of 6,500 revolutions a minute. The largest of these engines, 250 horse power in size, is less than a foot wide at the base and eighteen inches high. It is in use in a dynamo room at Trenton, N. J., and the firm say they never had a more satisfactory machine. The patent was obtained a year ago, since which time several machines have been built and put into use."

The latest telegram that we have seen proceeds from Sleepy Eye, Minn., dated January 16, 1897. We quote from the New York Herald:

"The sale of Grant Brambel's rotary engine to the Allen syndicate, of London, England, has been consummated, and the Sleepy Eye inventor has letters of credit on the Bank of England for \$6,700,000. The amounts paid were: For the English patent, \$1,600,000; for France and Germany, \$2,000,000; for the United States, \$3,100,000.

"These amounts and the fact of the receipt of the



THE "SEVEN MILLION DOLLAR" ROTARY ENGINE.

wide publicity which the story has attained. We do not know what object there is in foisting upon the public a story which is in such a high degree improbable. We do not need to go beyond the patent itself and its very narrow claim to discover the falsity of the rumor. The principle upon which the engine is operated is by no means new, while the claim confines the design to minute details of construction. If, as it is claimed, an English syndicate has purchased the patent at a price of some \$7,000,000, is it not likely that before investing so vast a sum the patent itself would have been submitted to rigid examination as to scope and validity? We believe, therefore, that the story can be regarded in no other light than a hoax, and it is the object of the SCIENTIFIC AMERICAN to try and arrive at the truth of such matters. We desire simply to direct the attention of anyone who may be sufficiently interested in the story to examine into the merits of the case, and we believe that they will be satisfied with us that the whole matter is founded on baseless rumor.

THE TRAINING OF HORSES.

A military bicycle and athletic tournament in aid of a fund to endow hospital beds for the National Guardsmen of New York and vicinity was held in the Madison Square Garden, New York City, from January 11 to 16,

be trained indoors, in armories or riding academies. The artificial gaits of the saddle horse are simply natural gaits which have been improved by a greater freedom in the movements of the shoulders and greater flexibility of the joints. A distinction is usually made between military and school trained horses and hunting and racing horses, as the latter receive their training out of doors and not under cover. The military horse must not only have a good temper, be obedient, speedy and quick to turn, but must be also accustomed to firing, music, flags, and, in fact, must not be afraid of anything. On the other hand, a horse trained in a riding school must be proficient in the acquired gaits by which the riding masters try to improve the natural gait. This teaching comprises maneuvers of two kinds. The first includes those in which the horse does not lift his feet any higher than in his natural gait, and the second in which both fore feet or all the feet are raised from the ground simultaneously. Our engraving shows a number of steps which are obtained by fancy training, both as taught by the riding schools and by the military trainers.

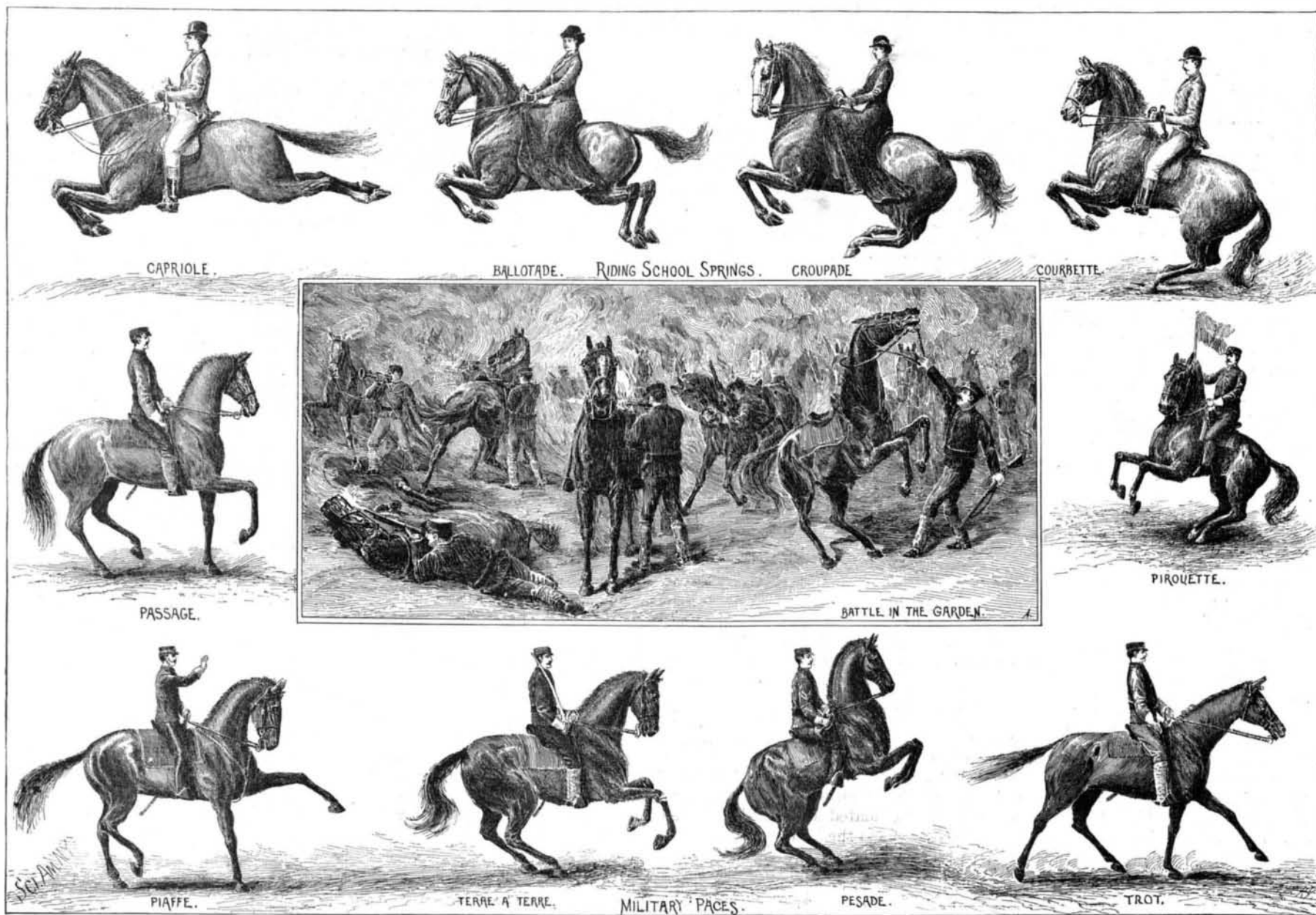
The "piaffe," shown in the lower left hand corner of our engraving, is the trot without movement, the animal lifting diagonally opposite feet simultaneously as in trotting; holding them in the air a moment and then putting them down into the same footprints with-

ouvers, be held perpendicular to the surface of the ground. The "pesade" is the first movement of the spring and jump. If, when the forward part of the horse's body begins to descend, he makes a short spring forward, then the term "courbette" is employed. In the "pirouette" or wheel, the horse turns in a circle, the diameter of which is nearly equal to the length of his body, the hind feet serving as the turning point around which he moves. The smaller the circle and the fewer the steps, the better. In this exercise the number of the steps taken by the hind feet must equal those taken by the fore feet.

The "croupade" is the first of three springs which belong distinctly to the riding school. In the riding school jumps the horse must land on his hind feet at all jumps, while in the military spring all four feet must touch the ground simultaneously, and in the hunting spring, the fore feet must land first.

In the "croupade" the horse raises the fore part of his body, and before it falls raises his hind feet, drawing them under his body, so that when they touch the ground again they have moved forward only about a foot. The higher the speed, the better the legs can be drawn under the body, and the nearer the line of the back approaches the horizontal, the more perfect the maneuver.

The "ballotade" and the "capriole" differ in the



GREAT MILITARY TOURNAMENT RECENTLY HELD AT MADISON SQUARE GARDEN, NEW YORK.

and was attended by thousands of spectators. Great enthusiasm was shown at each performance when the military part of the programme was reached. By special permission, detachments of the regular artillery, cavalry and infantry, United States Army, gave exhibitions in which the skill of the soldiers was almost matched by the wonderful training and instinct of the horses. The drilling of Captain Dodd's Troop F, Third United States Cavalry, was especially fine, and General Miles says that the Cossacks, the Uhlans and Arabs can do no better. Captain Dodd found himself on a lonely post on the plains and set himself to the task of bringing men and horses to a perfect state of discipline. He did not allow the slightest approach to harshness toward the horses on the part of the men, and the great docility and perfection of drill has been brought about by kindness. The horses seemed to enter thoroughly into the spirit of the drill, and in the mock battles and the various evolutions they riveted the attention of the audience. The recent tournament will, it is thought, do much toward interesting people, not only in the regular army but in the training of horses as well. The exhibition of the cavalry troops, National Guard State of New York, was also very successful and showed what might be done where the horses necessarily had to

out any sideways movement. The fore leg is raised until the thigh is almost horizontal, but the hind leg cannot be raised as high, owing to the formation of the joint. The piaffe is the expression of impatience by an eager animal unable to advance. This trot is a very effective one in processions.

The "passage," or Spanish step, is the piaffe in motion, a restrained trot, the name coming from the Italian word "promenade." The more regular and shorter the horse's step, the longer the foot is held in the air, the more perfect the results obtained. In this gait the step is much shorter than the ordinary gait, the ground covered by each forward movement being only about a foot. This enables the horse to make a slow oblique advance. Both the piaffe and the passage are especially useful for increasing the freedom of the movement of the shoulders of the horse.

The "terre-a-terre" is a gallop in two time, the fore and hind feet rising and falling alternately. This motion is the original of the toy rocking horse.

The "pesade" movement is the raising of the fore part of the body of the horse with the fore legs drawn under to such a height that the line of the back will form an angle of 45° with the ground. The body of the rider must, in this position, as in all of the man-

position of the hind feet, the horse alighting upon them in both jumps. In the "ballotade" the position of the fore legs is almost the same as that of the hind legs. In this exercise the horse does not draw his hind legs under him, but raises them so that the shoes show at the rear as if ready for a blow. The "capriole" is the highest and most complete of the riding school springs. When the horse has raised his fore and hind feet equally high and his back is almost horizontal, he thrusts his hind legs out with all the power at his command.

From the foregoing it will be understood that the three riding school springs are distinguished from one another by the position of the hind legs. In the "croupade" the legs are drawn under the animal's body, in the "ballotade" he raises his hind feet so that the shoes are shown as if ready for a blow, and in the "capriole" the hind feet are thrown out.

GREECE has determined to have Olympic games at Athens every four years. The stadium is to be completed in Pentelic marble, M. Averoff, of Alexandria, who gave a million drachmæ to have the race course put in order, having promised to give half a million drachmæ (\$100,000) a year for the purpose.