SCIENTIFIC AMERICAN

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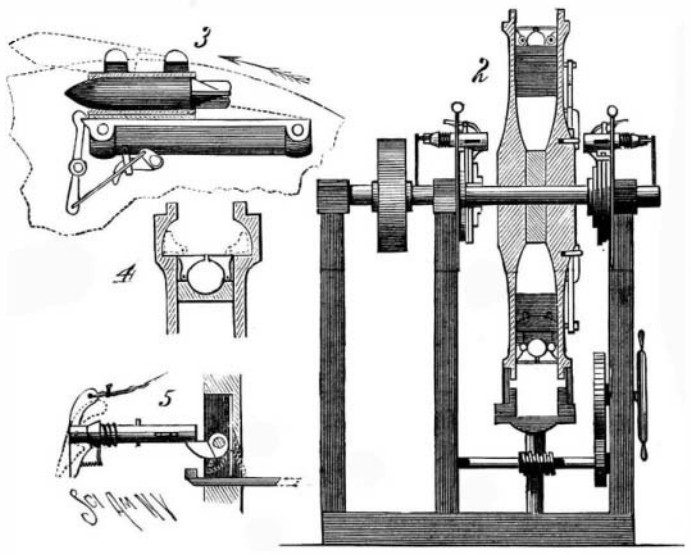
NEW DYNAMITE GUN.

From time to time we have published accounts of the various experiments that have been made of late years in ordnance for the discharge of the high explosives. During the past eight years, the value of dynamite, gun cotton, nitro-glycerine, mercury fulminate, etc., for use in warfare, has been thoroughly appreciated, and the only problem to solve has been how to handle these explosives with less destruction to one's self than to the enemy. This has not been altogether so easy of accomplishment. It is believed that the problem of throwing large charges of explosives to a considerable distance has been accomplished by Capt. Zalinski's dynamite gun, in which the inertia of the shell in the gun is gradually overcome by subjecting it to a gradually increasing pressure of compressed air. The experiments to this end have been successful, and the shell leaves the muzzle of the gun at a very high rate of speed, while the initial shock is comparatively slight. Owing to the peculiar structure of the projectile used in this type of gun, the range is somewhat limited. We have also illustrated a dynamite gun in which common gun powder was used as the propelling power. In both of these guns the shell is made of a peculiar type, being adapted to take up the initial shock of discharge.

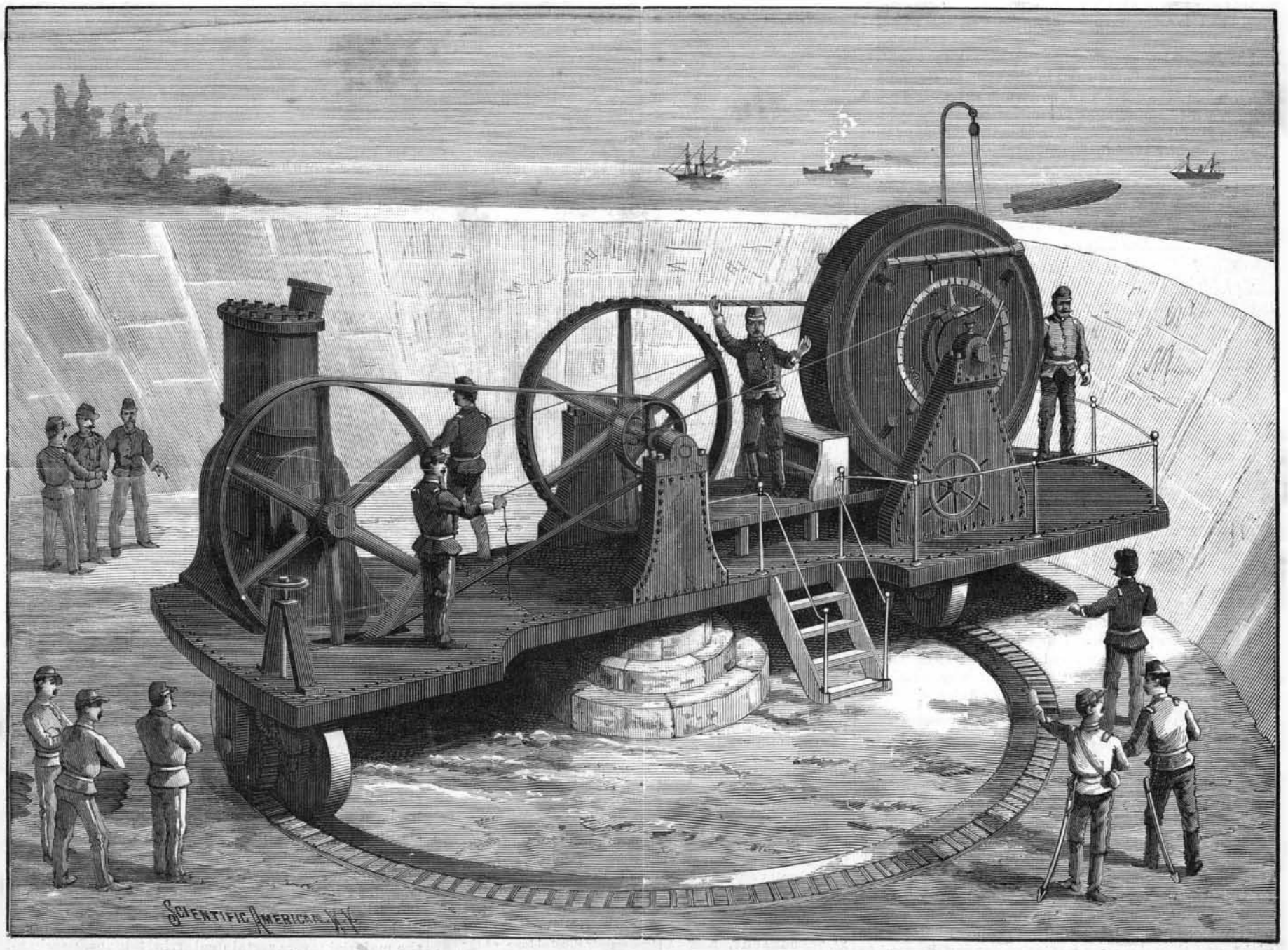
In the gun which is illustrated below, and which is the invention of Walter E. Hicks, of New York City, the danger of self-destruction from accidental explosion at discharge has been reduced to a minimum, as there is absolutely no shock, the shell being projected by the rotary motion of a revolving carriage. As this motion begins with a slow movement, gradually increasing in rapidity, there is no jar or shock until the projectile has been discharged and has come in contact with some obstructing object. The power that is employed to this end is centrifugal force—that force which bursts grindstones and tears them into a thousand pieces, and which dashes flywheels to destruction. It is that same force which, according to La Place, gives the planet Saturn her beautiful rings.



DETAILS OF DYNAMITE GUN.

The rotatable carriage from which the projectiles are discharged consists of two steel disk wheels (see detail) mounted parallel upon a shaft, which is provided with a pulley wheel for connecting it with a steam engine, or any high power motor, by means of which the carriage may be set at a high rate of rotation. These wheels are constructed thick and strong at the point at which they connect with the shaft, in order to resist the great strain, which is measured by the square of the velocity multiplied by the weight of the carriage. The gun represented in the cut is constructed for carrying four charges at a time, each of which may be discharged in rapid succession. The projectiles are inserted in carriers or chambers (see Figs. 3 and 4), which are arranged between the wheels at equal intervals from one another, and near the periphery of the wheels. The projectiles fit closely in these chambers, where they are firmly held until the instant of discharge by two doors, which lock and unlock automatically, and which hold the projectile in a vise-like grip.

The end of the carrier is journaled in the side of the wheels, and the other end is left free to oscillate in radial slots in the wheels. The free ends of these carriers are held down when loaded and locked by clutch bars meshing in teeth on the free ends, the clutches being attached to a shaft connected with the firing mechanism; when the gun is to be discharged, the clutch bars are released from the free ends of the carriers, which fly upward by reason of the centrifugal force exerted upon them, the doors fall automatically (see Fig. 4) into recesses in the sides of the wheels, and the projectiles, having received their momentum from the rotary motion of the carriage, are projected into space. As was observed, the carriers are pivoted at one end, which allows a certain amount of outward play, for the



NEW MILITARY ENGINE FOR THROWING DYNAMITE SHELLS.

reason that when a body is suddenly set free from the outer edge of a revolving disk or carriage, that body, owing to the centripetal force, will follow a curved path, therefore, the projectile carriers are mounted to admit of a certain amount of outward play in order to counteract to a certain extent their tendency toward a curvilinear trajectory. The gun can be used as a mortar for high angle fire or close siege work, and is also adapted for long range. The journals on each side of the wheels are provided with flanges and concentric disks (see Fig. 2) which revolve on sleeves extending on the inside of the journals. These concentric disks have the firing bolts attached to the peripheries (see Fig. 5); and they are adjusted by caps and set screws to the journal flanges, the whole being surrounded by an annular rim, indexed with the degrees of two quadrants, so that by adjustment of the concentric disks, the alidades attached to the sleeves through which the firing bolts slide will point to the degrees of elevation or depression desired.

The gun can be discharged at any angle in the vertical plane, while the arc of fire in the horizontal plane is the same as in any other piece of ordnance. The tripping device on the rotary disk is arranged in such a way that the shell can be discharged at the point previously fixed upon; this being entirely arranged before discharge by the position of the quadrant. The tripping devices for two of the carriers are located upon the right hand disk, and those for the other two carriers on the left hand disk, whereby two of the shells may be discharged at a time, the other two being left in the carrier until it is desirable to discharge them. The four shells may be discharged in rapid succession, and the trajectory of each being practically identical, each successive shot will add to the destruction done by the preceding one. One peculiarity of the gun or engine, as it might perhaps more properly be called, is its comparative noiselessness. There being no expansion of gases and no vacuum, there is no report of any kind, the only sound being the whiz of the shell as it passes through the air. There is neither flash nor smoke, report nor recoil, and there is nothing to apprise an enemy of the whereabouts of the gun, and the destroyer might come in the midst of an enemy unseen and unheard. It is hoped that a thorough trial of this new gun will be made, from which data may be obtained concerning the efficiency, range, and practicability of this as a weapon of warfare.

The combination shot and shell designed to be used in this engine is of regulation shape, having a solid steel head for the purpose of producing the greatest penetration upon impact. It is provided with a steel rod or precussion striker, extending through the center, one end of which is adjusted in the apex of the ogival head, while the other end rests against a precussion primer, which upon impact explodes the charge of explosive, thereby producing a double blow by impact of the shot and by the subsequent explosion.

The shot can also be exploded submarine, being provided with a device which will produce an explosion in case the target should be missed. Should that target be a ship, that effect would thus not be wholly lost.

Finish for Redwood.

A prominent dealer in redwood supplies the following formula and directions for treating redwood finish. We understand it is a practice that has been indorsed by successful experience in San Francisco. Take 1 quart spirits of turpentine, add 1 pound corn starch, add ¼ pound burnt sienna, add 1 tablespoonful raw linseed oil, add tablespoonful of brown japan. Mix thoroughly, apply with a brush, let it stand say fifteen minutes, rub off all you can with fine shavings or a soft rag, then let it stand at least twenty-four hours that it may sink into and harden the fibers of the wood; afterward apply two coats of white shellac, rub down well with fine flint paper, then put on from two to five coats best polishing varnish; after it is well dried rub with water and pumice stone ground very fine, stand a day to dry; after being washed clean with chamois, rub with water and rotten stone, dry, wash as before, clean, and rub with olive oil until dry. Some use cork for sandpapering and polishing, but a smooth block of hard wood like maple is better when treated in this way. Redwood, according to a Californian's idea, will be found the peer of any wood for real beauty and life as a house trim or finish.

Lighting by Means of Accumulators.

At Springfield, Mass., the electric light company have recently put into their works on Taylor Street the system of the Electrical Accumulator Company, of New York, composed of 378 large cells, which take up a floor space of about 20 by 15 feet, and they stand about 8 feet high. The company are able to store electricity enough in the accumulators to run 500 lights ten hours. In this way they are able to do more work with the same amount of engine power, as the engines can be used to store up electricity during the day for use in the night, and then the same motive power can be used to propel the arc dynamos at night.

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(Illustrated articles are marked with an asterisk.)

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SCIENTIFIC AMERICAN SUPPLEMENT

No. 678.

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DOGS THAT LEARN TRADES.

The dog corps, long since established in the French army, has been recently much increased, so efficient have these little soldiers become. At an early stage of the trials they gave satisfaction as advanced posts, scenting or hearing a stranger approaching even in the darkness, and quickly learning the difference between a friendly and a foreign uniform. The latest trick the military dog has learned is that of carrying dispatches between distant sections of an army or reliefs or reenforcements presumably advancing through hostile country. The system is an offshoot of the dog smuggler system, which is described in the current number of *Blackwood's*, and the steps by which the animals are taught to understand what is wanted of them are best shown by reference to that article.

The smuggler in broad day walks across the frontier, his dog by his side, leaving the latter at the house of his accomplice and returning without him. When night falls, the dog is given a beating and turned loose to find his way home. Next he has a small packet fastened to his collar, and gradually the burden is increased. Then half a dozen or more are employed at the same time; the most intelligent being given no burden, that he may the more readily act as a scout for the others. He goes ahead, they keeping well back, till he gives them the signal that the coast is clear. The customs dog from its earliest years is made to play hide and seek with bags of coffee, rolls of lace, packages of tobacco, and the like. They do not bark, being taught to sit silently in ambush and give a low growl or simply cock up their ears and point the true direction of the advancing pack.

The French army dogs, mastiffs, like the smugglers' dogs, though first they must be taken from point to point to find them again, when they get to understand the idea, and what is wanted of them, will find a distant column or command with little difficulty if given the general direction, unless it be at too great a distance, and carry messages to and fro with commendable zeal.

"A POSSIBLE REVOLUTION IN MEDICINE."

Most people have read of the bacteria and of the discoveries concerning them made by Pasteur and Koch. The subject seems generally to be regarded as belonging to the doctors—an interesting phase of the progress of our time and something for students to sit up late over, but not directly interesting to lay minds. This seems to be a grave error, for, in a recent paper on "A Possible Revolution," Dr. Austin Flint says that by a knowledge of the bacteria nearly all human ills of a physical nature may be cured or prevented. Hence there is no secular subject that may fairly be looked upon as more engaging and timely. Slowly, but surely, there is working a revolution in the science and practice of medicine and surgery. He thinks a time will come when the cause will be known of every infectious disease; when they will be preventable, or having broken out, will be easily curable; and, best of all, when it will be possible for the intelligent physician to afford protection against all such diseases as scarlet fever, measles, yellow fever, whooping cough, etc.

Indeed, there need not be any epidemics, and even constitutional diseases will be curable if only the progress in the science of bacteriology should go on at the present rate, because, in a figure which the Doctor borrows from the French, "The higher one ascends, the further off seems the horizon." That is to say, the further we go in bacteriology, the greater appears the promise. In the last few years there has been a really remarkable advance, "an evolution of knowledge," the author calls it. There is "Pasteur's work with the fermentations, his discovery of the microbe which breeds in the silkworm a peculiar disease, and especially the isolation of the microbe of the carbuncular disease of sheep—which sometimes attacks man. These give a powerful impulse to the study of bacteriology." Koch's part in the bacteriological era would seem, from what our author says, to be somewhat similar to that of Ampere in electro-magnetism; he supplemented Pasteur's discovery, as Ampere did Oersted's.

Bacteria, which are now known to be vegetable and not animal growths, are to be found in large numbers in the intestines even of the most healthy, and it is in knowing the nature and habit of these that will enable the student to prevent their inroads when the condition of the system leaves it disarmed. Even now, so we are told, consumption can no longer be called incurable, fermentive indigestions are successfully treated by means of a class of remedies known as disinfectants. In many of the skin diseases is found an organism at work; in diphtheria the germs are at work in the mucous membrane. In both cases the physician now addresses himself particularly to dealing with these germs. Among the diseases in which, our author says, the presence of bacteria has already been surely traced, and their influence depressed or destroyed, to the relief or cure of the patient, are: Tuberculosis, diphtheria, typhoid fever, yellow fever, relapsing fever, the malarial fevers, certain catarrhs, tetanus, nearly all contagious and skin diseases.