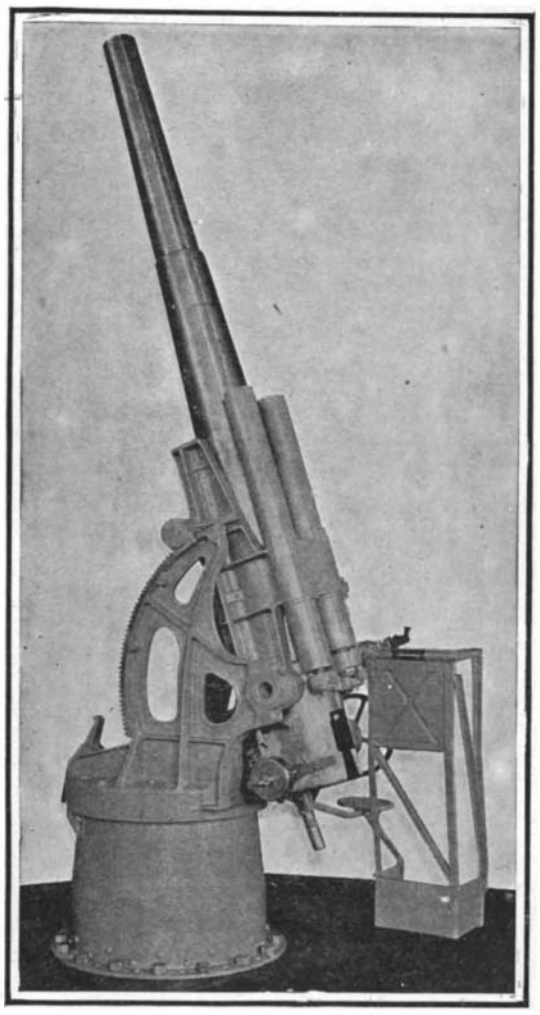
ARTILLERY FOR AIRSHIP ATTACK.

BY THE PARIS CORRESPONDENT OF THE SCIENTIFIC AMERICAN.

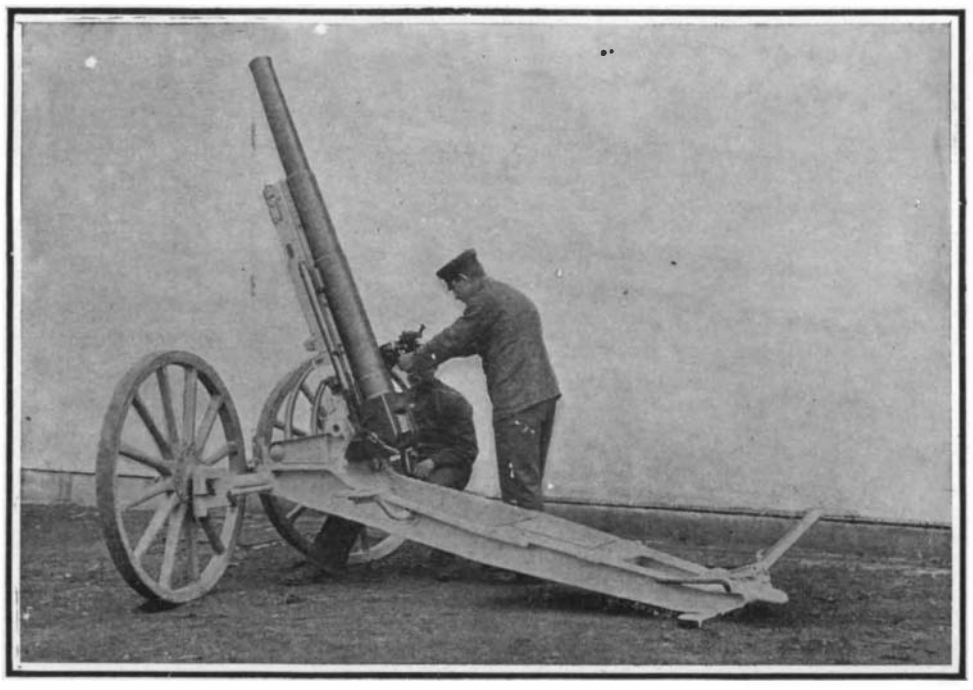
After having carefully studied the problem which is presented by the conditions of firing at great heights and at a large angle such as is required for use with airships, aeroplanes or balloons, the Krupp firm has brought out three general types of cannon, each of which is adapted for a special use. In the first place we have the more simple type of cannon with field mounting, while a second type is constructed with a view of being placed upon a motor car. For use on shipboard they design a third type which is represented in our engraving. In the second and third cases, the cannon is designed to be rapidly rotated in all directions by the use of a central pivot base such as is usually installed on vessels and for coast defense use. On the other hand, the field gun has its wheels arranged so as to turn upon pivots, which allows of placing the wheels in the crosswise direction in the position here shown. In order to give effective results it is found that the angle of elevation must be at least 70 degrees, and the field gun is designed to reach this angle. The automobile and ship cannon will, however, make a greater angle, the maximum being for these two types as high as 75 degrees. In all these cases a rapid rate of firing is given by an automatic opening and closing of the breech. The caliber has been reduced as much as possible, as also the weight of the projectile, while the long bore gives a high initial speed to the shot and diminishes the time required to attain the mark. Owing to the lessening of the caliber, greater lightness is obtained, and this is of service especially in the field and the automobile types of gun.

Sighting is carried out in the most efficient manner by the use of an appropriate form of sighting telescope in combination with a general finder which covers a wider range of field. There is also a range-finder by which the distance is first obtained, and afterward the indications are directly given so as to be able to point the gun for different heights of the airship without loss of time, and thus the use of firing tables is dispensed with in all these cases.

The question of the kind of shot which is best adapted for firing upon balloons or airships is of prime importance; and this matter has been made the object of a number of experiments. It is recognized that shrapnel will penetrate the balloon envelope, but without doing much damage at least of an immediate nature, seeing that the holes are closed again for the most part by the internal pressure of the gas, so that the loss of gas is not a rapid one and the airship is able to reach a place of safety in the majority of cases. It is found that the most effective form of projectile is a special kind of grenade, which is designed to explode in the interior of the balloon and to bring about ignition of the gas. The new projectile designed by the Krupp firm is intended to accomplish this, and at the same time the path of the projectile from the time it leaves the gun can be followed by the use of a special smoke producer carried on the shot. By observing the trail of smoke the gunner learns whether the shot comes near the mark. When the projectile leaves the gun, the smoke producer has been set working by an appropriate device. At night the path of the shot is still followed by the light which the smoke producer gives out. When it penetrates the envelope, a very sensitive device causes the detonation of the grenade.



The 4.2-inch Krupp gun for aeronantic attack, on a naval mount.



Bore, 2.6 inches; projectile, 9 pounds; velocity, 2050 f. s.; maximum range, 28,550 feet.

Field gun for airship attack.

In the case of the field cannon, which has a 6.5 centimeter bore (2.6 inches), the weight of the gun itself is 775 pounds and that of the chassis 1,150 pounds, making a total of 1,925 pounds for the cannon when prepared for actual service. The gun can be turned about through a complete circle, and has a maximum vertical angle of 70 degrees. The weight of the projectile for this type is 9 pounds. The initial speed of the shot is 2,050 feet per second. With the field gun it is possible to cover a maximum range of 28,550 feet, and a maximum height of 18,800 feet.

Of a heavier build than the former, and also of greater range, is the second type of gun of 7.5 centimeter (3 inch) caliber, which is designed to be mounted upon a heavy motor car, as we represent it in our engraving. Like the former, it is provided with hydraulic recoil brake, and in the present case there is used a middle pivot. For elevating and lowering the gun through the required range there is used a double-toothed sector which is driven by pinion and crank. A special arrangement is used for the rotation, by which a slow movement is obtained, but a quick rotation may also be given by a more rapid mechanism when it is needed to turn the gun rapidly into any desired position. It is to be noted that, owing to the high speed at which the airships move, such quick movements are one of the features which need to be especially designed in the case of guns for balloon firing. The weight of the gun itself, or 990 pounds, combined with the weight of the support, 1,550 pounds, gives a total weight of 2,540 pounds for this type of gun. We have here the maximum angle which is reached in the Krupp cannon, or 75 degrees. The weight of the projectile is 12 pounds, and the initial speed 2,060 feet per second. The maximum range is about 30,000 feet, and the greatest height about 20,000 feet. As regards the automobile car which is designed to take the present cannon, its total weight (exclusive of the gun) is 3½ tons, and it has an average speed of 30 miles an hour.

Owing to the fact that both axles are driving axles, with the use of the 50-horse-power motor the automobile car is able to travel over very difficult ground, and it easily mounts very steep grades. Under the front seat is a roomy chest which holds a good supply of tools and extra fittings, and special attention has been given to this point so that the car will not easily become disabled. To make the platform of the car as steady as possible during the firing, the platform

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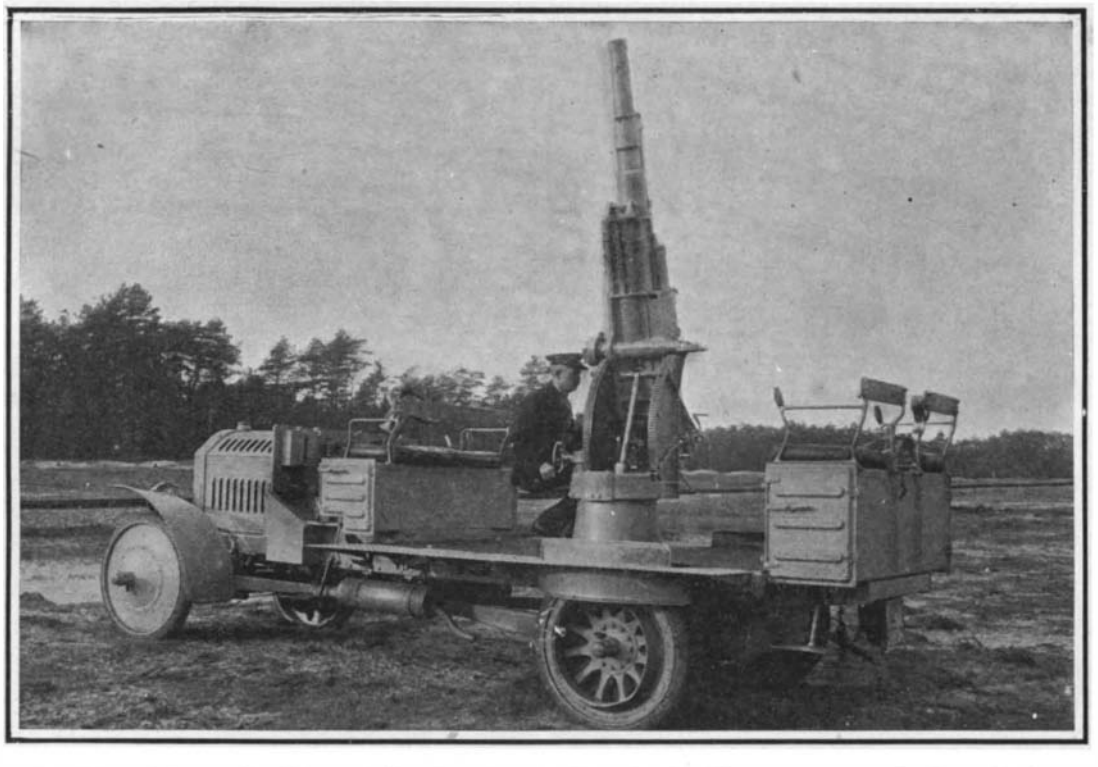
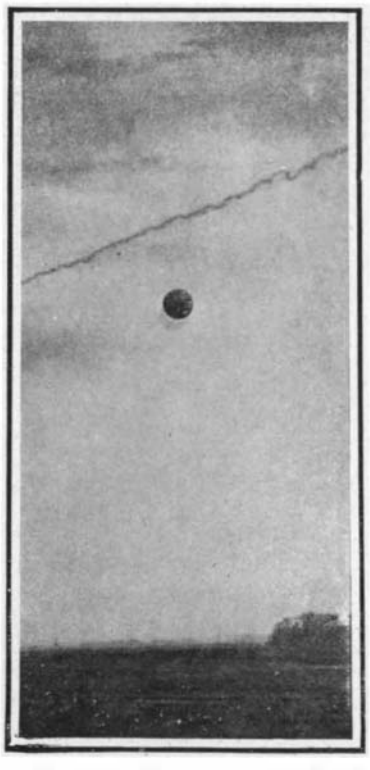
Destruction of a captive balloon by a special form of aeronautic grenade.



The 3-inch 12-pounder Krupp field piece for airship attack. The weapon can be brought to a maximum elevation of 75 degrees. The motor car on which it is mounted is of 50 horse-power and has an average speed of 30 miles an hour.



The projectile emits a train of smoke which marks the path of its flight.

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eighteen months, and containing the imbedded organs of fowls dead of spirochætosis, were lost, and thus a far-reaching investigation has been temporarily arrested, and it has not yet been possible to replace the material. Upon the receipt of the news of the catastrophe, Mr. Henry S. Wellcome, to whose munificence the Institution was due, immediately offered to replace the lost equipment; and through his generosity the laboratories were completely refitted and re-equipped with the most modern appliances, so that work could be resumed with the minimum delay. Consequently, so far as general usefulness goes, the Institution was only temporarily crippled.

Work is now again in full swing, and it should be pointed out that there is a very large field to be covered yet. If the various countries interested in the exploitation of the continent could establish similar laboratories to this in their respective territories, it would soon become a white man's land, and through concerted action the terrible maladies which at present arrest development would be completely subjugated.

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is clamped tight against the axles. The third type of cannon is of a much heavier build than the two which precede, seeing that in this case it is designed to be mounted on shipboard, and hence the weight does not need to be reduced as in the other cases. It is of a considerably larger caliber, this being 10.5 centimeters (4.2 inches). In most of the details it is designed on the same lines as the second type. It is intended to be mounted generally upon torpedo boats or swift cruisers, and naturally the gun can be brought into service as an ordinary cannon in cases where it is needed. For the gun proper, the weight is 3,080 pounds, while the support weighs 3,520 pounds, giving a total weight of 6,600 pounds for this type. Like the former, the angle of elevation is 75 degrees at a maximum. The projectile, weighing 40 pounds, has an initial speed of 2,300 feet per second. A horizontal range of 44,500 feet is reached in this case, and we have the unusual height of 37,620 feet.

The present types of gun were given a series of tests by firing upon captive balloons, and two of our engravings illustrate this feature. In one case we observe the balloon, which has not been hit by the shot, and this can be clearly seen by the trail of smoke which shows the path of the projectile. In the second view is represented the effect which takes place when the projectile strikes the balloon, and we have the detonation of the grenade and at the same time the explosion of the gas and the destruction of the balloon.

Alcohol vs. Gasoline Engines.

Almost any engine with a well-designed carbureter will run as well with alcohol as with gasoline, except for a difference in ease of starting and in certainty of operation at low speeds. By using alcohol in an alcohol engine with a high degree of compression the fuel-consumption rate in gallons per horse-power hour can be made practically the same as for gasoline in a gasoline engine of the same size and speed. An alcohol engine with the maximum compression for alcohol will have 30 per cent more available horse-power than a gasoline engine of the same size, stroke, and speed, and the weight per horse-power may be less. Tests with mixtures of gasoline and alcohol showed no gain in efficiency over gasoline or alcohol alone. Diluting gasoline with water did not affect fuel economy.

With alcohol the case was different, but with dilutions up to 80 per cent alcohol the effect was so slight that 80 per cent alcohol is a cheaper fuel than 90 per cent if it can be had for 15 per cent less.

Stamp mortar, M. P. Boss	939,208
Starting and separating gate, R. V. Jones	939,703
Steam generator, F. N. Tilton	939,759
Steam trap, Singer & Pratt	939,450
Steam trap, N. English	939,667
Steering gear, R. S. Riley	939,323
Stirrup, safety, J. L. James	939,697
Stoker for furnaces, mechanical, F. W. Seyboth	939,869
Stone cutting machine, W. F. Meyers	939,528
Stone fluting machine, G. N. Williams, Jr.	939,577
Store service credit system apparatus, C. F. Kettering	939,267
Stove, L. Moore	939,529
Stove, Choltus & Jeannesson	939,890
Superheater for use in connection with vulcanizers and other apparatus, J. Berliner	939,956
Surfacing machine, A. H. Whatley	939,363
Surfacing machine, F. R. Allen	939,373
Suspender check, F. B. Hawes	939,687
Suspenders, G. M. Edgarton	939,898
Suspending device, portable, C. F. Redman	939,318
Sweeping compound, Wolfgram & Klausman	939,369
Syringe or the like, C. P. Leyner	939,520
Syringe, vaginal, E. H. Keske	939,266
Table lock, extension, J. A. Barbrake	939,379
Talking machine, W. W. Wooster	939,781
Tape, T. P. Himes	939,839
Telegraph sending machine, J. A. Hulit	939,507
Telegraph system and apparatus, T. B. Dixon	939,401
Telegraph transmitter, B. F. Bellows	939,383
Telegraph transmitter, G. M. Goddard	939,683
Telemeter, H. Wild	939,366
Telemeter rod, C. E. Flanagan	939,489
Telephone attachment, H. R. Palmer	939,439
Telephone system, F. E. Summers	939,756
Temperature regulating apparatus, J. M. Pullen	939,858
Thermostat, H. G. Geissinger	939,957
Thread cop, A. N. Chartier	939,667
Thread cutting mechanism, filling, E. H. Ryon	939,445
Thread cutting tool, W. Murchey	939,735
Tie holder, A. A. Felix	939,678
Time lock, E. M. Benham	939,384
Tire antislipping attachment, M. J. Frambach	939,491
Tire, cushion, W. E. Marengo	939,524
Tire fastener, L. M. Nelson	939,619
Tire for vehicle wheels, elastic, B. M. de Sa	939,327
Tire, pneumatic, J. L. Maitland	939,428
Tire protector, F. R. & C. R. Colvin	939,474
Tire, resilient, W. H. Rowling	939,638
Tire, vehicle wheel, T. Midgley	939,610, 939,611
Tongue, draft, T. Pojar	939,547
Tonnage equating machine, J. M. Daly	939,222
Tool, F. H. Gruer	939,496
Tool, pneumatic, C. Christiansen	939,803
Toy, J. B. Bowman	939,586
Track sanding device, E. L. Larson	939,718
Track supporting device, overhead, Neller & Louden	939,618
Traction device, M. E. Schmidt	939,334
Train switch, electrically actuated, J. Y. Porter	939,626
Tramways, point operating mechanism for, T. N. Atkinson	939,939
Transmission mechanism, temperature controlled, H. H. Taylor	939,566
Trap, P. Elfstrom	939,818
Tripod, J. M. Pullen	939,850
Trolley head, T. R. Stam	939,564
Trolley head, J. J. Bennett	939,658
Trough. See Eaves trough.	
Trousers stretcher, E. N. Hallett	939,831
Truck, J. F. Fierke	939,406
Truck bolster, J. J. Byers	939,946
Truck, car, C. S. Shallenberger	939,870
Truck, hand, A. B. Kernel	939,600
Truck, lifting, A. A. Ake	939,783
Trucks, blocking device for, Lattneer & Robinson	939,518
Trunk, wardrobe, G. H. Wheary	939,575
Tube mill lining, G. H. Rotherham	939,637
Tube welding apparatus, Dicke & Klinkmann	939,591
Tubing, apparatus for making spiral, E. T. Greenfield	939,244
Turbine, C. A. Kaiser	939,514
Turbine, J. H. Felthousen	939,821
Turbine, internal combustion, gas, G. E. Doe	939,229
Twine making machine, C. Kieren	939,268
Twine, take-up, J. B. Eastman	939,233
Typewriter attachment, A. C. Kendrick	939,265
Typewriter carriage stop mechanism, M. B. Sargent	939,640
Typewriting machine, C. B. Yaw	939,579
Typewriting machine, E. E. Barney	939,583
Typewriting machine, A. T. Brown	939,587
Umbrella, folding, X. J. Zoller	939,842
Valve, T. J. Hendricks	939,499
Valve, J. L. Fitts	939,823
Valve, air, J. W. Ledoux	939,277
Valve device for corrosive liquids, W. H. Smith	939,927
Valve, regulating, B. Blumel	939,792
Vault closure, Myers & Poister	939,922
Vegetable cutter, Myers & Kahne	939,951
Vehicle body, E. W. Crosby	939,478
Vehicle wheel, L. Garnier	939,681
Vehicle wheel, T. Hubscher	939,695
Vehicle wheel, spring, E. Murray	939,432
Vehicles, fore carriage of, J. Schmitt	939,555
Vending machine, coin controlled, E. F. Spaulding	939,563
Violin, F. O. Fish	939,486
Vise, quick acting woodworking, W. Y. Mentzer	939,284
Voltaic high-current arcs, production of, H. Pauling	939,442
Voting machine, Stacy & Julius	939,755, 939,929
Voting machine counter construction, C. F. Currey	939,674
Vulcanizer, F. E. Smith	939,842
Wagon bed, C. B. Tillery	939,758
Wagon, dumping, J. Heberling	939,414
Wagon, dumping, T. Wright	939,782
Wall and constructing same, composite, J. H. Magdiel	939,726
Warp stop motion, electric, J. Regan	939,924
Washing machine, W. C. & L. R. Simmons	939,340
Washington machine gearing, A. Van Wormer	939,645
Water closet disinfecting devices, valve for, J. Kneen	939,424
Water gage, H. H. Vaage	939,673
Water heater, electric, Levy & Blanchard	939,605
Water meter, J. Hubmann	939,506
Web coating machine, W. A. Daniels	939,396
Weighing machine, W. W. Rosenfield	939,747
Wet machine, W. White	939,460
Wheels, manufacturing metal, G. Kowarsky	939,714
Whip socket, R. Habekost	939,246
Winding mechanism, self, Blodgett & Atkinson	939,791
Windmill tower, W. Hopper	939,504
Window operating mechanism, swinging, J. S. Gourlay	939,412
Window screen, H. B. Wilson	939,780
Wire reel and mounting therefor, F. P. Murphey	939,616
Wire splicer, I. G. Huston	939,509
Wire stretcher, J. F. Ball	939,787
Wood blight composition, J. W. Lafer	939,273
Woven fabric, T. B. Dorman	939,230
Wrench, E. C. & G. W. Rea	939,317
Wrench, D. Mallory	939,728
Wrench, P. Bartok	939,788
Wrench, L. G. Van Ormer	939,879
Yarn cleaner or slub catcher, G. W. Foster	939,490

A printed copy of the specification and drawing of any patent in the foregoing list, or any patent in print issued since 1863, will be furnished from this office for 10 cents, provided the name and number of the patent desired and the date be given. Address Munn & Co., Inc., 361 Broadway, New York.

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