

**Photographing Cannon Balls.**

(From the British Journal of Photography.)

Some months ago when on a visit to Woolwich Arsenal, we were shown by Mr. McKinlay, Proof Master, some photographs taken of guns while being fired, which not unnaturally excited feelings of surprise. So rapid had been the exposure, and so well had the proper moment for the exposure been seized, that the projectile could be seen protruding from the cannon's mouth while in the act of proceeding on its distant mission. Mr. McKinlay kindly afforded us every requisite information relative to his invention for securing such wonderful results; and, from the fact that the comparative efficiency of certain kinds of small-arms and the influence they are now exercising in European affairs are at present receiving a large share of public attention, we think that it may not prove uninteresting to bring before our readers some matters of scientific interest in connection with our own "great guns," and the means employed for ascertaining by photography, and with the utmost possible precision, not only the path of a projectile in the air, but the time occupied in its progress between two or more points anywhere in the course of its flight. It will be obvious that when it is desired to obtain a photograph of a gun at the moment of discharge, the gun itself must be made subservient to the exposing and covering of the sensitive plate. It is impossible that any person, however delicate his eyes and ears may be, can operate so dexterously as to stop the exposure when the ball has been projected, say a few inches from the muzzle of the gun, and when it is consequently traveling at its greatest velocity. This can only be accomplished by automatic arrangements, aided by electricity.

Let us now suppose that a stereoscopic camera, fitted with powerful lenses of short focus, has a thin, light disk fitted up in front of the lenses, revolving on an axis between the two lenses. Two holes in this disk correspond with the apertures of the lenses, so that if a circular spring—like that of a pair of snuffers—cause the disk to make half a revolution with great rapidity, the holes or apertures will, when flashing past the apertures of the lenses, admit the light for an exceedingly brief period of time. This is the means employed in the Arsenal for effecting the exposure of the plate.

We shall now enter into the details of the manner of discharging and arresting the circular exposing diaphragm. The opening and shutting of the camera at the precise instant of time is, as we have said, by far too nice an operation to be accomplished by hand. It must be borne in mind that a gun commences to recoil as soon as the projectile is fairly clear of its muzzle. The picture which we examined had been taken when the projectile was yet emerging from the gun's mouth, and before it had got quite clear of it, and consequently before the recoil of the gun had commenced. The exposure was very rapid, but not so much so as to show the front edge of the emerging projectile with a sharp outline. Although the gun, from the recoil not having commenced, was quite sharp, the front edge of the projectile, was, so to speak, vignetted.

The gun is fired by means of the galvanic tube invented by Mr. McKinlay, and such as is used in proving ordnance. Inside of this there is a small platinum wire, which, when a current of electricity is passed through it, instantly becomes red hot and melts. Let us now see how this affects the operation of photographing the gun. When the gun is ready for firing, the disk in front of the lenses is wound up so that the rotating force of the spring in the center is at its maximum. It is retained in this position by means of a catch and trigger, the latter of which is operated on by means of an electro-magnet. The following, then, is what takes place: When the galvanic current is sent through the wire, the fine platinum wire imbedded among the gun powder of the discharging tube or fuse immediately becomes red-hot and melts. But while in progress of melting, it accomplishes two things—it transmits a current through it by which the electro-magnet becomes vivified and pulls the discharging trigger of the disk in front of the camera lenses; and secondly, it ignites the gunpowder and discharges the gun. But were this all, the exposure would be made before the powder had had time to ignite and consequently dis-

charge the gun; hence it is important that the lenses be kept open until the gun really discharges its contents. The means for effecting this are as simple as they are ingenious and complete. When the trigger acts so as to release the disk from its enforced pent-up condition, it is propelled forward by the central spring until the apertures in the disk and those of the lenses coincide, where, by means of a stop, the disk is retained until the powder is ignited and the gun discharged, when, the platinum wire being ruptured, the passage of the electricity is stopped, the electro-magnet simultaneously losing the power by which it was enabled to arrest the rotatory progress of the disk, which thus darts forward and closes up the camera as the contents of the gun are in the act of being ejected from it.

**Developing Heat.**

MESSRS. EDITORS:—I see in your foreign correspondence, on page 98, current volume of the SCIENTIFIC AMERICAN that Mr. B. Stewart, at Kew, is conducting some new experiments for developing heat by rotating a disk in vacuo, and that this heat arises from causes unknown. Allow me to observe that this experiment is only a modification of the experiments of Arago, who rotates a disk under a compass needle, and so produces currents in the disk, which react on the needle, and Foucault, who turns a disk between the poles of an electro-magnet, and thus develops currents which strongly heat the disk.

In every rapidly-turned metallic disk, electric currents are induced by the influence of the earth's magnetism, and these currents will necessarily heat the disk. When the magnetic influence is weak, as is the case with the earth, the currents are weak, and the heat developed will be so slight, that it takes a thermo-electric pile to observe the rise of temperature. As the friction and disturbance of the surrounding air may produce much more heat, the disk is placed in vacuo in order to eliminate this influence, but when trying to neutralize the earth's magnetism by an opposing steel magnet, placed at a certain distance, we may neutralize the earth's action on the compass needle placed at a certain point, but the opposing neutralizing currents will be still there, and show their action in any moving metallic mass, by inducing electric currents, of which the existence is proved by the consequent rise of temperature. P. H. VANDER WEYDE, M. D.

Philadelphia, Aug. 10, 1866.

**Fleas and Mosquitoes.**

MESSRS. EDITORS:—In an article on page 82, current volume of the SCIENTIFIC AMERICAN, you state that oil or essence of pennyroyal is believed to be a specific against the attack of fleas. I have always used it when fleas were in my bed or about my clothing, and found that it would banish them entirely, and am now using it with equal success to banish mosquitoes; they will not come near where it is. W. N. TAYLOR.

**Steam Fire Engines.**

MESSRS. EDITORS:—If any of your readers can give the greatest performance of an American steam fire engine, replies upon the following points are solicited:—Diameter of steam cylinder; stroke of do.; pressure of steam; diameter of water cylinder; pressure; number of strokes per minute; length of hose through which one stream was projected; diameter of nozzle and distance of projection. Length of hose of 100 feet is preferred. C. H. H.

New York, Aug. 10, 1866.

**Preserving Green Peas.**

MESSRS. EDITORS:—In answer to the inquiry concerning green peas, on page 69, current volume, I give the following:—

I have found that, by gathering peas when young, and in the best condition for immediate use, then podding and scalding, and drying thoroughly in the sun or oven, they will keep almost any length of time done up in paper bags. When wanted for use, soak them in mint tea until they swell again to their natural size. J. H. D.

**AGRICULTURAL EXHIBITIONS.**

Notwithstanding our best endeavors, we have not succeeded in procuring so complete a list of prominent fairs as we desired. We give a selection from the list we have.

The New England Agricultural Society and the Vermont State Society will hold a joint exhibition at Brattleboro, Vt., on the 4th, 5th, 6th and 7th days of September. The Agricultural and Mechanical Association of St. Louis will open an exhibition in that city Oct. 1st, to continue six days. The premiums amount, in the aggregate, to over \$20,000.

STATE FAIRS.—American Pomological, St. Louis, Sept. 4; Canada West, Toronto, Sept. 24, 28; Illinois, Chicago, Sept. 24, 29; Indiana, Indianapolis, Oct. 1, 5; Iowa, Burlington, Sept. 18, 21; Kansas, Lawrence, Oct. 2, 5; Kentucky, Paris, Oct. 2, 5; Michigan, Adrian, Sept. 13, 16; Minnesota, Rochester, Oct. 3, 5; New Hampshire, Nashua, Sept. 19, 20; New York, Saratoga, Sept. 11, 14; Ohio, Dayton, Sept. 25, 28; Pennsylvania, Easton, Sept. 25, 27; Wisconsin, Janesville, Sept. 25, 28.

NEW YORK.—State and County:—Albany, Albany, Sept. 25, 28; Genesee, Batavia, Sept. 19, 20; "International," Rouse's Point, Sept. 18, 19.

MASSACHUSETTS.—State and County:—Bristol, Taunton, Oct. 2; Berkshire, Pittsfield, Oct. 2; Essex, Haverhill, Sept. 25; Hampshire, Franklin and Hampden, Northampton, Oct. 4; Hampden, Springfield, Oct. 2; Middlesex, Concord, Sept. 20; Norfolk, Dedham, Sept. 27; Plymouth, Bridgewater, Sept. 27.

NEW JERSEY.—State and County:—Monmouth, Freehold, Sept. 19, 20; Morris, Morristown, Sept. 11, 14.

PENNSYLVANIA.—State and County:—Bucks, Newtown, Sept. 25, 26; Chester, West Chester, Sept. 27, 29.

KENTUCKY.—State and County:—Warren, Bowling Green, Sept. 18, 20.

MICHIGAN.—State and County:—Jackson, Jackson, Sept. 26, 28.

ILLINOIS.—State and County:—Cass, Virginia, Sept. 4, 6; Peoria, Peoria, Sept. 19, 21.

WISCONSIN.—State and County:—Brown, Green Bay, Sept. 26, 27; Horse Show, Milwaukee, Sept. 11, 13.

IOWA.—State and County:—Cerro Gordo, Mason, Sept. 20, 21.

**THE MARKETS.**

Although there are many complaints of the general dullness in business, and there are no very encouraging signs of an early fall trade, yet prices are well sustained, and money is plenty and obtainable at low rates. The new tariff law, which went into operation Aug. 10th, has tended to enhance the prices of such imported articles as were subjected to a higher rate of duties. Reports of a damaged crop of cereals have not had the effect to stimulate speculation to any great extent, notwithstanding the facility of obtaining money. This is probably owing to the manifest unreliability of these reports; as it is morally certain the crop will be an unusually large one: at least, whatever occasional failure there may be in the wheat crop, induced by local causes, will be more than counterbalanced by the excess in the corn yield. The unsettled state of European affairs still threatens the peace of that continent, and although the European crop reports are generally favorable, we believe the demand for American grain will be large.

GOLD.—Has held firmly at about 149. Exchange is dull and the rates in favor of the buyer. Money is obtained on call at 4@5 1/2 cent. Discount at about 6 3/4 cent.

ASHES.—Pots are quite dull, but with continued light receipts, market steady; the small size 30 bbls. at \$5 3/4@5 5/8. Pearls are nominal; we hear of no business.

BRICKS.—Common Hard have advanced to \$12. Croton and Philadelphia are unchanged at \$14@15 for the former, and \$40 for the latter.

COFFEE.—Rio held firm. No disposition to sell. St. Domingo, 11 1/2c., in bond, and Costa Rica at 17 1/2; both good.

COPPER.—Detroit, 31@31 1/2; Portage Lake, 31.

COTTON.—Market depressed. Prices have declined from 20@4c. Ordinary, 25@28; middling, 33@37c.

FLOUR.—Slight advance. Common brands, \$3 55@3 85; Genesee extra, \$10 25@12 50; Canada not in demand.

MEAL.—Dull.

GRAIN.—Wheat advanced slightly. Milwaukee, \$2 20@2 23 1/2 Amber, \$3 75; North Carolina Red, \$2 86. No exports. Rye, Western, 82c; Corn, 80@81c; Western Mixed, \$1; Oats declined to 30@44 Chicago; 45@47 Milwaukee; 57 Delaware.

IRON.—Market inactive. No. 1 American pig \$47@48. Scotch, \$47@50. Bar and scrap very quiet.

LATHES.—Are firm, with sales of Eastern, at \$4, three months.

LEAD.—Pig is in better demand, and, though prices are without quotable change, the market is firmer. In sellers' favor; the transactions are 300 tons Spanish at \$6 75; 50 do., English (Cookson's), \$7, all gold. Bar, Sheet, and Pipe may be quoted steady at 10 1/2c., cash.

LEATHER.—The market for Hemlock Sole continues dull, and prices are very firm. We quote Rio Grande and Buenos Ayres Light Weights, 33@34 cents; Middle do., 35@36; Heavy do., 36@37; California Light, 31@32; Middle do., 32 1/2@34 1/2; Heavy do., 34@35; Orinoco, &c., Light, 31@32; Middle do., 32@34; Heavy do., 29@32; Slaughter Upper in Rough, 31@33. Oak Sole is in tight stock, and the market is firm. French and American Calf Skins are firm with a fair demand.

LIME.—Rockland is in good demand. Common at \$1 50; Lump is nominal at \$2 00, cash. Rosendal Cement, \$1 75, cash.

LUMBER.—There is an active demand for Eastern Spruce, with sales at \$26, usual terms.

MOLASSES.—There has again been a more active demand for the low and medium grades Cuba, a considerable portion of which, we learn, is to pass into the hands of distillers. The operations, including two or three cargoes to arrive coastwise, are 1,704 hds. and 84 tcs. Clayed Cuba, at 42@44c.; 480 hds., 10 tcs., and 131 bbls. low grade Cuba Muscovado, 48c.; 434 hds. do., 52@55; 197 hds. and 23 tcs. English Island, 50; 65 hds. Porto Rico, 60@70, 4 mos. the lower price for fair; and 450 hds. and 75 tcs. Centrifugal Cuba, on terms not mentioned.

NAILS.—Cut are very firm and scarce, with a tendency to advance; some sizes are scarce, and for these 1/2 cent. more is paid. We quote: Cut, 6 1/2@7 cents; Clinch, 8 1/2; Forged Horse, 52 Pressed do., 22@24; Copper, 50; Yellow Metal, 33; Zinc, 20; and Wrought Ship and Boat Spikes, 7@8 cents, as to sizes, net cash.

SUGAR.—Prices have favored sellers, and we have to notice an advance of 1/4 of a cent #10 on Refining grades, bringing Fair Refining Cuba to 10 1/2@10 3/4 cents; Good, do., to 11@11 1/2; and No. 12 Box to 11 1/2@11 3/4, 4 mos. Grocery grades are without particular change, but are the turn dearer. Refined continues in good demand, but less active than before. Messrs. Stuart quote their best Crushed, Granulated, and Ground, 16 1/2 cents; White A, 16 1/2; and Yellow C, 15 1/2—the range of other manufacture is 16 1/2@17 cents for Hard; 15 1/2@16 1/2 for Soft White (B and A only), and 14@15 1/2 for Yellow.

WIRE.—Telegraph, 9c. @10c. for Nos. 7 and 11, and for hoop skirt, 55c. for No. 18 covered, and 55c. for uncovered.

WOOL.—Market unsettled. Western Fleeces at 48@50c. for low grades, 55 for ordinary, and 65@72 1/2 for choice—the latter price for Ohio picklock; super and extra pulled, 53@65 short staple at 35; Texas, 15@18 for inferior, 20@24 for ordinary, and 25@30 for superior.

ZINC.—9 1/2c. less 4 per cent. for gold; 13 1/2c., currency, for Lehigh.